

Chapter 1
Appendix 1-A

SVBGSA Joint Exercise of Powers Agreement

JOINT EXERCISE OF POWERS AGREEMENT

establishing the

SALINAS VALLEY BASIN GROUNDWATER

SUSTAINABILITY AGENCY

JOINT EXERCISE OF POWERS AGREEMENT

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SALINAS VALLEY BASIN GROUNDWATER SUSTAINABILITY AGENCY

THIS JOINT EXERCISE OF POWERS AGREEMENT (“Agreement”) establishing the Salinas Valley Basin Groundwater Sustainability Agency (“Agency”) is made and entered into as of 12/22/16 (“Effective Date”), by and among the public agencies listed on the attached Exhibit “A” (collectively “Members” and individually “Member”) for the purpose of forming a Groundwater Sustainable Agency (“GSA”) and achieving groundwater sustainability in the Salinas Valley Groundwater Basin.

RECITALS

WHEREAS, in the fall of 2014 the California legislature adopted, and the Governor signed into law, three bills (SB 1168, AB 1739, and SB 1319) collectively referred to as the “Sustainable Groundwater Management Act” (“SGMA”), that initially became effective on January 1, 2015, and that has been amended from time-to-time thereafter; and

WHEREAS, the stated purpose of SGMA, as set forth in California Water Code section 10720.1, is to provide for the sustainable management of groundwater basins at a local level by providing local groundwater agencies with the authority, and technical and financial assistance necessary, to sustainably manage groundwater; and

WHEREAS, SGMA requires the designation of Groundwater Sustainability Agencies (“GSAs”) for the purpose of achieving groundwater sustainability through the adoption and implementation of Groundwater Sustainability Plans (“GSPs”) or an alternative plan for all medium and high priority basins as designated by the California Department of Water Resources; and

WHEREAS, SGMA requires that the Basin have a designated GSA by no later than June 30, 2017, and an adopted GSP by no later than January 31, 2020, if a high or medium priority basin in critical overdraft, and no later than January 31, 2022, if a high or medium priority basin; and

WHEREAS, SGMA authorizes a combination of local agencies to form a GSA by entering into a joint powers agreement as authorized by the Joint Exercise of Powers Act (Chapter 5 of Division 7 of Title 1 of the California Government Code) (“Act”); and

WHEREAS, each Member is a local agency, as defined by SGMA, within that portion of the Salinas Valley Groundwater Basin (“Basin” and as more fully described below) within Monterey County, which is designated basin number 3-004 in Department of Water Resources Bulletin No. 118 (update 2016), and consisting of seven sub-basins plus that portion of the Paso Robles sub-basin within Monterey County (but not including the adjudicated portion of the

Seaside sub-basin), each of which is designated as either a high or medium priority basin, and one of which (the 180/400 ft. aquifer) is designated in critical overdraft; and

WHEREAS, the Members are therefore authorized to create the Agency for the purpose of jointly exercising those powers granted by the Act, SGMA, and any additional powers which are common among them; and

WHEREAS, the Members, individually and collectively, have the goal of cost effective sustainable groundwater management that considers the interests and concerns of all beneficial uses and users of groundwater within and adjacent to the Basin; and

WHEREAS, the Members hereby enter into this Agreement to establish the Agency to serve as a GSA for the Basin and undertake the management of groundwater resources pursuant to SGMA; and

WHEREAS, the Members intend to cooperate with adjacent GSAs such as any GSA formed over a portion of the Paso Robles sub-basin (3-04.06) within San Luis Obispo County, and the Pajaro Valley Water Management Agency; and

WHEREAS, the Members intend to study the potential for state legislation to, among other amendments, amend the WRA Act to modify the governance structure of the WRA in a form similar to the governance of the Agency established herein and to establish that agency as the statutorily designated GSA for the Basin, or establish a new entity to be so designated;

NOW THEREFORE,

In consideration of the matters recited and the mutual promises, covenants, and conditions set forth in this Agreement, the Members hereby agree as follows:

Article I: Definitions

Section 1.1 – Definitions.

As used in this Agreement, unless the context requires otherwise, the meaning of the terms hereinafter set forth shall be as follows:

(a) “Act” means the Joint Exercise of Powers Act, set forth in Chapter 5 of Division 7 of Title 1 of the California Government Code, sections 6500, *et seq.*, as may be amended from time-to-time.

(b) “Agreement” means this Joint Exercise of Powers Agreement establishing the Salinas Valley Basin Groundwater Sustainability Agency.

(c) “Agency” means the Salinas Valley Basin Groundwater Sustainability Agency, which is a separate entity created by this Agreement pursuant to the provisions of the Act and SGMA.

(d) "Agricultural Directors" means the four Directors representing agricultural interests, as more fully set forth in rows (f) – (i) of Exhibit B of this Agreement.

(e) "Agricultural Association" means the Salinas Basin Agricultural Water Association.

(f) "Alternate Director" means an Alternate Director appointed pursuant to Section 6.6 of this Agreement.

(g) "Appointing Authority" means the entity authorized to appoint Primary and Alternate Directors pursuant to Sections 6.2, 6.3 and 6.6 of this Agreement and as identified in Exhibit B to this Agreement.

(h) "Basin" means that portion of the Salinas Valley Groundwater Basin, newly designated no. 3-004 in the Department of Water Resources' Bulletin No. 118 (update 2016), within the County of Monterey and that includes the following sub-basins: 1) 180/400 Foot Aquifer (No. 3-004.01); 2) East Side Aquifer (3-004.02); 3) Forebay Aquifer (3-004.04); 4) Upper Valley Aquifer (3-004.05); 5) Langley Area (3-004.09); 7) the newly designated Monterey sub-basin (3-004.10); and, 8) the portion of the Paso Robles Area (3-004.06) in Monterey County; but not including that portion of the Seaside Area that has been adjudicated, all as their boundaries may be modified from time to time through the procedures described in California Water Code section 10722.2 or by the Department of Water Resources under its separate authority, and not including any other area for which a GSA has been established pursuant to SGMA.

(i) "Board of Directors" or "Board" means the governing body of the Agency as established by Section 6.1 of this Agreement.

(j) "Brown Act" means the California Open Meeting Law, Government Code section 54950 *et seq.*

(k) "Bylaws" means the bylaws adopted by the Board of Directors pursuant to Section 6.8 of this Agreement to govern the day-to-day operations of the Agency.

(l) "Cause" means a conviction of a crime i) of moral turpitude, or ii) involving fraud, misrepresentation, or financial mismanagement, or iii) a finding by an administrative body or agency, or a court of law, that the person has violated any conflict of interest provision of federal, state or local law.

(m) "City Selection sub-Committee" means a subcommittee of the Monterey County City Selection Committee, established by Government Code section 50270 *et seq.*, and consisting of the mayors of the following cities: Gonzales, Soledad, Greenfield, and King City.

(n) "County" means the County of Monterey.

(o) "CPUC" means the California Public Utilities Commission.

(p) "CPUC Regulated Water Company" means an investor owned water company operating in the Basin that has been granted a certificate of public convenience and necessity by the CPUC and is regulated by the CPUC.

(q) "Determination Date" means the date on which the Agency votes to notify the State of its intent to become a GSA as provided in Water Code sections 10723 (a) and (b).

(r) "Director" or "Directors" means Primary and Alternate Directors as set forth in Section 6.6 of this Agreement.

(s) "Director Position(s)" means those eleven Board positions, singularly or plural, established pursuant to Section 6.1 of this Agreement.

(t) "Disadvantaged Community" means a disadvantaged community or economically distressed area as those terms are defined in Water Code section 79702 (as may be amended from time-to-time) within the Basin.

(u) "Effective Date" means the date by which two Members have executed this Agreement which date shall be set forth in the introductory paragraph of this Agreement.

(v) "Fiscal Year" means that period of 12 months beginning July 1 and ending June 30 of each calendar year.

(w) "Groundwater Sustainability Agency" or "GSA" has the meaning set forth in California Water Code section 10721(j).

(x) "Groundwater Sustainability Plan" or "GSP" has the meaning set forth in California Water Code section 10721(k).

(y) "GSA Eligible Entity or Entities" means those entities eligible to become a GSA pursuant to SGMA.

(z) "Initial Board" means the initial Board of Directors established pursuant to Section 6.2, below.

(aa) "Initial Contribution" means the required contribution of Members as set forth in Section 10.4 of this Agreement.

(bb) "Local Agency" or "Local Agencies" has the meaning set forth in California Water Code Section 10721(n).

(cc) "Local small water system" means a system for the provision of piped water for human consumption that serves at least two, but not more than four, service connections, including any collection, treatment, storage, and distribution facilities under control of the operator of such system which are used primarily in connection with such system, and any collection or pretreatment storage facilities not under the control of the operator which are used primarily in connection with such system; it does not include two or more service connections,

which supply dwelling units occupied by members of the same family, on one parcel, all as set forth in Monterey County Code section 15.04.020 (g).

(dd) "Majority Vote" means the affirmative vote of six Directors then present and voting at a meeting of the Board.

(ee) "Member" or "Members" means the GSA Eligible Entities listed in the attached Exhibit "A" that have executed this Agreement, including any new Members that may subsequently join this Agency with the authorization of the Board, pursuant to Section 5.2 of this Agreement.

(ff) "Mutual Water Company" has the meaning set forth in Corporations Code section 14300.

(gg) "Permanent Board" means the permanent Board of Directors established pursuant to Section 6.3 of this Agreement.

(hh) "Permanent Director" means a Director appointed to the Permanent Board.

(ii) "Permanent Director Position" means a Director Position on the Permanent Board.

(jj) "Primary Director" means a Primary Director appointed pursuant to Sections 6.4 of this Agreement.

(kk) "Public Water System" means a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. A public water system includes the following: (1) Any collection, treatment, storage, and distribution facilities under control of the operator of the system that are used primarily in connection with the system, (2) Any collection or pretreatment storage facilities not under the control of the operator that are used primarily in connection with the system, or (3) Any water system that treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption, all as set forth in Health and Safety Code section 116275 (h).

(ll) "South County Cities" means the cities of Gonzales, Soledad, Greenfield and King City.

(mm) "State" means the State of California.

(nn) "State Small Water System" means a system for the provision of piped water to the public for human consumption that serves at least five, but not more than 14, service connections and does not regularly serve drinking water to more than an average of 25 individuals daily for more than 60 days out of the year, as set forth in California Health and Safety Code section 116275 (n).

(oo) “Super Majority Vote” means the affirmative vote of eight Directors then present and voting at a meeting of the Board.

(pp) “Super Majority Plus Vote” means the affirmative vote of eight Directors then present and voting at a meeting of the Board but including the affirmative vote of three of the Agricultural Directors.

(qq) “Sustainable Groundwater Management Act” or “SGMA” means the comprehensive groundwater legislation collectively enacted and referred to as the “Sustainable Groundwater Management Act” as codified in California Water Code Sections 10720 *et seq.* and as may be amended from time-to-time.

(rr) “WRA” means the Water Resources Agency of the County of Monterey.

Unless otherwise indicated, all statutory references are to the statutory codes of the State.

Article II: The Agency

Section 2.1 – Agency Established.

There is hereby established a joint powers agency known as the Salinas Valley Basin Groundwater Sustainability Agency. The Agency shall be, to the extent provided by law, a public entity separate from the Members of this Agreement.

Section 2.2 – Purpose Of The Agency.

The purpose of Agency is to cooperatively carry out the requirements of SGMA including, but not limited to, serving as the GSA for the Basin and developing, adopting and implementing a GSP that achieves groundwater sustainability in the Basin, all through the exercise of powers granted to a GSA by SGMA and those powers common to the members as provided in the Act.

Article III: Term

Section 3.1 – Term.

This Agreement shall become operative on the Effective Date. Subject to the terms of Sections 11.6, 11.7 and 11.8, below, this Agreement shall remain in effect unless terminated pursuant to Section 11.10, below.

Article IV: Powers

Section 4.1 – Powers.

The Agency shall possess the ability to exercise those powers specifically granted by the Act, SGMA, and the common powers of its Members related to the purposes of the Agency, including, but not limited to, the following:

- a) To designate itself the GSA for the Basin pursuant to SGMA.
- b) To adopt rules, regulations, policies, bylaws and procedures governing the operation of the Agency and the adoption and implementation of the GSP.
- c) To develop, adopt and implement a GSP for the Basin pursuant to SGMA.
- d) To retain or employ consultants, advisors, independent contractors, agents and employees.
- e) To obtain legal, financial, accounting, technical, engineering, and other services needed to carry out the purposes of this Agreement.
- f) To conduct studies, collect and monitor all data related and beneficial to the development, adoption and implementation of the GSP for the Basin.
- g) To perform periodic reviews of the GSP including submittal of annual reports.
- h) To register and monitor wells.
- i) To issue revenue bonds or other appropriate public or private debt and incur debts, liabilities or obligations.
- j) To levy taxes, assessments, charges and fees as provided in SGMA or as otherwise provided by law.
- k) To regulate and monitor groundwater extractions as permitted by SGMA, provided that this provision does not extend to a Member's operation of its system to distribute water once extracted or otherwise obtained, unless and to the extent required by other laws now in existence or as may otherwise be adopted.
- l) To establish and administer projects and programs for the benefit of the Basin.
- m) To cooperate, act in conjunction, and contract with the United States, the State, or any agency thereof, counties, municipalities, special districts, groundwater sustainability agencies, public and private corporations of any kind (including without limitation, investor-owned utilities), and individuals, or any of them, for any and all purposes necessary or convenient for the full exercise of the powers of the Agency.

n) To accumulate operating and reserve funds and invest the same as allowed by law for the purposes of the Agency.

o) To apply for and accept grants, contributions, donations and loans under any federal, state or local programs for assistance in developing or implementing any of its projects or programs in connection with any project undertaken in the Agency's name for the purposes of the Agency.

p) To acquire by negotiation, lease, purchase, construct, hold, manage, maintain, operate and dispose of any buildings, property, water rights, works or improvements within and without the respective jurisdictional boundaries of the Members necessary to accomplish the purposes describe herein.

q) To sue or be sued in its own name.

r) To invest funds as allowed by law.

s) Any additional powers conferred under SGMA or the Act, or under applicable law, insofar as such powers are needed to accomplish the purposes of SGMA, including all powers granted to the Agency under Article 4 of the Act which are in addition to the common powers of the Members, including the power to issue bonds or otherwise incur debts, liabilities or obligations to the extent authorized by the Act or any other applicable provision of law and to pledge any property or revenues of the rights thereto as security for such bonds and other indebtedness.

t) Any power necessary or incidental to the foregoing powers in the manner and according to the procedures provided for under the law applicable to the Members to this Agreement and to perform all other acts necessary or proper to fully carry out the purposes of this Agreement.

Section 4.2 – Exercise Of Powers.

In accordance with Section 6509 of the Act, the foregoing powers shall be subject to the restrictions upon the manner of exercising such powers pertaining to the County.

Section 4.3 – Water Rights And Consideration Of All Beneficial Uses And Users Of Groundwater In The Basin.

As set forth in Water Code section 10723.2 the GSA shall consider the interests of all beneficial uses and users of groundwater in the Basin, as well as those responsible for implementing the GSP. Additionally, as set forth in Water Code section 10720.5(a) any GSP adopted pursuant to this Agreement shall be consistent with Section 2 of Article X of the California Constitution and nothing in this Agreement modifies the rights or priorities to use or store groundwater consistent with Section 2 of Article X of the California Constitution, with the exception that no extraction of groundwater between January 1, 2015 and the date the GSP is adopted may be used as evidence of, or to establish or defend against, any claim of prescription. Likewise, as set forth in Water Code section 10720.5(b) nothing in this Agreement or any GSP

adopted pursuant to this Agreement determines or alters surface water rights or groundwater rights under common law or any provision of law that determines or grants surface water rights.

Section 4.4 – Preservation Of Police Powers.

Nothing set forth in this Agreement shall be deemed to modify or otherwise limit a Member's police powers in any way, or any authority to regulate groundwater under existing law or any amendment thereto.

Article V: Membership

Section 5.1 – Members.

The Members of the Agency shall be the entities listed on the attached Exhibit A so long as their membership has not been withdrawn or terminated pursuant to the provisions of Article XI of this Agreement. GSA Eligible Entities shall have until the Determination Date to execute this Agreement and pay their Initial Contribution, and become Members. Any GSA Eligible Entity that has not executed this Agreement and paid their Initial Contribution by the Determination Date shall be subject to the process described in Section 5.2, below, to become a Member.

Section 5.2 – New Members.

New Members may be added to the Agency by the unanimous vote of all other Members so long as: 1) the new Member is a GSA Eligible Entity; and, 2) the new Member agrees to or has met any other conditions that the existing Members may establish from time-to-time.

Once an application is approved unanimously by the existing Members the attached Exhibit A shall be amended to reflect the new Member.

Article VI: Directors And Officers

Section 6.1 – Board Of Directors.

The Agency shall be governed and administered by an eleven (11) member Board of Directors which is hereby established. All voting power of the Agency shall reside in the Board.

Section 6.2 – Initial Board of Directors.

An Initial Board shall be composed of the Director Positions with the qualifications and Appointing Authority as described in Exhibit B. The nominating groups identified in Section 6.5, below, may, but are not required to, provide nominations to the relevant Appointing Authority for the Initial Board; however, any such nomination must be received by the respective Appointing Authority no later than January 31, 2017. If such nominations are received no later than the time specified the Appointing Authorities shall follow the respective procedures for

appointment to the Permanent Board set forth in Section 6.5, below. If such nominations are not received by the time specified, the Appointing Authority may make appointments to the Initial Board as it determines in its sole discretion.

The Initial Board shall serve only until September 30, 2017, at which time a Permanent Board shall be appointed as described below.

Section 6.3 – Permanent Board.

Subject to the Appointment and Nominating procedures set forth in Section 6.5, below, beginning on October 1, 2017, a Permanent Board shall be established consisting of the Director Positions with the qualifications and Appointing Authority as described in Exhibit B. With the exception of the CPUC Regulated Water Company Director Position, each Permanent Director Position shall have a term consisting of three (3) years and shall hold office until their successor is appointed by their Appointing Authority and the Agency has been notified of the succession. The terms of Permanent Director Positions shall be staggered, with Director Positions identified in rows (a), (c), (f), (h) and (j) of exhibit C serving three (3) year terms from initial appointment, and those identified in rows (b), (d), (g), (i), and (k) serving two (2) year terms from initial appointment, and thereafter serving three (3) year terms. The CPUC Regulated Water Company Director Position shall serve a term of two (2) years, and a Director shall hold office until their successor is appointed and the Agency has been notified of the succession. Notwithstanding the actual date of their initial appointment, for purposes of establishing the terms of Permanent Directors such initial appointment shall be deemed to have commenced on the July 1 preceding such initial appointment, and the terms of Directors shall thereafter commence on July 1 of the respective appointing year. Each Director Position shall require an affirmative appointment by the Appointing Authority for every term.

Section 6.4 – General Qualifications.

a) Each Director, whether on the Initial Board or Permanent Board, must have the following general qualifications:

- i. General education and/or knowledge, interest in and experience relating to the control, storage, and beneficial use of groundwater.
- ii. General understanding and knowledge of the Basin and all its beneficial users.
- iii. Working knowledge and understanding of how to develop strategic plans, policies, programs, and financing/funding mechanisms.
- iv. Genuine commitment to collaboratively work together to (i) achieve groundwater sustainability through the adoption and implementation of a GSP for the Basin, and all its beneficial uses; and (ii) provide for the ongoing sustainable management of the Basin.
- v. General knowledge and understanding of one or more of the different facets

(administration, financial, legal, organizational, personnel, etc.) needed for a successful and productive organization.

- vi. Ability to commit the time necessary, estimated at a minimum 15-20 hours per month, to responsibly fulfill their commitment to the organization. This includes, but is not limited to: (i) Board meetings, (ii) Board training, (iii) analyzing financial statements and technical reports, (iv) reviewing Board documents before Board meetings, (v) attending Board meetings, and (vi) serving on committees to which they are assigned.
- vii. A permanent resident within the Basin, or a representative of an agency with jurisdiction, or a business or organization with a presence, within the Basin.

b) Nominating groups and Appointing Authorities, as described in Section 6.5, should endeavor to avoid nominating or appointing a person to a Director Position that, because of his or her employment or other financial interest, is likely to be disqualified from a substantial number of decisions to be made by the Board on the basis of conflict-of-interest requirements.

Section 6.5 – Appointments and Nominations for Director Positions on the Permanent Board.

The appointment and nominating process for each Primary and Alternate Director Positions on the Permanent Board shall be as follows:

- a) City of Salinas Director Position.

The City of Salinas shall appoint the Director Position listed in Row (a) of Exhibit B, the specific qualifications of such Director Position to be at the discretion of the City of Salinas.

- b) South County Cities Director Position.

The Director Position listed in Row (b) of Exhibit B shall be filled by a representative from one of the four cities listed therein. The City Selection sub-Committee shall determine which city shall be the Appointing Authority for each term of the Director Position. The specific qualifications of such Director Position shall be at the discretion of that city designated the Appointing Authority. If the City Selection sub-Committee cannot reach agreement on a city to be the Appointing Authority for this Director Position, the County Board of Supervisors shall decide which city shall be the Appointing Authority.

- c) Other GSA Eligible Entity Director Position.

- i. Representative of the entities listed on Exhibit C shall be eligible to participate in the nominating process for the Other GSA Eligible Entity Director Position listed in Row (c) of Exhibit B.

- ii. The representatives collectively by agreement among themselves shall make nominations to the Appointing Authority for the persons to fill both the Primary and Alternate Director Positions when the term of such position are expiring or are vacant.
 - iii. The representatives shall nominate one or more persons to fill both the Primary and Alternate Director Positions. If more than one person is nominated the representatives shall indicate the preferred nominee.
 - iv. The Appointing Authority shall appoint the nominee (if only one) or appoint from among the nominees; the Appointing Authority may reject a nominee only for Cause. If the representatives cannot or do not forward any nominations the Appointing Authority shall make the appointment based upon its own determination.
 - v. The representatives may also advise the Appointing Authority regarding the removal of their nominee from the Director Positions for Cause. If the Appointing Authority determines that Cause exists such Director shall be removed and a new Director appointed to fill out the remaining term of the removed Director. The representatives may also request that their nominee in the Director Position be removed for any reason or no reason. If such request is made the Appointing Authority shall remove the Director and a new Director appointed to fill out the remaining term of the removed Director.
 - vi. From time-to-time entities may ask to be removed from Exhibit C. If such request is made the Appointing Authority shall notify the other Members and the Board, and Exhibit C shall be modified accordingly.
 - vii. From time-to-time other entities may request to be included on Exhibit C. The then-existing representatives shall inform the Appointing Authority if such requests are acceptable. If accepted by the representatives the Appointing Authority shall notify the other Members and the Board, and Exhibit C shall be modified accordingly.
- d) Disadvantaged Community, or Public Water System Systems, including Mutual Water Companies serving residential customers, Director Position.
- i. Representative of the entities listed on Exhibit D shall be eligible to participate in the nominating process for the Disadvantaged Community, or Public Water System Systems, including Mutual Water Companies serving residential customers, Director Position listed in Row (d) of Exhibit B.
 - ii. The representatives by agreement among themselves shall collectively make nominations to the Appointing Authority for the persons to fill both the Primary and Alternate Director Positions when the term of such positions are expiring or are vacant.

- iii. The representatives shall nominate one or more persons to fill both the Primary and Alternate Director Positions. If more than one person is nominated the representatives shall indicate the preferred nominee.
 - iv. The Appointing Authority shall appoint the nominee (if only one) or appoint from among the nominees; the Appointing Authority may reject a nominee only for Cause. If the representatives cannot or do not forward any nominations the Appointing Authority shall make the appointment based upon its own determination.
 - v. The representatives may also advise the Appointing Authority regarding the removal of their nominee from the Director Positions for Cause. If the Appointing Authority determines that Cause exists such Director shall be removed and a new Director appointed to fill out the remaining term of the removed Director. The representatives may also request that their nominee in the Director Position may be removed for any reason or no reason. If such request is made the Appointing Authority shall remove the Director and a new Director appointed to fill out the remaining term of the removed Director.
 - vi. From time-to-time entities may ask to be removed from Exhibit D. If such request is made the Appointing Authority shall notify the other Members and the Board, and Exhibit D shall be modified accordingly.
 - vii. From time-to-time other entities may request to be included on Exhibit D. The then-existing representatives shall inform the Appointing Authority if such requests are acceptable. If accepted by the representatives the Appointing Authority shall notify the other Members and the Board, and Exhibit D shall be modified accordingly.
- e) CPUC Regulated Water Company Director Position.
- i. Representative of the entities listed on Exhibit E must meet the requirements of Section 1.1 (o) and shall be eligible to participate in the nominating process for the CPUC Regulated Water Company Director Position listed in Row (e) of Exhibit B.
 - ii. The representatives by agreement among themselves shall collectively make nominations to the Appointing Authority for the persons to fill both the Primary and Alternate Director Positions when the term of such position are expiring or are vacant.
 - iii. The representatives shall nominate one or more persons to fill both the Primary and Alternate Director Positions. If more than one person is nominated the representatives shall indicate the preferred nominee.

- iv. The Appointing Authority shall appoint the nominee (if only one) or appoint from among the nominees; the Appointing Authority may reject a nominee only for Cause. If the representatives cannot or do not forward any nominations the Appointing Authority shall make the appointment of an employee or agent of a CPUC Regulated Water Company listed on Exhibit E based upon its own determination.
 - v. The representatives may also advise the Appointing Authority regarding the removal of their nominee from the Director Position for Cause, although such authority to remove shall rest solely with the Appointing Authority.
 - vi. From time-to-time entities may ask to be removed from Exhibit E. If such request is made the Appointing Authority shall notify the other Members and the Board, and Exhibit E shall be modified accordingly.
 - vii. From time-to-time other entities may request to be included on Exhibit E. The then-existing representatives shall inform the Appointing Authority if such requests are acceptable. If accepted by the representatives the Appointing Authority shall notify the other Members and the Board, and Exhibit E shall be modified accordingly.
- f) Agriculture Director Positions.
- i. The Agricultural Association shall be eligible to participate in the nominating process for the Agriculture Director Positions listed in Rows (f) – (i) of Exhibit B. The Agricultural Association shall be solely responsible for its membership.
 - ii. The Agricultural Association shall make nominations to the Appointing Authority for the persons to fill each Primary and Alternate Director Position when the terms of such positions are expiring or are vacant.
 - iii. The Agricultural Association shall nominate at least two persons to fill each Director Position; the Agricultural Association shall indicate the preferred nominee for each Director Position.
 - iv. The Appointing Authority shall appoint from among the nominees for each Director Position; the Appointing Authority may reject a nominee only for Cause. If the Agricultural Association cannot or does not forward any nominations the Appointing Authority shall make the appointment based upon its own determination.
 - v. The Agricultural Association may also advise the Appointing Authority regarding the removal of a nominee from a Director Position for Cause. If the Appointing Authority determines that Cause exists such Director shall be removed and a new Director appointed to fill out the remaining term of the removed Director. The Agricultural Association may also request that

their nominee in a Director Position may be removed for any reason or no reason. If such request is made the Appointing Authority shall remove the Director and a new Director appointed to fill out the remaining term of the removed Director.

g) Environment Director Position.

- i. Representative of the entities listed on Exhibit F shall be eligible to participate in the nominating process for the Environment Director Position listed in Row (j) of Exhibit B.
- ii. The representatives by agreement among themselves shall collectively make nominations to the Appointing Authority for the persons to fill both the Primary and Alternate Director Positions when the term of such positions are expiring or are vacant.
- iii. The representatives shall nominate at least two persons to fill both the Primary and Alternate Director Positions and the representatives shall indicate the preferred nominee.
- iv. The Appointing Authority shall appoint from among the nominees; the Appointing Authority may reject a nominee only for Cause. If the representatives cannot or do not forward any nominations the Board shall solicit applications from interested persons. At an open public meeting, the Board shall select qualified applicants whose names shall be forwarded to the Appointing Authority. The Board may indicate a preferred nominee. The Appointing Authority shall make the appointment from the list of candidates in its sole discretion. If the Board cannot, or does not, forward a list of candidates, the Appointing Authority shall make the appointment based upon its own determination.
- v. The representatives may also advise the Appointing Authority regarding the removal of their nominee from the Director Position for Cause. If the Appointing Authority determines that Cause exists such Director shall be removed and a new Director appointed to fill out the remaining term of the removed Director. The representatives may also request that their nominee in the Director Position may be removed for any reason or no reason. If such request is made the Appointing Authority shall remove the Director and a new Director appointed to fill out the remaining term of the removed Director.
- vi. From time-to-time entities may ask to be removed from Exhibit F. If such request is made the Appointing Authority shall notify the other Members and the Board, and Exhibit F shall be modified accordingly.
- vii. From time-to-time other entities may request to be included on Exhibit F. The then-existing representatives shall inform the Appointing Authority if such requests are acceptable. If accepted by the representatives the

Appointing Authority shall notify the other Members and the Board, and Exhibit F shall be modified accordingly.

- h) Public Member Director Position.
 - i. The Public Member Primary and Alternate Director Positions listed in Row (k) of Exhibit B shall be filled by application to the Board when the term of such position is expiring or is vacant.
 - ii. Board staff shall process the applications to an open and public meeting of the Board.
 - iii. At the public hearing, the Board shall select the qualified applicants whose names shall be forwarded to the Appointing Authority. The Board may indicate a preferred nominee.
 - iv. The Appointing Authority shall appoint from among the nominees in its sole discretion. If the Board cannot or does not forward any nominations the Appointing Authority shall make the appointment based upon its own determination.
 - v. The Board may also advise the Appointing Authority regarding the removal of the Public Member Director for Cause, although such authority to remove shall rest solely with the Appointing Authority.

Section 6.6 – Primary Directors And Alternates.

Subject to the Appointing and Nominating procedures set forth in Section 6.5, above, each Appointing Authority shall appoint one Primary Director and one Alternate Director for each Director Position. With the exception of the Chairperson and Vice-Chairperson duties as more fully described in Section 6.7, below, the Alternate Director shall serve and assume the rights and duties of the Primary Director when the Primary Director is unable to attend or participate in a Board meeting. Unless appearing as a substitute for a Primary Director, Alternate Directors shall have no vote, and shall not participate in any discussions or deliberations of the Board, but may appear at Board meetings as members of the public. The Primary and Alternate Directors may be removed by their Appointing Authority only for Cause only upon the recommendation of or consultation with the nominating body for that Director Position, or upon the request of the nominating body for that Director Position. In the event that a Primary or Alternate Director is removed from their position, that Director Position shall become vacant and the Appointing Authority for that Director Position shall appoint a new Primary or Alternate Director pursuant to the provisions of Section 6.5 who shall fill the remaining term of that Director Position. In the event that a Director resigns from a Director Position, the Board shall notify the nominating body for that Director Position and the Appointing Authority for that Director Position shall appoint a new Primary or Alternate Director pursuant to the provisions of Section 6.5 who shall fill the remaining term of that Director Position.

Section 6.7 – Officers Of The Board.

a) Designation.

Officers of the Board shall consist of a Chairperson and Vice-Chairperson who shall be selected from the Primary Directors. The Chairperson shall preside at all meetings of the Board. Notwithstanding the appointment of an Alternate Director for the Chairperson, the Vice-Chairperson shall perform the duties of the Chairperson in the absence or disability of the Chairperson; however, the Alternate Director may otherwise attend and participate in the meeting as a substitute for the absent Primary Director. The Chairperson and Vice-Chairperson shall exercise and perform such other powers and duties as may be assigned by the Board. In the absence of both the Chairperson and Vice-Chairperson, and notwithstanding the appointment of an Alternate Director for the Director Position serving as Vice-Chairperson, the Board shall elect a Chairperson Pro-Tem from the Primary Directors to preside at a meeting; however, the Alternate Director for the Vice-Chairperson may otherwise attend and participate in the meeting as a substitute for the absent Primary Director.

b) Election.

The Board shall elect officers at the initial meeting of the Board, described in Section 7.1, below. The Primary Director appointed by the City of Salinas shall be designated as the Chairperson Pro Tem to convene and preside at the initial meeting of the Board, described in Section 7.1, until a Chairperson is elected by the Board. The Chairperson so elected shall serve in such capacity until June 30 of the succeeding calendar year. Thereafter, the Board shall annually elect the officers of the Board from the Primary Directors. Officers of the Board shall hold office for a term of one year commencing on July 1 of each calendar year and they may serve for multiple consecutive terms. Officers of the Board may be removed and replaced at any time, with or without cause, by a Majority Vote. In the event that an officer loses their position as a Primary Director, that officer position shall become vacant and the Board shall elect a new officer from existing Primary Directors to serve the remaining officer term.

Section 6.8 – Bylaws.

The Board shall adopt Bylaws governing the conduct of meetings and the day-to-day operations of the Agency on or before the first anniversary of the Effective Date.

Section 6.9 – Official Seal And Letterhead.

The Board may adopt, and/or amend, an official seal and letterhead for the Agency.

Section 6.10 – Conflict of Interest.

Directors shall be subject to the provisions of the California Political Reform Act, California Government Code section 81000 et seq, and all other laws governing conflicts of interests. Directors shall file the statements required by Government Code section 87200, et seq.

Article VII: Board Meetings And Actions

Section 7.1 – Initial Meeting.

The initial meeting of the Board shall be held at either the County Board of Supervisors chambers, located at 168 W. Alisal Street in Salinas, or at the Salinas City Council chambers, located at 200 Lincoln Avenue in Salinas within thirty days (30) days of the Effective Date of this Agreement. The date and time of the meeting shall be prominently publicized and noticed in addition to any requirements of the Brown Act in an effort to maximize public participation.

Section 7.2 – Regular Meeting Schedule.

At its initial meeting, and annually before July 1 of each calendar year thereafter, the Board shall establish a schedule of regular meetings, including time and place, at a location overlying the Basin. The Board may vote to change the regular meeting location, time and place, and may call special or emergency meetings, provided that the new, special or emergency meeting location remains at a place overlying the Basin, unless otherwise authorized by the Brown Act.

Section 7.3 – Principal Office.

At its initial meeting the Board shall establish a principal office for the Agency, which shall be located at a place overlying the Basin. The Board may change the principal office from time to time as the Board sees fit so long as that principal office remains at a location overlying the Basin.

Section 7.4 – Conduct Of Board Meetings.

Meetings of the Board of Directors shall be noticed, held, and conducted in accordance with the provisions of the Brown Act and such By-laws as the Board may adopt that are consistent with the Brown Act.

Section 7.5 – Quorum.

A quorum of the Board shall consist of a majority of the Director Positions.

Section 7.6 – Voting.

Each Director Position shall have one vote. In all cases, when a quorum is present, a Majority Vote shall be required to conduct business, unless a Super Majority Vote or a Super Majority Plus Vote is required.

Section 7.7 – Super Majority Vote Requirement.

Items that require a Super Majority Vote include the following unless otherwise required by law:

- a) Approval of a GSP;
- b) Amendment of budget and transfer of appropriations;
- c) Withdrawal of Members pursuant to Section 11.6 (d); and,
- d) Termination of Members pursuant to Section 11.7 (c).

Section 7.8 – Super Majority Plus Vote Requirement.

Items that require a Super Majority Plus Vote include the following unless otherwise required by law:

- a) Decisions to impose fees not requiring a vote of the electorate or property owners;
- b) Proposals to submit to the electorate or property owners (as required by law) decisions to impose fees or taxes; and
- c) Limitations on well extractions (pumping limits).

Section 7.9 – Conflict Of Interest Code.

At the initial meeting of Board, the Board shall begin the process for adoption and filing of a Conflict of Interest Code pursuant to the provisions of the Political Reform Act of 1974 (Government Code section 81000 et seq.).

Article VIII: Board Committees

Section 8.1 – Committees Of The Board.

a) Board Committees.

The Board may from time-to-time establish one or more standing or ad hoc committees consisting of Directors to assist in carrying out the purposes and objects of the Agency, including but not limited to a Budget and Finance Committee, Planning Committee, and an Executive Committee. The Board shall determine the purpose and need for such committees. Meetings of standing committees shall be subject to the requirements of the Brown Act.

b) Advisory Committee.

The Board shall establish an advisory committee consisting of Directors and non-Directors. The advisory committee shall be designed to ensure participation by and input to the Board of those constituencies set forth in Water Code section 10723.2 whose interests are not directly represented on the Board. The Board shall determine the number and qualifications of committee members.

Article IX: Operations And Management

Section 9.1 – Initial Administrative And Legal Services.

One or more of the Members shall provide initial administrative, legal and other support services to the Agency at no charge until the appointment of the Permanent Board as provided in Section 6.3, above. The Members shall collectively determine which of the Members shall provide such services.

Section 9.2 – Contracting Administrative And Legal Services.

The Agency may engage one or more Members to provide administrative or legal services following the conclusion of the initial administrative and legal services described in Section 9.1 of this Agreement, on terms and conditions acceptable to the Board. Any Member so engaged shall have such responsibilities as are set forth in the contract for such Member's services.

Section 9.3 – Executive Director.

The Agency may appoint an Executive Director from time-to-time under terms and conditions to be determined by the Board. The Executive Director shall report to and serve at the pleasure of the Board. The Executive Director shall be responsible for the general administration of the Agency, the preparation and implementation of a GSP, and such other duties as may be determined by the Board. If the Board has contracted for administrative services as described in Section 9.2, above, and appoints an Executive Director, the Executive Director shall be responsible for the oversight and control of such contracted administrative services pursuant to the policies and directives established by the Board.

Section 9.4 – Legal Counsel And Other Officers.

a) General Counsel

The Agency may appoint a General Counsel from time-to-time under terms and conditions to be determined by the Board. The General Counsel shall report to and serve at the pleasure of the Board. The General Counsel shall be responsible for the general oversight of the Agency's legal affairs, including litigation. The Board may contract with other counsel for specialized legal services under the supervision of the General Counsel.

b) Treasurer and Auditor

The City of Salinas shall serve as the initial Treasurer and Auditor for the Agency upon its formation, and shall discharge the duties set forth in Sections 6505 and 6505.5 of the Act. Subsequent to formation of the Agency, the Board may appoint a separate Treasurer or separate Auditor pursuant to Section 6505.6 of the Act, and those officers shall discharge the duties set forth in Sections 6505 and 6505.5 of the Act, respectively. The Board may change such Auditor or Treasurer from time-to-time provided such change is consistent with the Act.

c) Custodian of Property

The Public Works Director of the City of Salinas (“PW Director”) shall serve as the initial Custodian of the Agency’s Property as set forth in Section 6505.1 of the Act upon the Agency’s formation. The PW Director shall file an official bond as described in Government Code section 1450 et seq. in the amount of \$50,000, the premium of which shall be paid by the Agency. Subsequent to the formation of the Agency, the Board may designate a different Custodian provided such Custodian files an official bond in an amount required by the Board.

b) Other Officers

Subject to the limits of the Agency’s approved budget, the Board may establish other officer positions and appoint and contract for the services of such other officers as it may deem necessary or convenient for the business of the Agency, all of whom shall serve at the pleasure of the Board.

Section 9.5 – Employees.

Subject to the limits of the Agency’s approved budget, the Agency may hire employees to discharge the duties and responsibilities of the Agency, subject to the general oversight and control of the Executive Director.

Section 9.6 – Independent Contractors.

Subject to the limits of the Agency’s approved budget, the Board may contract for the services of such consultants, advisers and independent contractors as it may deem necessary or convenient for the business of the Agency.

Article X: Financial Provisions

Section 10.1 – Fiscal Year.

The Fiscal Year of the Agency shall be July 1 – June 30.

Section 10.2 – Establishment Of Funds.

The Board shall establish and maintain such funds and accounts as may be required by generally accepted government accounting practices. The Agency shall maintain strict accountability of all funds and report all receipts and disbursements of the Agency on no less than a quarterly basis.

Section 10.3 – Budgets.

a) Initial Budgets

The initial budget of the Agency for the Fiscal Year ending June 30, 2017, shall not exceed \$50,000. The budgets of the Agency for Fiscal Years 2017 – 2018 and 2018 – 2019 shall not exceed \$1,100,000 each unless otherwise agreed to by the unanimous vote of the Members as

described in Section 10.4, below.

b) Regular Budgets

Beginning for Fiscal Year 2019 – 2020, no later than sixty (60) days prior to the end of each Fiscal Year, the Board shall adopt a budget for the Agency for the ensuing Fiscal Year. The Board may authorize mid-year budget adjustments, as needed by Super Majority Vote.

Section 10.4 – Initial Contributions.

a) Fiscal Years 2017 – 2018 and 2018 - 2019

In order to provide the necessary capital to initially fund the Agency during Fiscal Year 2017 - 2018, the Members identified below shall each provide the listed Initial Contribution to the Agency’s Treasurer/Auditor no later than July 7, 2017:

- 1) County: \$670,000
- 2) WRA: \$ 20,000
- 3) City of Salinas: \$330,000
- 4) City of Gonzales: \$ 20,000
- 5) City of Soledad: \$ 35,000
- 6) City of Greenfield: \$ 35,000
- 7) City of King: \$ 30,000
- 8) Castroville CSD \$ 20,000

In order to provide the necessary capital to fund the Agency during Fiscal Year 2018 – 2019, the Members identified below shall each provide the listed Initial Contribution to the Agency’s Treasurer/Auditor no later than July 6, 2018:

- 1) County: \$670,000
- 2) WRA: \$ 20,000
- 3) City of Salinas: \$330,000
- 4) City of Gonzales: \$ 20,000
- 5) City of Soledad: \$ 35,000
- 6) City of Greenfield: \$ 35,000
- 7) City of King: \$ 30,000
- 8) Castroville CSD \$ 20,000

b) Additional Initial Contributions

New Members not listed above executing this Agreement no later than the Determination Date shall pay a minimum Initial Contribution of twenty thousand dollars (\$20,000) per year for the two fiscal years. New Members not listed above executing this Agreement after the

Determination Date shall pay a minimum Initial Contribution of fifty thousand dollars (\$50,000) per year for the two fiscal years.

Should the Board determine that additional funding for each of Fiscal Years 2017 – 2018 and 2018 – 2019 is necessary for Agency operations the Board shall adopt a resolution requesting each of the Members to consider additional funding and demonstrating in detail 1) the need for the funding, and 2) the purposes for which the additional funding will be utilized. Such requested funding shall be in the same proportion as the Initial Contributions set forth in Section 10.4 (a) unless the Members unanimously agree otherwise.

Upon receipt of the resolution requesting additional funding representatives of the Members may meet and confer regarding the request; however, each Member shall consider and act upon the request no later than 30 (thirty) days following the adoption of the resolution by the Board.

c) Reimbursement of Initial Contributions

To the extent the Agency is able to secure other funding sources, and to the extent permitted by law, the Agency shall reimburse these Initial Contributions to the Members on a proportionate basis in relation to their cumulative Initial Contributions to the Agency.

Section 10.5 – Payments To The Agency.

All costs and expenses of the Agency may be funded from: (i) voluntary contributions from third parties; (ii) grants; (iii) contributions from Members from time to time to supplement financing of the activities of the Agency; (iv) advances or loans from the Members or other sources; (v) bond revenue; and, (vi) taxes, assessments, fees and/or charges levied by the Agency under the provisions of SGMA or as otherwise authorized by law.

Section 10.6 – Directors’ Stipends and Expenses.

Directors shall be eligible to receive a stipend in the amount of \$ 100 for each Board meeting actually attended plus mileage to and from Board meetings. In addition, Directors shall be reimbursed for the actual and necessary expenses incurred in the discharge of their duties pursuant to an adopted Board policy. Directors are not required to accept the stipend or mileage, or expenses, and may decline the same by written notice to the Board.

Article XI: Relationship Of Agency And Its Members

Section 11.1 – Separate Entity.

In accordance with Sections 6506 and 6507 of the Act, the Agency shall be a public entity separate and apart from the Members.

Section 11.2 – Liabilities.

In accordance with Section 6507 of the Act, the debt, liabilities and obligations of the Agency shall be the debts, liabilities and obligations of the Agency alone and not of its Members. The Members do not intend hereby to be obligated either jointly or severally for the debts, liabilities or obligations of the Agency, except as may be specifically provided for in California Government Code Section 895.2 as amended or supplemented.

Section 11.3 – Insurance.

The Agency shall procure appropriate policies of insurance providing coverage to the Agency and its Directors, officers and employees for general liability, errors and omissions, property, workers compensation, and any other coverage the Board deems appropriate. Such policies shall name the Members, their officers and employees as additional insureds.

Section 11.4 – Indemnity.

Funds of the Agency may be used to defend, indemnify, and hold harmless the Agency, each Member, each Director, and any officers, agents and employees of the Agency for their actions taken within the course and scope of their duties while acting on behalf of the Agency. To the fullest extent permitted by law, the Agency agrees to save, indemnify, defend and hold harmless each Member from any liability, claims, suits, actions, arbitration proceedings, administrative proceedings, regulatory proceedings, losses, expenses or costs of any kind, whether actual, alleged or threatened, including attorney's fees and costs, court costs, interest, defense costs, and expert witness fees, where the same arise out of, or are attributable in whole or in part, to negligent acts or omissions of the Agency or its employees, officers or agents or the employees, officers or agents of any Member, while acting within the course and scope of an Member relationship with the Agency. Notwithstanding the foregoing, the sole negligence, gross negligence, or intentional acts of any Member is exempted from this Section 11.3 - Indemnity.

Section 11.5 – Agreements With Members

The Agency intends to carry out activities in furtherance of its purposes consistent with the powers established by this Agreement and with the participation of all Members. Notwithstanding the foregoing, the Board shall have the authority to approve any agreements with one or more Members in order to further the purposes of the Agency, including, but not limited to, the commencement of a condemnation action within the jurisdictional boundary of the agreeing Member or Members.

Section 11.6 – Withdrawal Of Members.

a) Any Member shall the have the ability to withdraw by providing ninety (90) days written notice of its intention to withdraw. Said notice shall be given to the Board and to each of the other Members. If such Member is an Appointing Authority, the Member's withdrawal shall not be effective unless and until the non-withdrawing Members agree to an amendment to this

Agreement providing for the composition of and appointment to the Board.

b) A Member shall not be fiscally liable for any contribution to an adopted budget provided that the Member provides written notice ninety (90) days prior to the adoption of the budget of its intention to withdraw.

c) In the event of a withdrawal, this Agreement shall continue in full force and effect among the remaining members as set forth in Section 11.8, below.

d) Notwithstanding the foregoing, Members shall not have the ability to withdraw if there is outstanding bonded debt or other long term liability of the Agency unless and until it is determined by the Board by Super Majority Vote that the withdrawal of the Member shall not adversely affect the ability of the Agency to perform its financial obligations pursuant to the bonded debt or other liability. The Board shall communicate its finding to the non-withdrawing Members who may approve the withdrawal by unanimous vote.

Section 11.7 – Termination Of Members.

a) As an alternative to pursuing litigation against a Member for failure to meet its funding obligations set forth in this Agreement or as may be adopted by the Board from time to time, the Board may vote to terminate such Member. The Board shall transmit its determination to the Members who may approve the termination by unanimous vote of the Members not proposed to be terminated. If such Member is an Appointing Authority, the Member's termination shall not be effective unless and until the non-terminated Members agree to an amendment to this Agreement providing for the composition of and appointment to the Board.

b) In the event of a termination, this Agreement shall continue in full force and effect among the remaining members as set forth in Section 11.8, below.

c) Notwithstanding the foregoing, Members may not be terminated if there is outstanding bonded debt or other long term liability of the Agency unless and until it is determined by the Board by Super Majority Vote that the termination of the Member shall not adversely affect the ability of the Agency to perform its financial obligations pursuant to the bonded debt or other liability. The Board shall communicate its finding to the Members who may approve the termination by unanimous vote of the Members not proposed to be terminated.

Section 11.8 – Continuing Obligations: Withdrawal Or Termination.

a) Provided that at least two Members remain, the withdrawal or termination of one or more Members shall not terminate this Agreement or result in the dissolution of the Agency; this Agreement shall remain in full force and effect among the remaining Members; and the Agency shall remain in operation.

b) Except as provided in Section 11.6 (b), any withdrawal or termination of a Member shall not relieve the Member of its financial obligations under this Agreement in effect prior to the effective date of the withdrawal or termination.

Section 11.9 – Disposition Of Money Or Property Upon Board Determination Of Surplus.

Upon determination by the Board that any surplus money is on hand, such surplus money shall be returned to the then existing Members in proportion to their cumulative contributions to the Agency, or such surplus money may be deposited in a Board designated reserve account. Upon determination by the Board that any surplus properties, works, rights and interests of the Agency are on hand, the Board shall first offer any such surplus for sale to the Members and such sale shall be based on highest bid received. If no such sale is consummated, the Board shall offer the surplus properties, works, rights and interests of the Agency for sale in accordance with applicable law to any governmental agency, private entity or persons for good and adequate consideration.

Section 11.10 – Termination And Dissolution.

a) Mutual Consent

i) Except as otherwise provided in this Section 11.10 (a), this Agreement may be terminated and the Agency dissolved at any time upon the unanimous approval of the Members provided that provision has been made by the Members for the payment, refunding, retirement, or other disposition of any bonded debt or other long term liability in the name of the Agency.

ii) Upon Dissolution of the Agency, each then existing Member shall receive a proportionate share, based upon the cumulative contributions of all then remaining Members, of any remaining assets after all Agency liabilities and obligations have been paid in full. The distribution of remaining assets may be made “in kind” or assets may be sold and the proceeds thereof distributed to the Members. The Agency shall remain in existence for such time as is required to determine such distribution, and the Board, or other person or entity appointed by the Members, shall be responsible for its determination. Such distribution shall occur within a reasonable time after a decision to terminate this Agreement and dissolve the Agency has been approved by the Members. No former Member that previously withdrew or was terminated as of the effective date of the decision to terminate this Agreement and dissolve the Agency shall be entitled to a distribution upon dissolution.

b) Insufficient Members

Subject to the provisions of Sections 11.6 and 11.7, should Members either be terminated or withdraw such that only one Member remains, this Agreement shall terminate and the Agency dissolved. In such event the last remaining Member shall be entitled to all assets of the Agency.

c) Failure to be Financially Sustainable

In the event that the Agency does not take the necessary actions to create a sustainable revenue stream necessary to fully finance its operating budget by the end of Fiscal Year 2018 – 2019 this Agreement shall terminate and the Agency shall be dissolved, unless otherwise agreed to by amendment to this Agreement approved unanimously by all then-existing Members. In the event of such termination and dissolution, the process of dissolution shall begin on July 1, 2019, and proceed as set forth in Section 11.10 (a) (ii), above.

d) Legislative Determination

Should the State adopt legislation specifying that the Basin should be managed by a statutorily designated entity this Agreement shall terminate and the Agency shall be dissolved upon such terms and conditions as the legislation may designate. Upon such dissolution, the assets and liabilities of the Agency shall be disposed of in the manner specified by the legislation. If the legislation does not so specify, the assets and liabilities of the Agency shall be disposed of in the manner provided in Section 11.10 (a), above.

Article XII: Miscellaneous Provisions

Section 12.1 – Complete Agreement.

The foregoing constitutes the full and complete Agreement of the Members. This Agreement supersedes all prior agreements and understandings, whether in writing or oral, related to the subject matter of this Agreement that are not set forth in writing herein.

Section 12.2 – Amendment.

This Agreement may be amended from time-to-time by the unanimous consent of the Members, acting through their governing bodies. Such amendments shall be in the form of a writing signed by each Member.

Section 12.3 – Successors And Assigns.

The rights and duties of the Members may not be assigned or delegated without the written consent of all other Members. Any attempt to assign or delegate such rights or duties in contravention of this Agreement shall be null and void. Any assignment or delegation permitted under the terms of this Agreement shall be consistent with the terms of any contracts, resolutions or indentures of the Agency then in effect.

This Agreement shall inure to the benefit of and be binding upon the successors and assigns of the Members hereto. This section does not prohibit a Member from entering into an independent agreement with another person, entity, or agency regarding the financing of that Member's contributions to the Agency or the disposition of proceeds, which that Member receives under this Agreement so long as such independent agreement does not affect, or purport to affect, the rights and duties of the Agency or the Members under this Agreement.

Section 12.4 – Dispute Resolution.

In the event there are disputes and/or controversies relating to the interpretation, construction, performance, termination, breach of, or withdrawal from this Agreement, the Members involved shall in good faith meet and confer within twenty-one (21) calendar days after written notice has been sent to all the Members. In the event that the Members involved in the dispute ("Disputing Members") are not able to resolve the dispute through informal negotiation, the Disputing Members agree to submit such dispute to formal mediation before litigation. If Disputing Members cannot agree upon the identity of a mediator within ten (10) business days

after a Disputing Member requests mediation, then the non-Disputing Members shall select a mediator to mediate the dispute. The Disputing Members shall share equally in the cost of the mediator who ultimately mediates the dispute, but neither of the Disputing Members shall be entitled to collect or be reimbursed for other related costs, including but not limited to attorneys' fees. If mediation proves unsuccessful and litigation of any dispute occurs, the prevailing Member shall be entitled to reasonable attorneys' fees, costs and expenses in addition to any other relief to which the Member may be entitled. If a Disputing Members refuses to participate in mediation prior to commencing litigation, that Member shall have waived its right to attorneys' fees and costs as the prevailing party.

Section 12.5 – Execution In Parts Or Counterparts.

This Agreement may be executed in parts or counterparts, each part or counterpart being an exact duplicate of all other parts or counterparts, and all parts or counterparts shall be considered as constituting one complete original and may be attached together when executed by the Members hereto. Facsimile or electronic signatures shall be binding.

Section 12.6 – Member Authorization.

The governing bodies of the Members have each authorized execution of this Agreement, as evidenced by their respective signatures below.

Section 12.7 – No Predetermination Or Irrevocable Commitment of Resources.

Nothing herein shall constitute a determination by the Agency or any Members that any action shall be undertaken or that any unconditional or irrevocable commitment of resources shall be made, until such time as the required compliance with all local, state, or federal laws, including without limitation the California Environmental Quality Act, National Environmental Policy Act, or permit requirements, as applicable, have been completed.

Section 12.8 – Notices.

Notices authorized or required to be given pursuant to this Agreement shall be in writing and shall be deemed to have been given when mailed, postage prepaid, or delivered during working hours to the addresses set forth for each of the Members hereto on Exhibit "A" of this Agreement, or to such other changed addresses communicated to the Agency and the Members in writing.

Section 12.9 – Severability And Validity Of Agreement.

Should the participation of any Member, or any part, term or provision of this Agreement, be decided by the courts or the legislature to be illegal, in excess of that Member's authority, in conflict with any law of the State, or otherwise rendered unenforceable or ineffectual, the validity of the remaining portions, terms or provisions of this Agreement shall not be affected thereby and each Member hereby agrees it would have entered into this Agreement upon the same remaining terms as provided herein.

Section 12.10 – Singular Includes Plural.

Whenever used in this Agreement, the singular form of any term includes the plural form and the plural form includes the singular form.

IN WITNESS WHEREOF, the Members hereto, pursuant to resolutions duly and regularly adopted by their respective governing boards, have caused their names to be affixed by their proper and respective officers as of the day and year so indicated.

COUNTY OF MONTEREY

By 
Chair of the Board of Supervisors

Dated: 12-22-16

APPROVED AS TO FORM

CHARLES J. MCKEE, County Counsel

By 
CHARLES J. MCKEE

WATER RESOURCES AGENCY OF THE COUNTY OF MONTEREY

By 
Chair of the Board of Supervisors of the Water Resources Agency

Dated: 1-31-2017

APPROVED AS TO FORM

CHARLES J. MCKEE, County Counsel

By 

CITY OF SALINAS

By _____
Mayor

Dated: _____

Section 12.10 – Singular Includes Plural.

Whenever used in this Agreement, the singular form of any term includes the plural form and the plural form includes the singular form.

IN WITNESS WHEREOF, the Members hereto, pursuant to resolutions duly and regularly adopted by their respective governing boards, have caused their names to be affixed by their proper and respective officers as of the day and year so indicated.

COUNTY OF MONTEREY

By _____
Chair of the Board of Supervisors

Dated: _____

APPROVED AS TO FORM

CHARLES J. MCKEE, County Counsel

By _____

WATER RESOURCES AGENCY OF THE COUNTY OF MONTEREY

By _____
Chair of the Board of Supervisors of the Water Resources Agency

Dated: _____

APPROVED AS TO FORM

CHARLES J. MCKEE, County Counsel

By _____

CITY OF SALINAS

By _____
Mayor

Dated: 12-20-16

APPROVED AS TO FORM

CHRISTOPHER CALLIHAN, City Attorney

By Chris J. Callihan

CITY OF SOLEDAD

By _____
Mayor

Dated: _____

APPROVED AS TO FORM

_____, City Attorney

By _____

CITY OF GONZALES

By _____
Mayor

Dated: _____

APPROVED AS TO FORM

_____, City Attorney

By _____

CITY OF GREENFIELD

By _____
Mayor

Dated: _____

APPROVED AS TO FORM

CHRISTOPHER CALLIHAN, City Attorney

By _____

CITY OF SOLEDAD

By  _____
Mayor

Dated: 03/03/17

APPROVED AS TO FORM

Michael Rodriguez, City Attorney

By  _____

CITY OF GONZALES

By _____
Mayor

Dated: _____

APPROVED AS TO FORM

_____, City Attorney

By _____

CITY OF GREENFIELD

By _____
Mayor

Dated: _____

CITY OF GONZALES

By Maria Orozco
Maria Orozco, Mayor

Dated: 2/21/17

APPROVED AS TO FORM

By [Signature]
Michael F. Rodriguez, City Attorney

Dated: 2-21-2017

APPROVED AS TO FORM

_____, City Attorney


By _____

CITY OF KING

By 
Mayor

Dated: 3-24-2017

APPROVED AS TO FORM

, City Attorney

By 3-24-2017

CASTROVILLE COMMUNITY SERVICES

By _____
Chair of the Board of Directors

APPROVED AS TO FORM

_____, District Counsel

MONTEREY REGIONAL WATER POLLUTION CONTROL AGENCY

By _____
Chair of the Board of Directors

APPROVED AS TO FORM

_____, Agency Counsel

APPROVED AS TO FORM

_____, City Attorney

By _____

CITY OF KING

By _____

Mayor

Dated: _____

APPROVED AS TO FORM

_____, City Attorney

By _____

CASTROVILLE COMMUNITY SERVICES

By 
Chair of the Board of Directors

APPROVED AS TO FORM

 District Counsel

APPROVED AS TO FORM

_____, City Attorney

By _____

CITY OF KING

By _____
Mayor

Dated: _____

APPROVED AS TO FORM

_____, City Attorney

By _____

CASTROVILLE COMMUNITY SERVICES

By _____
Chair of the Board of Directors

APPROVED AS TO FORM

_____, District Counsel

MONTEREY REGIONAL WATER POLLUTION CONTROL AGENCY

By Maria De la Rosa
Chair of the Board of Directors

APPROVED AS TO FORM

Robert R. Wallington Agency Counsel

EXHIBIT A

MEMBERS

COUNTY OF MONTEREY
County Administrative Officer
168 W. Alisal St., Salinas, CA 93901

WATER RESOURCES AGENCY OF MONTEREY COUNTY
General Manager

CITY OF SALINAS
City Manager

CITY OF SOLEDAD
City Manager

CITY OF GONZALES
City Manager

CITY OF GREENFIELD
City Manager

CITY OF KING (KING CITY)
City Manager

CASTROVILLE COMMUNITY SERVICES DISTRICT
General Manager

EXHIBIT B

BOARD OF DIRECTORS

	<u>Director</u>	<u>Representing</u>	<u>Specific Qualifications</u>	<u>Appointing Authority</u>
a)	City of Salinas.	City of Salinas.	To be determined by the Appointing Authority.	Salinas City Council.
b)	South County Cities.	Cities of Gonzales, Soledad, Greenfield, and King City.	To be determined by the Appointing Authority.	Appropriate City Council as recommended by the City Selection sub-Committee.
c)	Other GSA Eligible Entity.	GSA Eligible Entities but not including the cities of Salinas, Gonzales, Soledad, Greenfield or King City.	Must be a representative of a GSA Eligible Entity but not including the cities of Salinas, Gonzales, Soledad, Greenfield or King City.	Monterey County Board of Supervisors.
d)	Disadvantaged Community, or Public Water System, including Mutual Water Companies serving residential customers.	Unincorporated Disadvantaged Communities, or Public Water Systems, including Mutual Water Companies serving residential customers only.	Must be a resident of a Disadvantaged Community in the unincorporated area, or a representative Public Water System, including Mutual Water Companies serving residential customers only.	Castroville Community Services District.
e)	CPUC Regulated Water Company.	CPUC Regulated Water Companies in the Basin.	Must be a representative of a CPUC Regulated Water	Salinas City Council.

f)	Agriculture.	Agricultural interests.	Company. Must be an individual that is: 1) engaged in, and derives the majority of his or her gross income or revenue from, commercial agricultural production or operations; or 2) designated by an entity this is engaged in commercial agricultural production or operations, and the individual derives the majority of his or her gross income or revenue from agricultural production or operations, including as an owner, lessor, lessee, manager, officer, or substantial shareholder of a corporate entity.	Monterey County Board of Supervisors.
g)	Agriculture.	Agricultural interests.	Same as (f).	Monterey County Board of Supervisors.
h)	Agriculture.	Agricultural interests.	Same as (f).	Monterey County Board of Supervisors.
i)	Agriculture.	Agricultural interests.	Same as (f).	Monterey County Board of Supervisors.
j)	Environment.	Environmental users and interests.	Must be a representative of an	Monterey County

			established environmental organization that has a presence or is otherwise active in the Basin.	Board of Supervisors.
k)	Public Member.	Interests not otherwise represented on the Board.	A rural residential well owner; an industrial processor; a Local Small or State Small Water System; or other mutual water company.	Monterey County Board of Supervisors.

EXHIBIT C

OTHER GSA ELIGIBLE ENTITY DIRECTOR POSITION NOMINATING GROUP

COUNTY OF MONTEREY

WATER RESOURCES AGENCY OF MONTEREY COUNTY

MONTEREY REGIONAL WATER POLLUTION CONTROL AGENCY

EXHIBIT D

**DISADVANTAGED COMMUNITY, OR PUBLIC WATER SYSTEM, INCLUDING
MUTUAL WATER COMPANIES SERVING RESIDENTIAL CUSTOMERS DIRECTOR
POSITION NOMINATING GROUP**

CASTROVILLE COMMUNITY SERVICES DISTRICT (Group Contact)

Eric Tynan, General Manager

11499 Geil St.

Castroville, CA 95012

(831) 633-2560 phone

(831) 633-3102 fax

info@castrovillecsd.org

ENVIRONMENTAL JUSTICE COALITION FOR WATER

SAN JERARDO COOPERATIVE

SAN ARDO WATER DISTRICT

SAN VICENTE MUTUAL WATER COMPANY

EXHIBIT E

CPUC REGULATED WATER COMPANY DIRECTOR POSITION NOMINATING GROUP

ALISAL WATER CORPORATION DBA ALCO WATER SERVICE (Group Contact)

Thomas R. Adcock, President

249 Williams Road

Salinas, CA 93905

831-424-0441 phone

831-424-0611 fax

tom@alcowater.com

CALIFORNIA WATER SERVICE COMPANY

EXHIBIT F

ENVIRONMENT DIRECTOR POSITION NOMINATING GROUP

SUSTAINABLE MONTEREY COUNTY

LEAGUE OF WOMEN VOTERS OF MONTEREY COUNTY

LANDWATCH MONTEREY COUNTY

FRIENDS AND NEIGHBORS OF ELKHORN SLOUGH

CALIFORNIA NATIVE PLANT SOCIETY, MONTEREY CHAPTER

TROUT UNLIMITED

SURFRIDERS

THE NATURE CONSERVANCY

CARMEL RIVER STEELHEAD ASSOCIATION

Chapter 1
Appendix 1-B

Coordination Agreement

**Before the Board of Directors of the
Salinas Valley Basin Sustainable Groundwater Management Agency**

Resolution No. 2017-16

Resolution approving a Coordination Agreement)
between Marina Coast Water District and the)
Salinas Valley Basin Ground Water Sustainability)
Agency for the management of the Monterey)
Subbasin.

WHEREAS, the Marina Coast Water District has filed with the Department of Water Resources to become the Ground Water Sustainability Agency for the Monterey Subbasin; and,

WHEREAS, this filing has created the need for Marina Coast and the Salinas Valley Basin to coordinate management activities in the Monterey Subbasin; and

WHEREAS, the Marina Coast Water District and the Salinas Valley Basin Ground Water Sustainability Agency developed an agreement that is mutually acceptable for managing this basin; and,

WHEREAS, the proposed Coordination agreement will allow for Grant Applications that will fund Ground Water Sustainability planning in the subbasin;

NOW, THEREFORE, BE IT RESOLVED, by the Board of Directors of the Salinas Valley Basin Groundwater Sustainability Agency as follows:

The above recitals are true and correct.

The attached Coordination agreement between Marina Coast Water District and the Salinas Valley Basin Ground Water Sustainability Agency is hereby approved.

The General Manager and Agency Counsel are hereby authorized and directed to take such other and further actions as may be necessary or appropriate to implement the intent and purposes of this resolution.

PASSED AND ADOPTED on this 9th day of November 2017 by the following vote, to-wit:

AYES: Directors Alejo, Brennan, Granillo, Lipe, McHatten, McIntyre, Pereira, Secondo, Stefani, and Chair Gunter

NOES: None

ABSENT: Director Calcagno

ABSTAIN: None

I, Ann Camel, Clerk of the Board of Directors of the Salinas Valley Basin Groundwater Sustainability Agency, State of California, hereby certify that the foregoing is a true copy of an original order of said Board of Directors duly made and entered in the minutes thereof.

Dated: 11/9/17

Ann Camel, Clerk of the Board of Directors of the Salinas Valley Basin
Groundwater Sustainability Agency,
County of Monterey, State of California

A handwritten signature in blue ink that reads "Ann Camel" is written over a horizontal line.

PROPOSITION 1 Coordination Agreement

THIS PROPOSITION 1 COORDINATION AGREEMENT (the "Agreement") is made effective as of November 9, 2017 by the Marina Coast Water District Groundwater Sustainability Agency ("MCWD") and the Salinas Valley Basin Groundwater Sustainability Agency ("SVBGSA") regarding proposals for Sustainable Groundwater Planning ("SGWP") Grant Program funds, authorized by the Water Quality, Supply, and Infrastructure Improvement Act of 2014 ("Proposition 1") within the Monterey Subbasin and the 180/400 foot Subbasin, with reference to the following facts:

A. Eligibility criteria for Category 2 proposals for SGWP Grant Program funds, authorized by Proposition 1, only accept one application per Basin/Subbasin; and

B. An eligible agency may be part of the Proposition 1 application as a project proponent, but must identify a single entity that will act as the grant applicant and submit a basin-wide application and receive the grant on behalf of the basin; and

C. If multiple applications are received within a basin for Category 2 projects, DWR will contact the applicants and request that the Parties consolidate one single application for the basin to be submitted before the close of the open filing period; and

D. The applicant must include a Proposal level "Summary" highlighting each project contained in the Proposal and must demonstrate that it encompasses the entire basin or describes why a portion of the basin is not covered in the Proposal.

E. Applicants requesting funding for Category 2 Proposition 1 application must provide documentation of any communications with beneficial users of groundwater in the basin that may potentially be affected by implementation of the project, including, but not limited to DACs, SDACs, agricultural water users, municipal water users, wildlife refuges, or other stakeholders.

F. The Filing Period Closes November 13, 2017 for proposals for SGWP Grant Program funds; and

G. Proposition 1 requires a minimum cost share of 50% of the total project cost.

THEREFORE, in consideration of the facts recited above the Parties agree to the following with regards to Proposition 1 applications:

1. The Parties agree that MCWD shall be the Party responsible for submitting a grant application/proposal to DWR for a Category 2, Tier 2 Groundwater Sustainability Plan grant for the Monterey Subbasin and MCWD shall be the grantee if the proposal is successful. MCWD shall be responsible for the cost of preparing the grant. MCWD will coordinate with SVBGSA and obtain input from SVBGSA in preparation of the grant application/proposal for the Monterey Subbasin.

2. The Parties further agree that SVBGSA shall be the Party responsible for submitting a grant application/proposal to DWR for a Category 2, Tier 1 Groundwater Sustainability Plan grant for the 180/400 Foot Aquifer Subbasin and SVBGSA shall be the grantee if the proposal is successful. SVBGSA shall be responsible for the cost of preparing the grant. SVBGSA will coordinate with MCWD and obtain input from MCWD in preparation of the grant application/proposal for the 180/400 Foot Aquifer Subbasin.

3. A coordination committee including representatives from MCWD and SVBGSA shall be formed for each subbasin.

4. The parties agree that they shall share all data necessary to facilitate the completion of the Proposition 1 applications/proposals.

5. The Proposition 1 application for the Monterey Subbasin will include:

a) A project for the preparation of the GSP by MCWD for the Marina Subarea and the Ord Subarea, as shown on attached Exhibit "A;" and

b) A project for the preparation of a GSP by SVBGSA for the Corral de Tierra Subarea, also as shown on attached Exhibit "A".

6. The Marina, Ord and Corral de Tierra subareas shall be managed as follows:

a) If MCWD is allowed under the Sustainable Groundwater Management Act ("SGMA") to include the Ord Subarea within its Groundwater Sustainability Agency boundaries, MCWD shall manage the Marina and Ord Subareas as part of its GSA under the GSP described in Section 5 (a), above.

b) If MCWD is not allowed under SGMA to include the Ord Subarea within its Groundwater Sustainability Agency boundaries, the Ord Subarea may be designated by the SVBGSA as a Management Area within the boundaries of its GSA, and MCWD shall be allowed to manage the Ord Subarea under the GSP described in Section 5 (a), above.

c) SVBGSA shall manage the Corral de Tierra Subarea.

7. The GSP Project for the Monterey Subbasin will include review and potential refinement of the portion of the Salinas Valley Integrated Hydrologic Model ("SVIHM") that addresses the Monterey Subbasin and nearby subbasins. SVIHM is being developed by the USGS for the entire Salinas River Valley Basin.

8. MCWD will provide matching grant funds for development of the GSP and for SVIHM model review and refinement for the Marina Subarea and Ord Subarea of the Monterey Subbasin. Notwithstanding anything to the contrary, in the event MCWD is prevented from including the Ord Subarea within its GSP or the SVBGSA elects to include the Ord Subarea within its own GSP for the Monterey Subbasin, then SVBGSA shall reimburse

MCWD for all matching funds which MCWD has provided or expended proportionately for the Ord subarea after the effective date of this agreement, and SVBGSA shall be responsible for all matching funds applicable to the Ord Subarea for purposes of the SGWP Grant Program.

9. SVBGSA and MCWD may include additional project(s) in each other's grant applications for the Monterey and 180/400 Foot Aquifer Subbasins if they provide all required information in the appropriate format and demonstrate matching funds by an agreed upon timeframe.

10. The Parties acknowledge that the submission deadline for any Proposition 1 application is November 13, 2017. As such, the Parties agree to the following schedule for coordination of grant applications for the Monterey and 180/400 Foot Aquifer Subbasins:

- Proposition 1 Applicant to share draft Proposition 1 application with other Party (10/20/2017)
- Proposition 1 Applicant to receive feedback on Draft Proposition 1 application from other Party (by 10/27/2017)
- Proposition 1 Applicant to obtain complete information from other Party for any independent Projects (for which other Party is providing matching funds) for inclusion in in Draft Proposition I application (10/27/2017)
- Submit Prop 1 application to DWR by 11/13/2017

In the event either Party fails to provide any of the required information to the submitting Party by the identified dates, then this Agreement shall terminate and either Party may submit a Proposition 1 application on their own behalf, without regard to the other Party.

11. Assuming agreement is reached between the Parties regarding the Proposition 1 applications for the Monterey Subbasin and 180/400 Foot Aquifer Subbasin, the Parties will provide letters of support for each other's Proposition 1 grant applications for the 180/400 Foot Aquifer Subbasin and the Monterey Subbasin by November 3, 2017.

Agreed and acknowledged on November 21, 2017, by the signatures below:

SALINAS VALLEY BASIN
GROUNDWATER SUSTAINABILITY AGENCY

By: 

Title: General Manager

APPROVED AS TO FORM:


Leslie J. Girard
SVBGSA Agency Counsel

MARINA COAST WATER DISTRICT
GROUNDWATER SUSTAINABILITY AGENCY

By: 

Title: General Manager

APPROVED AS TO FORM:

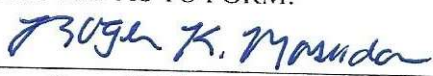
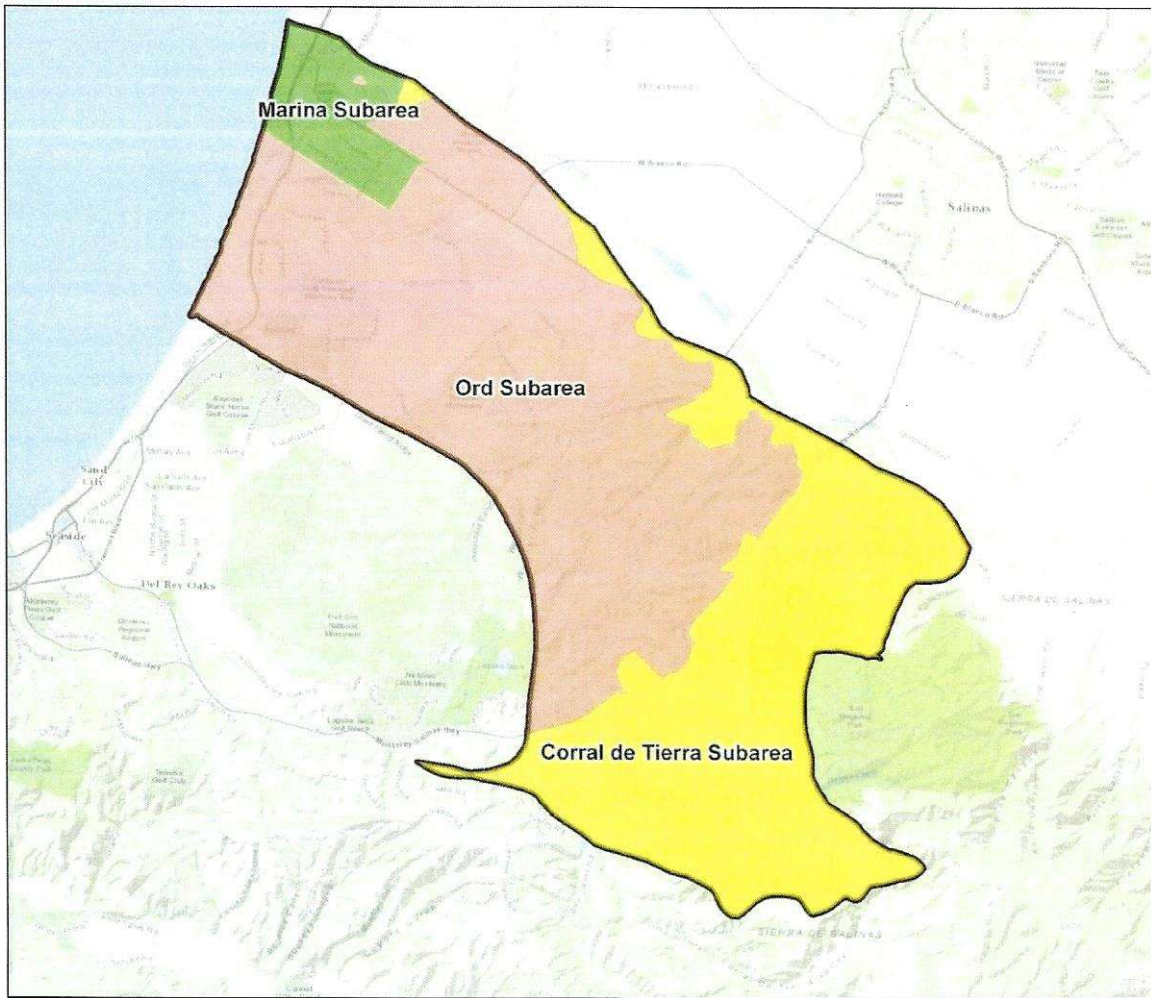





Roger K. Masuda
MCWDGSA Agency Counsel

EXHIBIT A. MONTEREY BASIN SUBAREAS



Legend

-  Monterey Subbasin (DWR 3-004 19)
-  Marina Subarea
-  Ord Subarea
-  Corral de Tierra Subarea



**Before the Board of Directors of the
Salinas Valley Basin Sustainable Groundwater Management Agency**

Resolution No. 2018-11)
Authorizing Execution of a Framework)
Agreement for the Monterey Basin)
Groundwater Sustainability Plan between the)
Marina Coast Water District Groundwater)
Sustainability Agency and the Salinas Valley)
Basin Groundwater Sustainability Agency)

WHEREAS, the Sustainable Groundwater Management Act (SGMA) of 2014, Water Code Sections 10720-10736.6 was signed into law September 16, 2014; and,

WHEREAS, SGMA gives local agencies authorities and powers to manage groundwater; and,

WHEREAS, Groundwater Sustainability Plans, in conformance with SGMA, for the 180/400 Aquifer and the Monterey subbasins are required by January 31, 2020 and 2022 respectively; and,

WHEREAS, SGMA requires a coordinated Groundwater Sustainability Plan (GSP) or GSPs among or between adjacent GSAs and adjacent subbasins; and,

WHEREAS, GSP development requires collaboration amongst GSAs and other local or regional water management groups at the groundwater subbasin level and encourages collaboration across groundwater subbasin boundaries; and,

WHEREAS, the Marina Coast Water District Groundwater Sustainability Agency (MCWDGSA) and the Salinas Valley Groundwater Sustainability Agency previously entered into a Proposition 1 Coordination Agreement regarding cooperation and coordination on the application for and receipt of Proposition 1 grant funds to fund the development of GSPs for the Monterey Subbasin and the 180/400 Foot Aquifer Subbasin; and,

WHEREAS, the proposed Framework Agreement's intent is that one GSP will be developed for the entire Monterey Subbasin (i.e. the Monterey Subbasin GSP), which will contain three management areas that generally encompass the Marina Subarea, the Ord Subarea (both of which are generally located north of State Route 68), and the Corral de Tierra Subarea (located generally south of State Route 68); and,

WHEREAS, the Framework Agreement clarifies that the MCWDGSA will prepare the GSP components for the Marina Management Area and the Ord Management Area, and SVBGSA will prepare the GSP components for the Corral de Tierra Management Area and the GSP for the entire 180/400 Foot Aquifer Subbasin; and,

WHEREAS, the Agreement requires the MCWDGSA and the SVBGSA to actively consult with each other and include each other for review of draft work products during the GSP

development process for the 180/400 Foot Aquifer Subbasin and the Monterey Subbasin; NOW, THEREFORE,

BE IT RESOLVED, by the Board of Directors of the Salinas Valley Basin Groundwater Sustainability Agency, that the General Manager is hereby authorized and directed to execute the Framework Agreement for the Monterey Groundwater Basin Groundwater Sustainability Plan between the Marina Coast Water District Groundwater Sustainability Agency and Salinas Valley Basin Groundwater Sustainability Agency attached hereto as Exhibit A.

BE IT FURTHER RESOLVED, that the General Manager and Agency Counsel are hereby authorized and directed to take such further actions as may be necessary or appropriate to implement the intent and purposes of this Resolution.

PASSED AND ADOPTED on this 13th day of December 2018 by the following vote, to-wit:

AYES: Directors Alejo, Brennan, Calcagno, Granillo, Gunter, Lipe, McIntyre, Pereira, Secondo, Stefani, and Chairperson McHatten

NOES: None

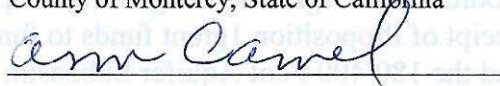
ABSENT: None

ABSTAIN: None

I, Ann Camel, Clerk of the Board of Directors of the Salinas Valley Basin Groundwater Sustainability Agency, State of California, hereby certify that the foregoing is a true copy of an original order of said Board of Directors duly made and entered in the minutes thereof.

Dated: 12/13/18

Ann Camel, Clerk of the Board of Directors of the Salinas Valley Basin Groundwater Sustainability Agency,
County of Monterey, State of California



FRAMEWORK AGREEMENT

This Framework Agreement is made effective as of 12/13/18 by the Marina Coast Water District Groundwater Sustainability Agency (MCWD) and Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) (collectively, the “Parties”) regarding Groundwater Sustainability Plan (GSP) development for the Monterey Subbasin and the 180/400 Foot Aquifer Subbasin, with reference to the following:

RECITALS

A. On September 16, 2014 Governor Jerry Brown signed into law Senate Bills 1168 and 1319 and Assembly Bill 1739, known collectively as the Sustainable Groundwater Management Act (the “Act”), effective January 1, 2015; and

B. The Act was amended by Senate Bill 13, effective January 1, 2016; and

C. The legislative intent of the Act is to provide sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide local agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; and

D. The Act requires formation of one or more groundwater sustainability agencies (“GSAs”) that will be responsible for developing a single or multiple groundwater sustainability plan (“GSP”) for a groundwater basin; and

E. The purpose of this Framework Agreement is to outline the process to be used by the Parties to work collaboratively to develop one GSP for the entire Monterey Subbasin and one GSP for the entire 180/400 Foot Aquifer Subbasin (the “GSPs”). It is further intended to guide the Parties’ coordination during GSP development in the Monterey Subbasin and the 180/400 Foot Aquifer Subbasin and further intended to, in part, implement the intent and purposes of the Coordination Agreement between the Parties dated November 21, 2017.

F. The Parties recognize that a detailed approach is to be developed by the Parties’ technical staff under these guidelines to make sure that the elements of the GSPs are appropriately coordinated to support sustainable management.

NOW, THEREFORE, in consideration of the promises, terms, conditions and covenants contained herein, the Parties to this Agreement hereby agree as follows:

1. Overarching Approach. The Parties agree that one GSP will be developed for the entire Monterey Subbasin (i.e. the Monterey Subbasin GSP), which will contain three management areas that generally encompass the Marina Subarea, the Ord Subarea (both of which are generally located north of State Route 68), and the Corral de Tierra Subarea (located generally south of State

Route 68). The Parties recognize that the exact boundaries of the management areas are to be confirmed. Consistent with the Proposition 1 Grant Work Plans:

(a) MCWD GSA will prepare the GSP components for the Marina Management Area and the Ord Management Area;

(b) SVBGSA will prepare the GSP components for the Corral de Tierra Management Area.

(c) The Parties further agree that SVBGSA will prepare a GSP for the entire 180/400 Foot Aquifer Subbasin.

(d) The Parties agree that they will actively consult with each other, and include each other for review of draft work products during the GSP development process for the 180/400 Foot Aquifer Subbasin and the Monterey Subbasin.

2. Schedule. The Parties agree to develop a detailed approach and schedule for development of the GSPs. The detailed approach and schedule for the Monterey Subbasin GSP should outline the process of preparing separate and common GSP components, as well as identify the timing of data sharing and review of key work products. The detailed approach and schedule for the 180/400 Foot Aquifer should identify the process and timing of consultation and review for key work products. The Parties recognize that a successful GSP relies on involving each other for early input and providing draft work products to the other Party for timely review, and further recognize that the GSP for the 180/400 Foot Aquifer Subbasin must be filed with DWR no later than January 31, 2020, and the GSP for the Monterey Subbasin must be filed no later than January 31, 2022.

3. Coordination Committees; Stakeholder Engagement. The Parties agree to form a Steering Committee that oversees activities under this agreement. The Steering Committee shall include the General Manager and one Board Member from each Party, who will update each Party's Board of Directors. Staff and consultants from each Party may participate in the Steering Committee as necessary. In addition, the Parties agree to form a Technical Committee that consists of staff and/or technical consultants to perform activities under this agreement. The Steering Committee and Technical Committee shall each hold regular meetings pursuant to schedules described in Attachment A and may hold special meetings and workshops as necessary.

The Parties agree to work collaboratively to develop and implement stakeholder engagement plans for the GSPs and ensure regular, productive communication between the Parties, stakeholders, and stakeholder representatives. Each Party is responsible for guiding efforts within their respective plan preparation areas in both basins, e.g., MCWD for the Marina and Ord Subareas of the Monterey Subbasin, and SVBGSA for the Corral de Tierra Subarea of the Monterey Subbasin as well as the 180/400 Foot Subbasin

4. Data Management and Exchange. (a) The Parties agree to develop and maintain coordinated data management system(s) that meet the requirement California Code of Regulations (CCR) Title 23, Section 352.6, such as a single DMS or separate DMSs with coordinated schema to facilitate data sharing.

(b) Each Party shall be responsible for the collection of information to support GSP analyses within their respective plan preparation areas, including but not limited to data to support groundwater conditions assessment, hydrogeologic conceptual model development, numerical model development, and water budget analysis.

(c) The Parties agree, to the fullest extent permitted by law, to make all data necessary to facilitate development of the GSPs available to the other Party and conduct information exchange, either through a formal or informal request, in a timely fashion. To the extent it is necessary to make a written request for information to another Party, each Party shall designate a representative to respond to information requests and provide the name and contact information of the designee to the Coordination Committee. Nothing in this Agreement shall be construed to prohibit any Party from voluntarily exchanging information with any other Party by any other mechanism separate from the Coordination Committee.

(d) It is understood and agreed that a Party to this Agreement may provide the other Party with confidential information. To ensure the protection of such confidential information and in consideration of the agreement to exchange said information, appropriate arrangements may be made to restrict or prevent disclosure.

(e) It is further understood that information to be exchanged may include data obtained from the Monterey County Water Resources Agency (MCWRA) under agreements with the MCWRA. The Parties agree to make the data obtained from MCWRA available for information exchange to the extent permitted by law, and as long as provision of such exchanges follow the terms of agreement with MCWRA.

(f) The Parties agree to consider the development of a Uniform Data Sharing and Confidentiality Agreement with MCWRA so that there will be uniform rules among the three agencies as to how and what data is to be shared, what data shall be considered confidential, and how confidential data is to be secured, protected, shared, and released.

5. Water Budget. The Parties agree to prepare coordinated water budgets and basin setting information for the Monterey and 180/400 Foot Aquifer Subbasins, as required by 23 CCR 354.18. The Parties agree to work to reach consensus on inputs, assumptions, and methodology, as well as review and potential refinement of the portion of the Salinas Valley Integrated Hydrological Model that addresses the Monterey Subbasin and 180/400 Foot Aquifer Subbasins.

6. Monitoring Network. The Parties agree to develop coordinated monitoring network objectives for the Monterey and 180/400 Foot Aquifer Subbasins. The monitoring network shall facilitate the collection of data necessary to characterize groundwater and related surface water conditions and evaluate changing conditions that occur from implementation of the GSPs in each Management Area.

7. Proposition 1 Grant Administration. The Parties agree to coordinate grant administration for GSP development in the Monterey Subbasin. Pursuant to the provisions of the Proposition 1 Sustainable Groundwater Planning Grant Agreement for the Monterey Subbasin,

MCWD will submit invoices, deliverables and other grant administration materials to DWR on behalf of SVBGSA and will redistribute SVBGSA's portion of grant reimbursements to SVBGSA. However, MCWD will not be responsible for verifying the format or information within SVBGSA's submittals. SVBGSA is responsible for timely providing MCWD the information necessary for preparation of quarterly progress reports and grant completion reports.

8. Indemnification. Each Party agrees to defend, indemnify and hold harmless the other Party, and their officers, employees and agents, from against any and all demands, claims, causes of action, suits, judgements, liabilities, liens, losses, damages, expenses, fines, penalties and assessments (collectively, "damages") arising out of or related to the preparation, consideration and approval of a GSP or GSP components by the indemnifying Party for its respective management area, except in the case of a claim or litigation by one Party against the other. The Parties agree to cooperate in the defense of any claim or lawsuit arising out of such actions to the extent permitted by law.

9. Termination. Either Party by majority vote of its governing body may terminate this Framework Agreement for any reason or no reason upon at least nine (9) months' prior written notice to the other Party. Such notice may be made by personal delivery or first class U.S. Mail (postage prepaid), and shall be deemed delivered upon actual receipt of the notice by the other Party. Such notice shall be addressed to the General Manager of the non-noticing Party. Within thirty (30) days of delivery of the notice, the Steering Committee representatives shall personally meet and attempt in good faith to resolve the dispute.

Notwithstanding anything to the contrary herein, this Framework Agreement shall not be terminated (the "effective termination date") unless and until the parties shall have entered into intra-basin coordination agreements in accordance with Water Code §10727.6 and 23 CCR §357.4 for each parties' respective GSP for their respective portions of the 180/400 Foot Aquifer and the Monterey Subbasin. The intra-basin coordination agreement must address any necessary approvals resulting in grant changes from DWR as a result of changing from a single GSP for each of the sub-basins to coordinated multiple GSP's for each of the sub-basins.

Until the effective termination date, each Party shall continue to develop their respective portions of the GS Plans pursuant to the Proposition 1 Coordination Agreement. The Parties shall obtain any necessary approvals for resulting grant changes from DWR. All reimbursements required by that agreement shall be due and payable on the effective termination date.

IN WITNESS WHEREOF, MCWD and SVBGSA execute this Framework Agreement effective as of the date first written above.

Marina Coast Water District Groundwater
Sustainability Agency,

By:  _____

Date: 1/4/19

APPROVED AS TO FORM

Roger K. Masuda

Roger Masuda
MCWDGSA General Counsel

Salinas Valley Basin Groundwater
Sustainability Agency,

By: _____

Date: _____

APPROVED AS TO FORM

Leslie J. Girard
SVBGSA General Counsel

APPROVED AS TO FORM

Roger Masuda
MCWDGSA General Counsel

Salinas Valley Basin Groundwater
Sustainability Agency,

By:  _____

Date: 12 / 13 / 18 _____

APPROVED AS TO FORM


Leslie J. Girard
SVBGSA General Counsel

ATTACHMENT A
Regular Committee Meeting Schedules

The Steering Committee for coordinating GSP development in the 180/400 Foot Aquifer and Monterey Subbasins will meet quarterly beginning the fourth quarter of 2018. Meetings of the Steering Committee shall be subject to the California Open Meeting Law (“Brown Act”). The first meeting of the Committee shall be called by the General Manager of the SVBGSA, who shall preside pro tem at the start of the meeting. At the initial meeting the Committee shall choose a chairperson and set a regular schedule of meetings as required by the Brown Act.

The Technical Committee will meet regularly every other month starting September 2018, exact time and location to be determined. Meetings of the Technical Committee are not subject to the Brown Act. During the Technical Committee meetings, GSA staff and technical consultants will

- Provide status update regarding work progress and schedule;
- Exchange data and information available at the time of the meeting;
- Coordinate development and review of work products; and
- Present and discuss technical topics.

November 19, 2018

Resolution No. 2018-GSA02
Resolution of the Board of Directors
Marina Coast Water District Groundwater Sustainability Agency
Authorizing the General Manager to Execute a Framework Agreement for the
Monterey Groundwater Basin Groundwater Sustainability Plan between the
Marina Coast Water District Groundwater Sustainability Agency and the
Salinas Valley Basin Groundwater Sustainability Agency

RESOLVED by the Board of Directors (“Directors”) of the Marina Coast Water District Groundwater Sustainability Agency (“District”), at a regular meeting duly called and held on November 19, 2018, at 211 Hillcrest Avenue, Marina, California as follows:

WHEREAS, the Sustainable Groundwater Management Act (SGMA) of 2014, Water Code Sections 10720-10736.6 was signed into law September 16, 2014; and,

WHEREAS, the District formed Groundwater Sustainability Agencies for the Central Marina and Ord Community Service Areas in portions of the Monterey Subbasin and the 180/400 Subbasin in conformance with the SGMA; and,

WHEREAS, SGMA gives local agencies, such as the District, additional authorities and powers to manage groundwater; and,

WHEREAS, the District is committed to sustainable management of its groundwater resources; and,

WHEREAS, the Groundwater Sustainability Plans for the District GSAs in conformance with SGMA for the 180/400 Aquifer and the Monterey subbasins are required by 2020 and 2022 respectively; and,

WHEREAS, the District has commenced Groundwater Sustainability Planning and that doing so is consistent with the goals and objectives stated in the District’s Strategic Plan; and,

WHEREAS, SGMA requires a coordinated a Groundwater Sustainability Plan (GSP) or GSPs among or between adjacent GSAs and adjacent subbasins; and,

WHEREAS, GSP development requires collaboration amongst GSAs and other local or regional water management groups at the groundwater subbasin level and encourages collaboration across groundwater subbasin boundaries; and,

WHEREAS, the Framework Agreement’s intent is that one GSP will be developed for the entire Monterey Subbasin (i.e. the Monterey Subbasin GSP), which will contain three management areas that generally encompass the Marina Subarea, the Ord Subarea (both of which are generally located north of State Route 68), and the Corral de Tierra Subarea (located generally south of State Route 68); and,

WHEREAS, the Agreement clarifies that the MCWDGSA will prepare the GSP components for the Marina Management Area and the Ord Management Area and SVBGSA will

prepare the GSP components for the Corral de Tierra Management Area and that the SVBGSA will prepare a GSP for the entire 180/400 Foot Aquifer Subbasin; and,

WHEREAS, the Agreement directs both the MCWDGSA and the SVBGSA will actively consult with each other and include each other for review of draft work products during the GSP development process for the 180/400 Foot Aquifer Subbasin and the Monterey Subbasin.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors of the Marina Coast Water District does hereby Authorize the General Manager to execute a Framework Agreement for the Monterey Groundwater Basin Groundwater Sustainability Plan between the Marina Coast Water District Groundwater Sustainability Agency and Salinas Valley Basin Groundwater Sustainability Agency.

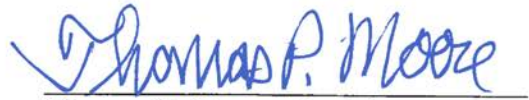
PASSED AND ADOPTED on November 19, 2018 by the Board of Directors of the Marina Coast Water District by the following roll call vote:

Ayes: Directors Cortez, Lee, Shriner, Moore

Noes: Directors None

Absent: Directors Gustafson

Abstained: Directors None


Thomas P. Moore, President

ATTEST:



Keith Van Der Maaten, Secretary

CERTIFICATE OF SECRETARY

The undersigned Secretary of the Board of the Marina Coast Water District Groundwater Sustainability Agency hereby certifies that the foregoing is a full, true and correct copy of Resolution No. 2018-GSA02 adopted November 19, 2018.


Keith Van Der Maaten, Secretary

COOPERATION AGREEMENT AMONG GROUNDWATER SUSTAINABILITY AGENCIES IN THE 180/400 FOOT AQUIFER SUBBASIN

This COOPERATION AGREEMENT (“Agreement”) establishing cooperation among the 180/400 Foot Aquifer Subbasin Groundwater Sustainability Agencies (“GSAs”) is made and entered into and effective upon the date when the last Member signs this Agreement (“Effective Date”) by and among the County of Monterey acting in the capacity of its Groundwater Sustainability Agency (“County GSA”) and the Salinas Valley Basin Groundwater Sustainability Agency (“SVBGSA”). Either County GSA or SVBGSA are also referred to as a “Member” or collectively as “Members”.

Recitals

WHEREAS, in 2014, the California legislature adopted, and the Governor signed into law, three bills (SB 1168, AB 1739, and SB 1319) collectively referred to as the “Sustainable Groundwater Management Act” (“SGMA”), that initially became effective on January 1, 2015, and that has been amended from time-to-time thereafter; and

WHEREAS, the stated purpose of SGMA, as set forth in California Water Code Section 10720.1, is to provide for the sustainable management of groundwater basins at a local level by providing local groundwater agencies with the authority, and technical and financial assistance necessary, to sustainably manage groundwater; and

WHEREAS, SGMA requires the designation of Groundwater Sustainability Agencies (“GSAs”) for the purpose of achieving groundwater sustainability through the adoption and implementation of Groundwater Sustainability Plans (“GSPs”) or an alternative plan for all medium and high priority basins as designated by the California Department of Water Resources (“DWR”); and

WHEREAS, each Member is a GSA, as defined by SGMA, duly organized and existing under and by virtue of the laws of the State of California, and each Member has water supply, water management or land use responsibilities within the 180/400 Foot Aquifer Subbasin (“Subbasin”), which is designated subbasin number [REDACTED] in the most recent edition of DWR Bulletin Number 118; and

WHEREAS, the California Department of Water Resources (“DWR”) on December [REDACTED], 2019 recognized County of Monterey as the exclusive GSA for an approximately 400-acre parcel within the Subbasin currently owned by RMC Pacific Materials, LLC and depicted in Exhibit [REDACTED] attached hereto (the “CEMEX Site”); and

WHEREAS, the SVBGSA is the exclusive GSA for the majority of the Subbasin, excluding the CEMEX Site and one other small area, as depicted in Exhibit [REDACTED] attached hereto; and

WHEREAS, SVBGSA has prepared a draft GSP for the entire Subbasin, including the CEMEX Site; and

WHEREAS, Section 10720.7 of SGMA requires all basins designated as high or medium priority basins by the DWR in its Bulletin 118 be managed under a GSP or coordinated GSPs pursuant to SGMA; and

WHEREAS, the Members have determined that the sustainable management of the Subbasin pursuant to SGMA may best be achieved through the cooperation of the Members operating through this Agreement; and

WHEREAS, the Members agree that this Agreement does not establish nor is it intended to establish a GSA; and

WHEREAS, the Members desire, through this Agreement, to enter into this Agreement for the purpose of organizing the various GSAs in the Subbasin and cooperating in the development and implementation of a single GSP for the Subbasin; and

WHEREAS, the governing board of each Member has determined it to be in the Member's best interest and in the public interest that this Agreement be executed;

NOW THEREFORE, in consideration of the matters recited and the mutual promises, covenants, and conditions set forth in this Agreement, the Members hereby agree as follows:

TERMS OF AGREEMENT

ARTICLE 1. DEFINITIONS

As used in this Agreement, unless context requires otherwise, the meanings of the terms set forth below shall be as follows:

- 1.1. "Agreement" means this Cooperation Agreement.
- 1.2. "CEMEX Site" has the meaning set forth in the recitals above.
- 1.3. "Committee" means any committee established pursuant to Article 8 of this Agreement.
- 1.4. "Coordination Agreement" means a legal agreement adopted between two or more GSAs that provides the basis for coordinating multiple GSAs or GSPs within a basin. Coordination Agreements are required if multiple GSAs in a basin prepare multiple GSPs.
- 1.5. "County GSA" means the County of Monterey Groundwater Sustainability Agency.
- 1.6. "Effective Date" means the date on which the last Member executes this Agreement.
- 1.7. "GSA Workgroup" has the meaning set forth in Article 7 of this Agreement.
- 1.8. "GSA" means a groundwater sustainability agency.
- 1.9. "GSP" means a groundwater sustainability plan.
- 1.10. "Management Area" refers to an area within a basin for which a GSP may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions unique to that area based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.

1.11. “Member” means each party to this Agreement that satisfies the requirements of Article 6 of this Agreement, including any new members pursuant to Article 6 of this Agreement.

1.12. “Member’s Governing Body” means the board of directors, board of supervisors, council, trustees or other voting body that controls the individual public agencies that are Members.

1.13. “Project Agreement” has the meaning assigned to it in Article 11 of this Agreement.

1.14. “SGMA” has the meaning assigned to it in the first Recital of the Agreement.

1.15. “Specific Project” means a project undertaken by some, but not all Members, pursuant to Article 11 of this Agreement.

1.16. “SVBGSA” means Salinas Valley Basin Groundwater Sustainability Agency.

1.17. “State” means the State of California.

1.18. “Subbasin” means the 180/400 Foot Salinas Aquifer Subbasin, to reflect the most recent Bulletin 118 boundaries and as currently shown on the map attached to this Agreement as Exhibit B, which is incorporated herein by this reference. (DWR basin_____).

ARTICLE 2. PURPOSE OF THE AGREEMENT

2.1. The purposes of this Agreement are to: (a) develop, adopt, and implement a single, legally sufficient GSP for the Subbasin in order to implement SGMA requirements and achieve the sustainability goals outlined in the GSP; (b) cooperatively carry out the purposes of SGMA in the Subbasin; (c) coordinate basin-wide public involvement and stakeholder outreach and engagement in implementing the Subbasin GSP; (d) specify the terms under which County GSA designates SVBGSA to manage the CEMEX Site under SGMA and implement the SVBGSA’s GSP for the CEMEX Site, as well as the Subbasin and (e) to maintain mutual respect for the autonomy of individual Members and preservation of each Member’s separate legal authorities, powers, duties and rights as separate public agencies and GSAs, except as set forth in this Agreement.

ARTICLE 3. TERM

3.1. This Agreement shall become effective on the Effective Date and shall continue in full force and effect until terminated pursuant to the provisions of Article 13.

ARTICLE 4. PRESERVATION OF POWERS

4.1 Preservation of Powers. Each Member retains its powers granted through SGMA. Each Member reserves its rights, in its sole and absolute discretion, and all Members confirm that nothing contained herein shall:

4.1.1. Alter any water right, contract right, or any similar right held by any Member or any Member’s landowners or customers, or amend a Member’s water delivery practice, course of dealing, or conduct.

4.1.2. Limit or interfere with any Member's rights and authorities over its own internal matters, including, but not limited to, a Member's legal rights to surface water supplies and assets, groundwater supplies and assets, facilities, operations, water management, and water supply matters.

4.1.3. Modify or limit any Member's police powers, land use authorities, well permitting or any other authority.

ARTICLE 5. BASIN COOPERATION

5.1. Each Member recognizes the benefits of cooperation amongst the GSAs within the Subbasin and, to that end, will in good faith, and with the consent of each Member's governing body, take actions to help effect the timely adoption of a GSP for the entire Subbasin.

5.2. County GSA designates SVBGSA as the manager of the CEMEX Site for groundwater management purposes under SGMA, including the implementation and enforcement, if necessary, of the GSP. SVBGSA agrees to undertake all reasonable and necessary actions to comply with SGMA at the CEMEX Site, including taking actions to review, adopt and implement the GSP, including filing of annual reports and documents required by SGMA.

5.3. County GSA authorizes SVBGSA to exercise any and all legal authorities in compliance with applicable law for the CEMEX Site. In the event County GSA disagrees with SVBGSA's use of legal authority affecting the CEMEX Site, County may promptly, and no later than days following the disputed action, provide notice of disagreement and proceed to dispute resolution in accordance with Article 9.2.

5.4. Nothing herein is intended to or shall be construed as a waiver, relinquishment, abandonment, or infringement of the legal authorities of the County GSA for the CEMEX Site, or of any other legal authority of the County of Monterey.

5.5. The Members shall, whenever and as often as reasonably requested to do so by any other Member, execute, acknowledge, and deliver or cause to be executed, acknowledged, and delivered, any and all documents and instruments as may be necessary, expedient or proper in the reasonable opinion of the requesting Member to carry out the purposes and intent of this Agreement.

ARTICLE 6. MEMBERS

6.1. Initial Members. The initial Members of this Agreement shall be the County of Monterey Groundwater Sustainability Agency and Salinas Valley Groundwater Sustainability Agency.

6.2. New Members. Additional Parties may join the Agreement and become a Member provided that the prospective new member: (a) is an established GSA in the Subbasin as provided by SGMA (Water Code §10723); (b) pays its share of all previously incurred costs, if any; (c) pays all applicable fees and charges, if any; and (d) receives unanimous consent to join from the existing Members, evidenced by the execution of a written amendment to this Agreement signed by all Members, including the new public agency.

ARTICLE 7. GSA Workgroup

7.1. Formation of the GSA Workgroup. This Agreement shall hereby establish the GSA Workgroup that will meet upon the request of any Member. Without amending this Agreement, the composition of the GSA Workgroup may be altered from time to time to reflect the withdrawal of any Member and/or the admission of any new Member. The GSA Workgroup shall consist of the following representatives, who shall be appointed in the manner set forth in Article 7:

7.1.1. One (1) representative appointed by the governing body of each Member, who shall be a member of the governing body of the Member (each, a “Member Director”).

7.1.2. One (1) alternate representative appointed by the governing body of each Member, who may be a member of the governing body or designee of the Member (each, an “Alternate Member Director”).

7.2. Purpose of the GSA Workgroup. The purpose of the GSA Workgroup shall be to establish: (a) a GSA cooperation forum of Member Directors; (c) a mechanism whereby Members raise, and attempt in good faith to resolve, disputes that may occur between and among Members pursuant Article 9.2 of this Agreement; and (d) if necessary, a mechanism to make advisory recommendations to the Members concerning implementation of the GSP for the CEMEX Site.

7.3. Alternate Member Directors. Alternate Member Directors shall not participate as a Member Director in any discussions or deliberations of the GSA Workgroup unless appearing as a substitute for a Member Director due to absence. If the Member Director is not present, the Alternate Member Director appointed to act in his/her place shall have the authority to act in his/her absence. Alternate Member Directors are encouraged to attend all GSA Workgroup meetings and stay informed on current issues before the GSA Workgroup.

7.4. Terms. The term for each member of the GSA Workgroup is four (4) years and these individuals may be reappointed. Each Member Director and Alternate Member Director shall serve at the pleasure of the appointing Member’s governing body and may be removed from the GSA Workgroup by the appointing Member’s governing body at any time. If, at any time, a vacancy occurs on the GSA Workgroup, a replacement shall be appointed by the appropriate Member to fill the unexpired term of the previous Member Director’s seat pursuant to this Article 7 and within ninety (90) days of the date that such position becomes vacant.

7.5. Removal of GSA Workgroup Members. A Director who no longer meets the qualifications set forth in Article 7.1 is automatically removed from the GSA Workgroup. Upon removal of a Member Director, the Alternate Member Director shall serve as a Member Director until a new Member Director is appointed.

ARTICLE 8. OTHER COMMITTEE FORMATION

8.1. Other Committees. The GSA Workgroup may, upon unanimous vote, form additional committees to assist in the implementation of this Agreement and SGMA, including committees comprised of staff or consultant representatives from the Members. Committee meetings shall be noticed to and open to other Members.

ARTICLE 9. DECISION-MAKING AND DISPUTE RESOLUTION

9.1. Decision-making Authority. Topics where the Members desire coordinated decision-making will be considered by the GSA Workgroup, and the Member Directors will strive for unanimous recommendations that will be presented to each Member's governing body for consideration. Such topics include, but are not limited to, implementation of the GSP, including adaptive management measures, and associated financial arrangements. When unable to reach unanimous recommendations, the GSA Workgroup will outline the areas in which it does not agree, providing some explanation to inform the respective GSAs' governing bodies. The recommendations of the GSA Workgroup notwithstanding, ultimate decision-making authority for topics considered by the GSA Workgroup resides with each Member's governing body in accordance with Article 4.1.

9.2. Dispute Resolution. It is the desire of Members to informally resolve all disputes and controversies related to this Agreement, whenever possible, at the least possible level of formality and cost. If a dispute occurs, staff representatives of the disputing Members shall meet and confer in an attempt to resolve the matter. If informal resolution cannot be achieved, the matter will be referred to the GSA Workgroup for further good faith efforts to resolve the dispute. With unanimous consent, the GSA Workgroup may engage the services of a trained mediator or retain technical consultants to assist with dispute resolution. In the event the GSA Workgroup is unable to resolve the dispute, any Member may resort to available legal and equitable remedies to resolve disputes.

ARTICLE 10. MANAGEMENT AREAS

10.1. Formation of Management Areas. The Members do not, at this time, contemplate management areas. However, the Members reserve the right to amend the GSP to create Management Areas within the Subbasin. A Management Area could be defined along the boundaries of one or more Member's jurisdictional boundaries, or it could be defined along other boundaries. In accordance with SGMA, any definition of Management Areas would be for the purposes of enhancing the ability of the GSAs to achieve and maintain sustainable groundwater management in the Subbasin. If Management Areas are formed, the following shall apply:

10.1.1. Common and Management Areas Chapters. The GSP will be organized so that there are GSP chapters or sections that address issues common to all Members followed by Management Area chapters or sections that may include specific minimum thresholds, measurable objectives, monitoring protocols and projects. All chapters must be consistent with the Subbasin sustainability goals.

10.1.2. Management Area Lead Responsibilities and Coordination. Each of the Members will have the responsibility to cooperatively develop their relevant Management Area chapter(s) for inclusion into the GSP. The development of all Management Area chapters will be coordinated through the GSA Workgroup to ensure consistency and efficiency.

10.1.3. Retention of Powers Granted through SGMA. If Management Areas are formed for the CEMEX Site, County GSA shall have the sole right to: 1) approve the sections or chapters of the GSP related to Sustainable Criteria and Projects and Actions as applicable within the CEMEX Site Management Area; 2) consider the interests of beneficial uses and users as required by Water code §10723.4 and GSP regulation §354.10; and 3) exercise the powers, without limitation, conferred upon a GSA by SGMA.

10.1.4. Failure to Submit Management Area Chapter. In the event of a failure by any Member to develop and submit a Management Area chapter within the deadline set by mutual agreement, failure to comply may lead to withdrawal or termination of this Agreement pursuant to Article 13 of this Agreement, or other legal remedies available to the Members.

ARTICLE 11. SPECIFIC PROJECTS

11.1. Member Specific Projects. In addition to the general activities undertaken by all Members, any Member may initiate a Specific Project to implement or comply with SGMA or the GSP. The Member proposing a Specific Project shall provide advance notice of their intent to undertake such project to the GSA Workgroup prior to committing to the Specific Project. The other Members shall promptly and not later than (60) days later respond to the Member proposing the Specific Project with notice of intent to participate or to not participate in the Specific Project. Upon notice of intent to participate, the affected Members shall negotiate a Project Agreement as set forth in section 11.2, below. If the other Members are not interested in participating in the Specific Project, then the proposing Member may individually pursue the Specific Project pursuant to section 11.3, below.

11.2. Project Agreement. Prior to undertaking any Specific Project in Article 11.1 for which a notice to intent to participate is made, the Members electing to participate in the Specific Project shall enter into a Project Agreement. A Member may elect not to participate in a Specific Project by providing notice and not entering into the Project Agreement. Each Project Agreement shall provide the terms and conditions by which the Members that enter into the Project Agreement will participate in the Project. All assets, rights, benefits, and obligations attributable to the Specific Project shall be assets, rights, benefits, and obligations of those Members that have entered into the Project Agreement. Any debts, liabilities, obligations, or indebtedness incurred in regard to a particular Specific Project shall be the debts, liabilities, obligations, and indebtedness of those Members that have executed the Project Agreement in accordance with the terms thereof and shall not be the debts, liabilities, obligations, and indebtedness of those Members that have not executed the Project Agreement.

11.3. Specific Projects Undertaken by One Member. All assets, rights, benefits and obligations attributable to Specific Projects undertaken by one Member shall be the assets, rights, benefits and obligations of that Member. Any debts, liability, obligations, or indebtedness incurred in regard to such Specific Projects shall be the debts, liabilities, obligations and indebtedness of the Member undertaking the Specific Project.

ARTICLE 12. FINANCIAL PROVISIONS

12.1. The Members acknowledge that the cost of the GSP was previously funded in a fair and equitable manner and no party shall seek reimbursement from the other for any cost incurred for the completion of the GSP. Following GSP adoption, as needed, continuing cooperation may be funded by Member contributions. If the Members decide that cost-sharing is required for any contract or expenditure made pursuant to this Agreement, any cost-sharing allocations shall be agreed to in writing by the Members in advance of executing any contracts with consultants, vendors, or other contractors or incurring any expense. Any such contracts shall be drafted in a manner that reflects that consultants, vendors, or contractors hired to perform work under this Agreement are working on behalf of the Members and will be expected to work with the Members on a collective basis and with each Member on an individual basis, as needed.

Such contracts shall be made enforceable by the Members. The contracts shall include appropriate indemnity and insurance provisions agreed upon by the Members. In the event a Member acts as the official contracting party and executes a contract on behalf of the Members (the “Contracting Party”), the Contracting Party shall:

12.1.1. comply with all applicable local, state, and federal laws including, without limitation, the California Public Contract Code and California Labor Code;

12.1.2. provide the other Members a reasonable opportunity to review any bids received and to review and provide input on any draft contract prior to its execution;

12.1.3. not approve any change orders that increase the cost of the original contract by more than 10% without prior consultation and written consent of the other Members;

12.1.4. provide diligent oversight of the work conducted by any contractor, vendor, or consultant under contract executed pursuant to this Agreement; and

12.1.5. maintain complete, accurate, and clearly identifiable records with respect to all contracts executed, and provide to the other Members, upon reasonable request, all records, documents, reports, conclusions, work product, and other information related in any way to any contract executed on behalf of the Members pursuant to this Agreement.

ARTICLE 13. WITHDRAWAL AND TERMINATION

13.1. **Withdrawal.** A Member may unilaterally withdraw from this Agreement by providing notice of withdrawal, in writing, to the other Members. Notices of withdrawal submitted after the GSP has been adopted by the GSAs and transmitted to DWR shall not be effective until the Members have met, conferred and satisfactorily resolved issues associated with withdrawal to ensure that the withdrawal does not cause the Subbasin to be noncompliant with SGMA and potentially subject the Subbasin to probationary status, including, if applicable, the Members negotiating and adopting a Coordination Agreement under SGMA.

13.2. **Termination of Agreement.** This Agreement may be rescinded by unanimous written consent of all Members.

13.3. **Right of Member in Event of Withdrawal or Termination.** Upon withdrawal or termination of a Member, the Member shall be entitled to use all relevant, non-confidential data or other information developed by any Member or the Members under SGMA or used in the implementation of the GSP.

13.4. **Financial Obligations.** Upon withdrawal or termination of a Member, the Member shall remain responsible for any outstanding financial obligation agreed to pursuant to Article 11 or 12.

ARTICLE 14. MISCELLANEOUS

14.1. **No Predetermination or Irretrievable Commitment of Resources.** Nothing in this Agreement shall constitute a determination by any of its Members that any action shall be undertaken or that any unconditional or irretrievable commitment of resources shall be made,

until such time as the required compliance with all local, state, or federal laws, including without limitation the California Environmental Quality Act, National Environmental Policy Act, or permit requirements, as applicable, has been completed.

14.2. Notices. Notices hereunder shall be sufficient if delivered via electronic mail, First-Class mail or facsimile transmission to the addresses as specified in Exhibit A.

14.3. Amendment. This Agreement may be amended at any time, by unanimous agreement of the Members, provided that before any amendments shall be operative or valid, they shall be in writing and signed by all Members hereto.

14.4. Agreement Complete. This Agreement constitutes the full and complete agreement of the Members. This Agreement supersedes all prior agreements and understandings, whether in writing or oral, related to the subject matter of this Agreement that are not set forth in writing herein.

14.5. Severability. If any provision of this Agreement is determined to be invalid or unenforceable, the remaining provisions will remain in force and unaffected to the fullest extent permitted by law and regulation.

14.6. Execution in Counterparts. The Parties intend to execute this Agreement in one or more counterparts each of which shall be considered an original Agreement.

14.7. Withdrawal by Operation of Law. Should the participation of any Member to this Agreement be decided by the courts to be illegal or in excess of that Member's authority or in conflict with any law, the validity of this Agreement as to the remaining Members shall not be affected thereby.

14.8. Assignment. The rights and duties of the Members may not be assigned or delegated without the written consent of all other Members. Any attempt to assign or delegate such rights or duties in contravention of this Agreement shall be null and void.

14.9. Binding on Successors. This Agreement shall inure to the benefit of, and be binding upon, the successors or assigns of the Members.

14.10. Venue. This Agreement shall be governed by and construed in accordance with the laws of the State of California, and any action related to the terms of this Agreement will be filed in Monterey County Superior Court.

14.11. GSA Status. By execution hereof, each Member represents that it is a legal entity authorized to be a Groundwater Sustainability Agency pursuant to California Water Code § 10723.

14.12. Indemnity. In lieu of the provisions of Government Code section 895.6, and pursuant to Government Code section 895.4, each Member agrees to defend, indemnify and hold harmless the other Member, and its officers, employees and agents, from any and all claims, suits, judgments, damages, penalties, costs, expenses, liabilities and losses (including without limitation, sums paid in settlement of claims, actual attorneys' fees, paralegal fees, consultant fees, engineering fees, expert fees, and any other professional fees) that arise from or are related in any way to each Member, its employees, officers, or other agents in the operation and/or

performance of this Agreement; provided, however, that no Member shall indemnify or hold harmless another Member for that other Member's own negligent acts, errors, or omissions, or willful misconduct, in the operation and/or performance of this Agreement. This indemnity shall survive the termination of this Agreement and the withdrawal of any Member to this Agreement.

14.13. Joint Defense. In the event of any challenge to the Subbasin GSP as it relates to the CEMEX Site, or made subject to a claim or penalty regarding the same, the Members shall meet and confer to determine whether to further coordinate and cooperate by undertaking joint defense, including utilizing a common interest/joint defense agreement.

IN WITNESS WHEREOF, the parties hereto, pursuant to resolutions duly and regularly adopted by their respective governing boards, have caused their names to be affixed by their proper and respective officers as of the date of execution of this Agreement.

By: _____ Date: _____
Chair, County of Monterey GSA

By: _____ Date: _____
Chair, SVBGSA

APPROVED AS TO FORM AND LEGALITY

By: _____ Date: _____

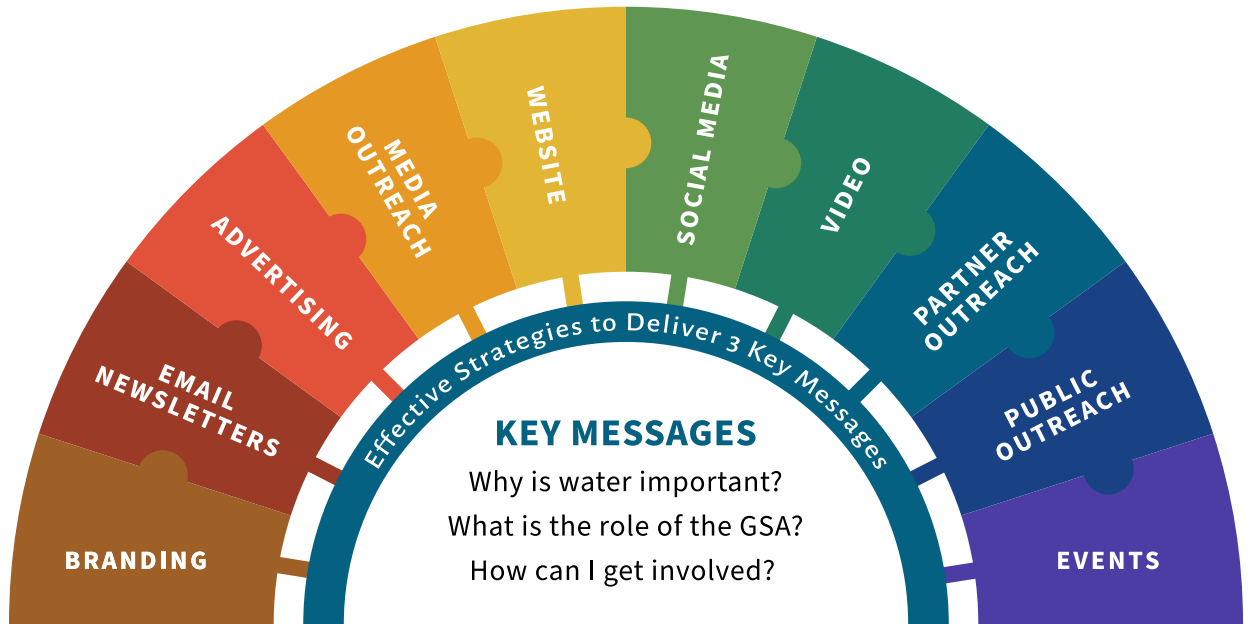
By: _____ Date: _____

Chapter 2
Appendix 2-A

Agency-Wide Marketing & Communications Plan

Appendix 2A. Agency-Wide Marketing & Communications Plan

Marketing & Communications Plan



Chapter 2

Appendix 2-B

Key Messages

Appendix 2B. Key Messages

Initially, our message points focus on: (1) **getting to know your GSA**; (2) **an overview of groundwater sustainability planning for our community**; and (3) **how we got here**. The key messages will be expanded as the work evolves.

Key Messages: Get to Know Your GSA

- The SVBGSA is on a mission to develop a Salinas Valley Integrated Groundwater Sustainability Plan by 2023 and achieve groundwater sustainability in the Salinas Valley by 2040.
- Our groundwater basin is comprised of 6 subbasins one of which is identified as “Critically Over-Drafted” – the 180/400-Foot Aquifer.
- The rate of the community’s current water use is unsustainable. To meet our community’s ongoing water supply needs now and into the future we must balance the basin.
- The State has put us on a tight timeline to fix the problem. We ambitiously accept the challenge.
- As of 2020, we have GSP for the 180/400-Foot Aquifer Subbasin and have scoped projects and programs to bring the subbasin back into balance.
- From 2020 through 2022 we will work on GSPs for the other five basins.
- We will start implementing our plans immediately and efficiently use our GSA sustainability fee to work towards sustainability.
- Developing a sustainability plan for groundwater impacts everyone. That’s why the SVBGSA Board and our Advisory Committee are diverse and include stakeholders from every walk of life in the Salinas Valley.
- We have an unprecedented opportunity, and responsibility, to work together collaboratively and develop a science-based Groundwater Sustainability Plan.
- Join us! Visit our website, sign up for updates, attend the next meeting and follow us on Facebook.

Key Messages: Groundwater Sustainability Plan

The Upper Valley Subbasin Groundwater Sustainability Plan and Salinas Valley Integrated Sustainability Plan are our 20-year plans to ensure that the Salinas Valley Groundwater Basin (SVGB) will be managed sustainably for our current and future generations.

- Aquifer subbasin planning is not only critical to our future - it's mandatory. SGMA mandates that science-based GSPs be developed for the Basin by 2020 and 2022, and that the plan be implemented by 2040.
- The stakes are high. Should we choose not to act, or fail to meet the 2020, 2022, or 2040 milestones, the State can intervene with required (and hefty) pumping restrictions and extraction fees.
- To meet these milestones, we have been granted the authority to develop GSPs, monitor and measure the basin and individual wells within the basin, implement capital projects, and assess necessary fees for planning and implementation.
- Six "Sustainability Indicators" will be evaluated in the GSPs and used to gauge what we need to do to bring our groundwater supply and demand back into balance.
- Given the hydrologic and geographic diversity of the SVGB, the ISP will identify overlapping projects and programs which benefit the basins. Our planning process includes initiating planning committees for the subbasins and maintains our governance structure of the Board, advisory committee, and planning committee.
- Stakeholder engagement is a key component to the development and implementation of the GSP. We encourage and invite the community to get involved. Attend our monthly Board meetings, attend a Subbasin Planning Committee meeting, sign up for our newsletter.

Key Messages: Our History

- The Salinas Valley Basin GSA is firmly rooted in stakeholder engagement.
- From 2015-2017, local agencies and stakeholders worked with the Consensus Building Institute (CBI) to facilitate the formation of the GSA.
- In 2015, CBI began by conducting a Salinas Valley Groundwater Stakeholder Issue Assessment, which included interviews and surveys. This process resulted in recommendations for a transparent, inclusive process for the local implementation of SGMA and the formation of the GSA.
- Following the Issue Assessment, The Collaborative Work Group of stakeholders representing a broad range of interests met from March 2016 through April 2017 and developed recommendations on the governance structure, voting, and legal structure of the GSA.
- The Stakeholder Forum was simultaneously held throughout 2016 and served as a critical element for interested stakeholders and the public to learn about and provide input on the GSA.

- After nearly two years of community engagement led by the top consensus-building professionals in the nation, the Salinas Valley Basin Groundwater Sustainability Agency was formed in April 2017 with a broad and diverse foundation of support.

Chapter 2
Appendix 2-C

Media Policy

Appendix 2C. Media Policy

The press is an important partner for getting our message out to the community. To maximize our effectiveness in working with the media, a consistent protocol will be followed by staff, consultants, board members, and committee members.

Agency Spokesperson(s)

- The primary spokesperson for all media inquiries is the General Manager (GM). Media inquiries should first be directed to the GM to coordinate a response.
- Reporters may want to also interview board and community members. Some board members may enjoy media conversations, while others do not. The SVBGSA will maintain a standby list of a few board and community members, who will be prepared and can be called on for media inquiries.
- In preparation for the interview, the GM and Public Information Officer (PIO) will work closely with the spokespeople in preparation for media interviews. Factual and coordinated talking points will be provided in advance of the interview.

Responding Quickly

- Reporters work on tight deadlines. To ensure an opportunity is not missed, all media inquiries should receive an immediate response and referred to the GM at the earliest possible opportunity.

The Back-Up Plan

- If the GM is unavailable and cannot be reached for comment, media inquiries should be directed to the Board's back-up media representative. The Board's representative will contact the PIO to determine whether a response is necessary. If the response is not urgent, offer the media an appointment time for when the GM is available. If it is a time sensitive and urgent matter, a statement will be released from the Board representative in close coordination with the PIO.

News Monitoring and Tracking

- Following the interview or statement, if published, the GM or PIO will circulate the coverage to the Board and committee members.

Chapter 2

Appendix 2-D

Disadvantaged Communities (DACs)

APPENDIX 2D. DISADVANTAGED COMMUNITIES

Introduction and Purpose of Appendix

Many of the communities in the Salinas Valley Groundwater Basin are classified as Disadvantaged Communities (DACs) and Severely Disadvantaged Communities (SDACs), as well as Economically Distressed Areas (EDAs). The SVBGSA jurisdictional area has well documented DAC-designated areas including seven Census Designated Places (CDPs), 60 Block Groups, and 20 Tracts. Additionally, work conducted by the Greater Monterey County Integrated Regional Water Management (IRWM) Program identified 25 small disadvantaged, severely disadvantaged, and suspected disadvantaged communities in unincorporated areas of the IRWMP region (Greater Monterey County Regional Water Management Group, 2018), which includes the entire SVBGSA area. As many of these communities are dependent on groundwater for drinking water, they face challenges associated with drinking water quality.

The State of California has recognized challenges in providing clean, safe, and affordable drinking water to all of its citizens, especially low-income and minority communities. In 2012, California law AB 685, the Human Right to Water, declared that every person has a right to clean, safe, and affordable drinking water. In 2019, the State further made it a priority by passing SB 200, the Safe and Affordable Drinking Water Fund. In Fiscal Year 2019-2020 alone, it will dedicate \$130 million for safe drinking water solutions in DACs that do not have access to safe drinking water.

The Salinas Valley Groundwater Basin is one of the most productive agricultural regions in the world. However, over several decades seawater intrusion and intensive fertilizer use resulting in nitrate contamination have compromised drinking water quality in parts of the Basin. Nitrate contamination in groundwater can pose serious health risks to pregnant women and infants if consumed at concentrations above the maximum contaminant level (MCL) of 10 milligrams per liter (mg/L) nitrate as nitrogen ($\text{NO}_3\text{-N}$). Nitrate contamination not only poses health risks, but also results in major costs for small rural communities. This is particularly challenging for the many economically disadvantaged communities in the Basin.

SGMA has limited requirements with regards to improving groundwater quality; the SGMA regulations are written in terms of avoiding degradation (CWC, §354.28 (c)(4)). However, the SVBGSA seeks to engage more constructively with disadvantaged communities moving forward in the subbasin planning processes. SVBGSA maintains excellent relationships with agencies monitoring and addressing water quality issues in the Basin. The purpose of this appendix is to provide background information on the relationship between DACs (including SDACs and EDAs) and groundwater, particularly with respect to the drinking water challenges in the Basin. Unless otherwise noted, the information in this appendix is based on and much is excerpted from

the Integrated Regional Water Management (IRWM) Plan for the Greater Monterey County Region (Greater Monterey Regional Water Management Group, 2018).

Identifying DACs in the Salinas Valley

A Disadvantaged Community (DAC) is defined in the California Water Code (§79505.5(a)) as a community with an annual median household income that is less than 80% of the statewide annual median household income, based on five-year estimates. Further, a Severely Disadvantaged Community (SDAC) is defined as a community with an annual median household income that is less than 60% of the statewide annual median household income, based on five-year estimates. For information on how these designations are determined, see the Greater Monterey County Integrated Regional Water Management Plan (Greater Monterey County Regional Water Management Group, 2018). These designations are significant because in order for a community to be eligible for State grant funds specially allocated for disadvantaged communities, or to be eligible for reduced matching fund requirements, a community must meet one of these strict definitions.

At the same time, the California Department of Water Resources (DWR) also recognizes the existence of communities that are economically challenged but that are not designated as being disadvantaged according to U.S. Census data. These communities have been labeled Suspected Disadvantaged Communities until their status can be proven either way.

In addition to disadvantaged communities, DWR recognizes Economically Distressed Areas. An economically distressed area (EDA) is defined as:

...a municipality with a population of 20,000 persons or less, a rural county, or a reasonably isolated and divisible segment of a larger municipality where the segment of the population is 20,000 persons or less, with an annual median household income that is less than 85 percent of the statewide median household income, and with one or more of the following conditions as determined by the department: (1) financial hardship, (2) unemployment rate at least 2 percent higher than the statewide average, or (3) low population density (Water Code §79702(k)).

Figure 1 shows the communities currently designated as DACs, SDACs, or EDAs in the Salinas Valley. This figure combines census tracts, blocks, and places to give a more complete representation of the communities within this area. Table 1 lists the DACs and SDACs in the Basin along with their 2016 populations. Currently, the statewide median household income is \$63,783. Therefore, the calculated DAC and SDAC thresholds are \$51,026 and \$38,270, respectively (see <https://water.ca.gov/Work-With-Us/Grants-And-Loans/Mapping-Tools>). For example, Castroville has a median household income of \$35,000 (Rural Community Assistance Corporation, 2017). Moss Landing is not currently designated as a DAC; however, according to

a survey by the California Rural Water Association (2018), its median household income is \$47,600.

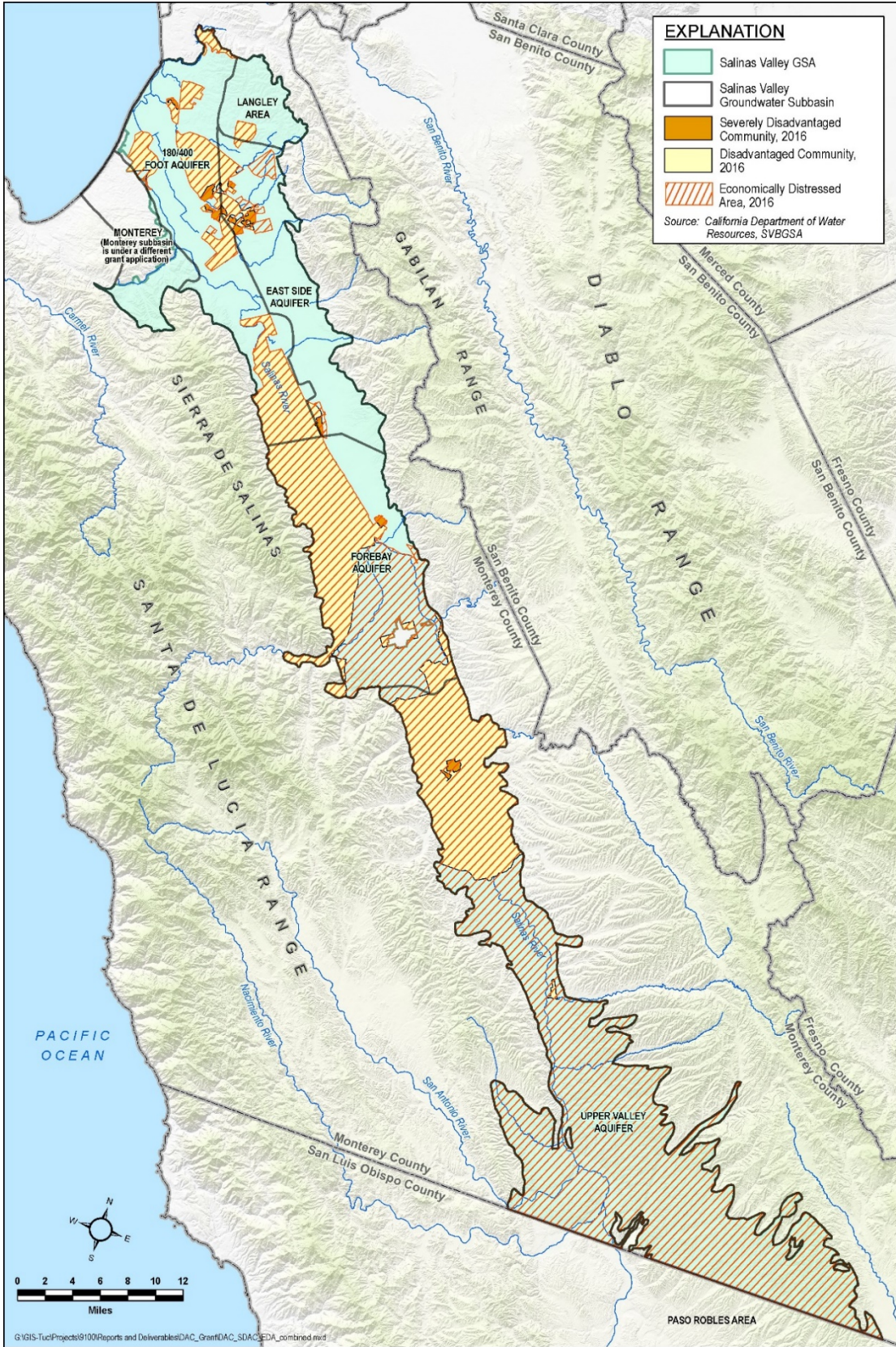


Table 1. DAC/SDAC 2016 Population in the Salinas Valley Groundwater Basin

Tract Name	Block Group Number	DAC/SDAC (2016)	Population (2016)
010804	2	DAC	1,612
000900	1	DAC	952
014302	1	DAC	1,544
011101	2	DAC	1,317
011203	2	DAC	2,840
011204	2	DAC	2,718
011304	2	DAC	3,127
011304	3	DAC	2,777
000900	2	DAC	1,360
000600	1	DAC	1,764
010504	2	DAC	2,716
010607	2	DAC	2,298
000400	1	DAC	3,039
010505	2	DAC	3,801
000300	1	DAC	2,226
000800	2	DAC	1,665
010506	1	DAC	2,897
000502	2	DAC	1,659
000702	3	DAC	2,015
014500	1	DAC	1,195
011101	3	DAC	3,048
011101	1	DAC	906
000200	1	DAC	2,549
010506	2	DAC	1,830
000400	2	DAC	2,922
010608	2	DAC	1,011
010607	1	DAC	2,317
000400	3	DAC	1,565
010608	3	DAC	995
000702	1	DAC	1,994
000600	4	DAC	1,022
014700	4	DAC	3,169
010202	1	DAC	1,037
010501	4	DAC	1,156
010400	3	DAC	1,826
011202	2	DAC	3,077
000900	3	SDAC	3,055
010400	1	SDAC	1,685
011102	1	SDAC	3,925
011303	2	SDAC	1,122
000702	2	SDAC	2,160
000701	2	SDAC	2,325
000501	2	SDAC	2,286
001300	1	SDAC	2,786
000501	1	SDAC	2,113
010804	3	SDAC	2,670
000103	1	SDAC	1,633

Tract Name	Block Group Number	DAC/SDAC (2016)	Population (2016)
001801	1	SDAC	1,721
001700	2	SDAC	1,526
000600	3	SDAC	2,924
000800	3	SDAC	1,526
000600	2	SDAC	1,480
000701	3	SDAC	1,766
000701	1	SDAC	1,881
001802	2	SDAC	1,536
011302	1	SDAC	2,149
011302	2	SDAC	1,321
		Total DAC/SDAC	117,536
		Total SDAC	43,590

As highlighted in the IWRM Plan, small disadvantaged communities in unincorporated areas often have small public water systems that serve fewer than 200 connections. The smallest of these communities have State Small Water Systems (SSWS), which serve between five and 14 connections); Local Small Water Systems (LSWS), which serve between two and four connections; and/or households served by private domestic groundwater wells. There is a significant difference in capacity, water supply, and infrastructure needs between a DAC served by a large water system (e.g., a large disadvantaged community of several thousand people, or a small disadvantaged community served by a large water utility) and a small disadvantaged community served by a small water system or by private wells. The State Water Resources Control Board (SWRCB) summarized these differences in its 2015 report, *Safe Drinking Water Plan for California* (SWRCB, 2015):

- Small water systems have the greatest difficulty in providing safe drinking water because they are least able to address the threats to public health associated with water quality.
- Larger water systems are better equipped to deal with water quality issues because they have more customers to fund the necessary improvements, have economy of scale, more technical expertise, better management skills and knowledge, are able to solve operational problems internally, and have dedicated financial and business-related staff. They generally have more sophisticated treatment and distribution system operators who are able to react to incidents and changes in treatment conditions that may occur during operations.
- On the other hand, small systems, especially those in disadvantaged communities, have only a small number of customers, which provides them with limited fiscal assets and no economy of scale. They often lack technical expertise, the ability to address many of the issues pertinent to operating a water system, as well as qualified management and financial and business personnel. In many instances, especially for very small water systems, the system operator may be just a part-time position.

Following the Greater Monterey County IRWM Plan, this Appendix includes DACs, SDACs, and EDAs and places an emphasis on small disadvantaged communities for the reasons highlighted by the SWRCB.

Jurisdictional Responsibilities

A number of agencies and groups have existing jurisdictional responsibility over groundwater quality. The SVBGSA will collaborate with these agencies and groups so as to not duplicate efforts or overstep its institutional authority. The following agencies and groups have responsibility over various aspects of groundwater (Greater Monterey County Regional Water Management Group, 2018):

- **Greater Monterey County IRWM Regional Water Management Group** – AB1630 appropriated State grant funds to enable this Group to develop solutions for DACs to be integrated into the broader IRWM planning effort. IRWM is a voluntary, collaborative effort to identify and implement water management solutions on a regional scale to increase regional self-reliance, reduce conflict, and manage water resources. The IRWM planning process brings together water and natural resource managers along with other community stakeholders to collaboratively plan for and ensure the region’s continued water supply reliability, improved water quality, flood management, and healthy functioning ecosystems. The Department of Water Resources manages grant programs specifically designated for adopted IRWM Plans including funding for water quality improvement projects.
- **State Water Resources Control Board (SWRCB)** – The SWRCB administers the state’s Drinking Water Program as the federally-designated Primary Agency responsible for the administration and enforcement of the Safe Drinking Water Act requirements in California. Prior to July 1, 2014, the California Department of Public Health was designated as the Primary Agency. These requirements are defined in the California Health and Safety Code and Titles 17 and 22, California Code of Regulations. The CDPH continues to maintain the State’s Drinking Water and Radiation Laboratory, which serves as the state’s principal laboratory as required for primacy under the Safe Drinking Water Act. The SWRCB is responsible for the regulatory oversight of over 7,600 public water systems in California. It may delegate oversight responsibility of public water systems with less than 200 service connections to local county health departments, which it has done in Monterey County.
- **Monterey County Department of Environmental Health (MCDEH)** – Delegated oversight responsibility by the SWRCB, MCDEH is the Local Primary Agency and its Drinking Water Protection Services regulates domestic water systems in the County that serve between two and 199 connections. There are approximately 160 such systems in the County regulated under this program. MCDEH also regulates all well construction in Monterey County.
- **SWRCB and Central Coast Regional Water Quality Control Board** – State policy on water quality control falls under the SWRCB, which is the state water pollution control agency for all purposes under the Clean Water Act (CWC §13160), including drinking water sources from both surface water and groundwater. The SWRCB has nine regional boards, including the Central Coast Regional Water Quality Control Board (CCRWQCB), which is responsible for the day-to-day implementation of the federal Clean Water Act and California’s Porter-Cologne Water Quality Control Act in the Central Coast. Together, the State Water Board and Regional Boards are responsible for the protection of the quality of ambient surface and groundwater up to the point where the water enters a drinking water well or surface water intake. The Regional Boards are

responsible for developing and enforcing water quality objectives and implementation plans to protect the beneficial uses of the State's waters. The Regional Boards enforce water quality regulations through the following means.

- **Basin Plan** – Each Regional Board is directed to formulate a water quality control plan, called a Basin Plan, that includes water quality standards under the Clean Water Act. The CCRWQCB implements the Basin Plan in the Central Coast Region, in part by issuing and enforcing waste discharge requirements to individuals, communities, or businesses whose waste discharges can affect water quality, including surface water, groundwater, or wetlands.
- **Waste Discharge Requirements (WDRs)** – WDRs, sometimes simply known as Orders, for discharges to waters of the United States also serve as National Pollutant Discharge Elimination System (NPDES) permits. The SWRCB and CCRWQCB regulate discharges from wastewater treatment and disposal systems under general WDRs. Small, domestic wastewater treatment systems having a maximum daily flow of 100,000 gallons per day (gpd) or less that discharge to land are covered under a statewide general WDR permit for small systems (Order WQ 2014-0153-DWQ). The State and Regional Boards are also responsible for plans and permits related to other uses, such as farming, septic tanks, and larger scale sewage treatment that can also impact the quality of surface and ground waters.
- **Irrigated Lands Regulatory Program (ILRP)** – The SWRCB initiated the ILRP in 2003 to control agricultural runoff's impairment of surface waters. In 2012, groundwater regulations were added to the program. Waste discharge requirements, which protect both surface water and groundwater, address agricultural discharges throughout the Central Coast. Anyone who irrigates land to produce crops or pasture commercially must seek ILRP permit coverage and maintain in good standing with their coalitions.
- **Department of Pesticide Regulation** – The California Department of Pesticide Regulation is responsible for ensure that pesticides do not contaminate the groundwater.
- **Office of Environmental Health Hazard Assessment** – The California Office of Environmental Health Hazard Assessment is responsible for providing the SWRCB with health-based risk assessments for contaminants. These assessments are used to develop primary drinking water standards.
- **California Public Utilities Commission (CPUC)** – The CPUC is responsible for ensuring that California's investor-owned water utilities deliver clean, safe, and reliable water to their customers at reasonable rates. The Water Division regulates over 100 investor-owned water and sewer utilities under the CPUC's jurisdiction; providing water service to about 16 percent of California's residents.

- **Local Agency Formation Commissions (LAFCOs)** – These commissions oversee the expansion of service areas of public agencies, including cities that own or operate public water systems. They can review public agencies to determine if the agency is providing municipal services in a satisfactory manner, including the delivery of safe drinking water.
- **Central Coast Groundwater Coalition (CCGC)** – The CCGC is a non-profit 501(c)5 mutual benefit organization that represents landowners and growers who operate in Monterey, San Benito, Santa Clara, Santa Cruz, San Luis Obispo, and Santa Barbara counties, as well as the northern portion of Ventura County in the Central Coast Region. The CCGC is not a governmental organization like the other jurisdictional agencies, and therefore does not have legal jurisdictional authority. However, the CCGC is the primary organization tasked with fulfilling the groundwater quality regulatory requirements in the Irrigated Lands Regulatory Program (ILRP) of the Central Coast Regional Water Quality Control Board. The organization combines the resources of its members to achieve economies of scale to comply with the regulatory requirements of the CCRWQCB. Between 2013 and 2015, the CCGC characterized the rural drinking water supply and shallow groundwater aquifer in the CCGC region which includes the previously noted six counties. In addition to using data from member wells, CCGC gathered publicly available data generated by the counties and data submitted by landowners and growers who perform individual monitoring as part of the current ILRP. Information collected on tested wells included depth to groundwater and well perforation levels where available. For many wells, quality parameters were collected, such as nitrates and total dissolved solids (TDS). In the groundwater characterization report, the information from the six counties was compiled and analyzed to produce maps showing areas where groundwater quality exceeds drinking water limits for nitrates. This information enabled CCGC to develop an accurate groundwater characterization in 2015 which provides growers, regulators and the public with a better understanding of local aquifers and geology in the six-county region.

DAC Drinking Water Challenges

Drinking water systems are categorized according to the number of service connections:

- Public water systems, which are referred to as municipal public water systems in this GSP for clarity, are water systems that provide drinking water to at least 15 service connections or serve an average of at least 25 people for at least 60 days a year,
- State small water systems are water systems that provide piped drinking water to between five and 14 service connections, and do not regularly serve drinking water to more than an average of 25 individuals daily for more than 60 days out of the year,
- Local small water systems are water systems that provide drinking water to between two and four service connections, and

- Private domestic wells usually provide water to only one or two connections.

Since state small water systems, local small water systems, and private domestic wells face more severe drinking water challenges than public water systems, they are the focus for the following discussion.

Private domestic wells are not regulated by the State. MCDEH requires one-time nitrate testing of newly installed private domestic wells, but there are no additional requirements. The SWRCB's Groundwater Ambient Monitoring and Assessment (GAMA) Domestic Well Project was developed in order to address the lack of domestic well water quality data. The GAMA Groundwater Information System includes numerous datasets that can be downloaded by users. The CCRWQCB also collects domestic well data per Irrigated Lands Regulatory Program (ILRP) groundwater monitoring requirements.

Between October 2013 and August 2014, the CCGC compiled water quality data from 229 samples from domestic and irrigation wells in the Salinas Valley. Data were collected from the GeoTracker GAMA database that includes data from the California Department of Public Health, GAMA-SWRCB data collection efforts and Regulated Sites. Additional data were collected from the USGS National Water Information System data, and data were extracted from the GAMA special study carried out by Lawrence Livermore National Laboratory. In its 2015 *Groundwater Characterization Report* (CCGC, 2015), CCGC made the following conclusions regarding nitrate in the Salinas Valley:

- 41% of wells with nitrate concentrations (or 309 of 758 total wells sampled) had maximum concentrations over the MCL.
- 34% of the land area within the Salinas Valley has nitrate concentrations over the MCL.
- 55% of domestic wells or 121 of 221 total sampled on CCGC-member properties had concentrations exceeding the MCL.

Domestic wells and wells associated with local small and state small water systems are generally more susceptible to nitrate contamination since they are typically shallow and are more likely to be located in rural areas within or adjacent to agricultural areas. They are also more susceptible to potential nitrate contamination from nearby septic systems. Public water systems, on the other hand, tend to access deeper groundwater and are more likely to be located in areas that are less susceptible to nitrate contamination. Public water system operators implement regular water quality testing and treatment as necessary, and wells are usually taken out of service once they become contaminated. Funding programs are often available for public water systems, and costs are spread out over a large number of ratepayers over time. When contamination is detected in private domestic wells, treatment options are limited and the individual homeowner will typically have to bear the full cost of addressing the problem (CCGC, 2015).

According to the IRWM Plan, only a very small percentage of domestic wells in Monterey County have been tested through the Central Coast Regional Water Quality Board's groundwater monitoring programs. MCDEH has recently adopted a policy to begin requiring well testing when an application for repair or replacement of a septic system is proposed, which will provide new additional data.

MCDEH Drinking Water Protection Services regulates state small and local small water systems through their Small Water System Program. There are currently 694 local small and 276 state small water systems in Monterey County, which serve about 4,232 connections (Greater Monterey County Regional Water Management Group, 2018).

DACs in the Basin rely primarily on groundwater for their drinking water supply, except for those who rely on bottled water due to unsafe or poor water quality conditions. The primary drinking water problems experienced by small DACs in Monterey County are related to nitrate contamination, seawater intrusion, or other contaminants of concern. Numerous studies over the decades have documented these challenges.

Insufficient water quantity is generally less of a problem in the Salinas Groundwater Basin than poor or unsafe water quality; although poor water quality effectively results in insufficient water supply. During the recent prolonged drought, while Monterey County was classified as experiencing "exceptional" drought, very few water users in the Greater Monterey County IRWM region actually suffered from a lack of water availability. While the drought had immediate impacts on surface water supplies throughout the State, it tended to have a more gradual impact on groundwater supplies. Groundwater quality, rather than quantity, is of primary concern for drinking water supplies in the Salinas Valley Groundwater Basin, particularly nitrate contamination and seawater intrusion.

Nitrate Contamination

Nitrate contamination is particularly problematic in the Salinas Valley Groundwater Basin, where agriculture dominates the landscape. Nitrate is currently extensively monitored and evaluated by the CCGC and is documented in a report submitted to the CCRWQCB (CCGC, 2015). Nitrate contamination in the Salinas Valley was first documented in a report published by the Association of Monterey Bay Area Governments (AMBAG) in 1978. In 1988, a report by the State Water Board documented that nitrate levels in the Salinas Valley groundwater had impaired its beneficial use as a drinking water supply. In a July 1995 staff report, the SWRCB ranked the Salinas Valley as their number one water quality concern due to the severity of nitrate contamination. All of the Salinas Valley cities have had to replace domestic water wells due to high nitrate levels that exceed the drinking water MCL. Maps prepared by the MCWRA indicate that elevated nitrate concentrations in groundwater were locally present through the 1960s, but significantly increased in the 1970s and 1980s.

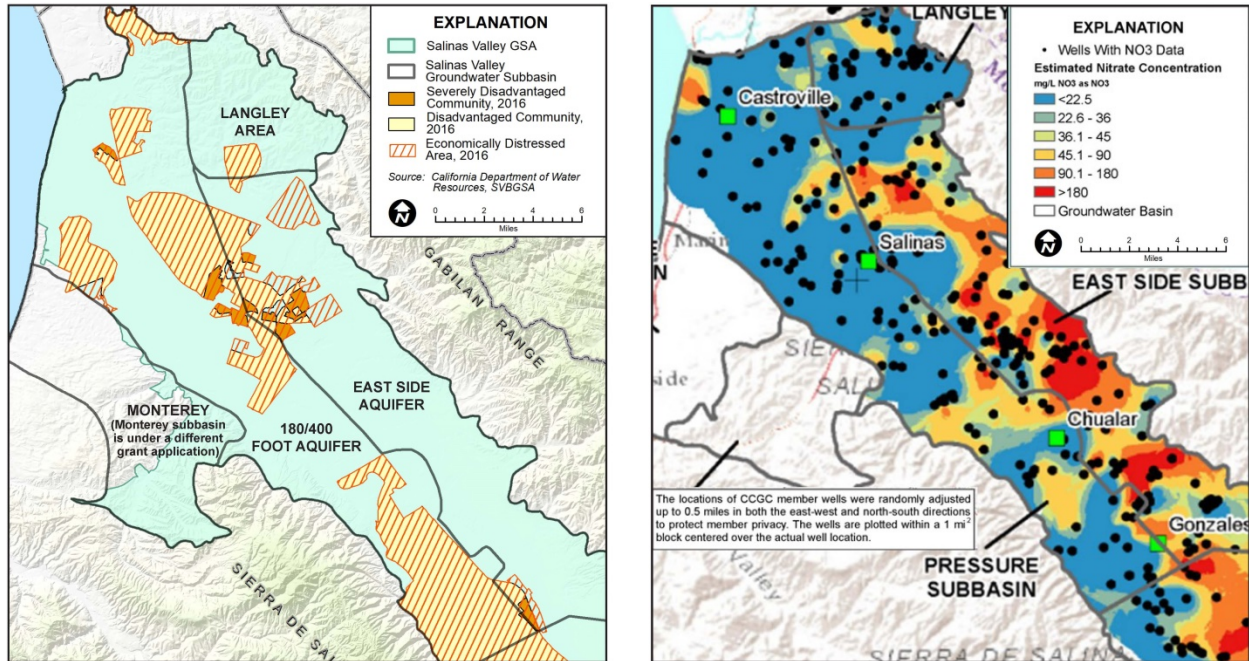


Figure 2. DACs, SDACs, and EDAs in the 180/400-Foot Aquifer Subbasin and Nitrate Concentration Map developed by CCGC (2015)

Seawater Intrusion

Seawater Intrusion is another major water quality concern for DACs and SDACs, primarily impacting coastal communities in the northern part of the Salinas Valley Groundwater Basin. Seawater intrusion has been observed in the 180-Foot and 400-Foot Aquifer Subbasin for over 70 years, and was documented in DWR Bulletin 52 in 1946. By the 1940s, many agricultural wells in the Castroville area had become so salty that they had to be abandoned (Greater Monterey County Regional Water Management Group, 2018). Seawater is high in chlorides. EPA defines the 500 mg/L threshold as an Upper Limit Secondary Maximum Contaminant Level (SMCL). Seawater intrusion is the primary threat to drinking water supplies for many DACs located in the northern coastal portion of the Basin.

Seawater has intruded inland in the 180-Foot and 400-Foot Aquifers, as shown on Figure 3 and Figure 4. Seawater intrusion in the 180-Foot Aquifer covered approximately 20,000 acres in 1995 and had expanded to approximately 28,000 acres by 2010. Since then, the rate of expansion has decreased, with an overlying area of 28,300 acres in 2017. The area overlying intrusion into the 400-Foot Aquifer is not as extensive, with an overlying area of approximately 12,000 acres in 2010. However, between 2013 and 2015, the 400-Foot Aquifer experienced a significant increase in the area of seawater intrusion, from approximately 12,500 acres to approximately 18,000 acres, likely resulting from localized downward migration between aquifers.

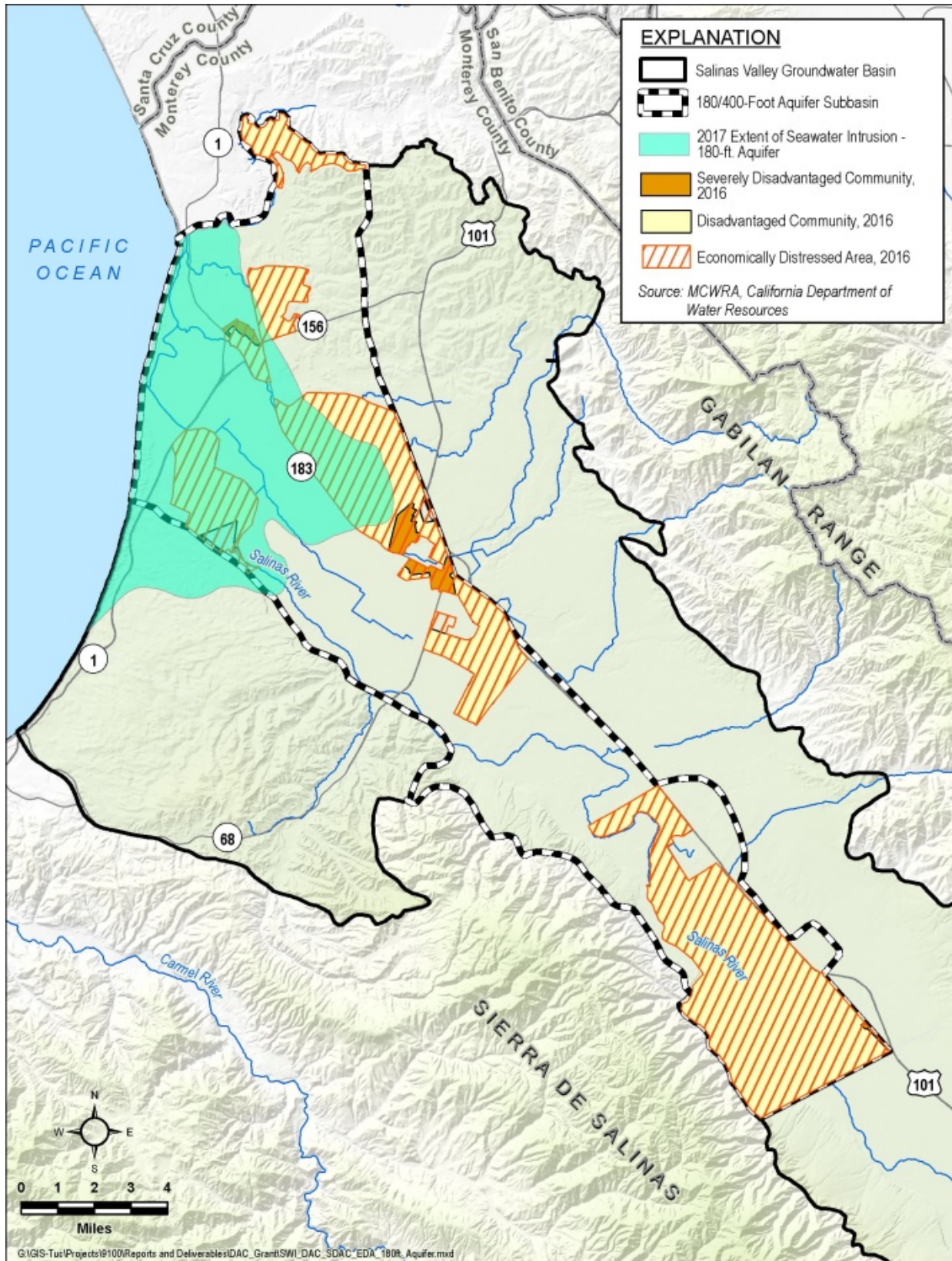


Figure 3. 2017 Extent of Seawater Intrusion in the 180-Foot Aquifer

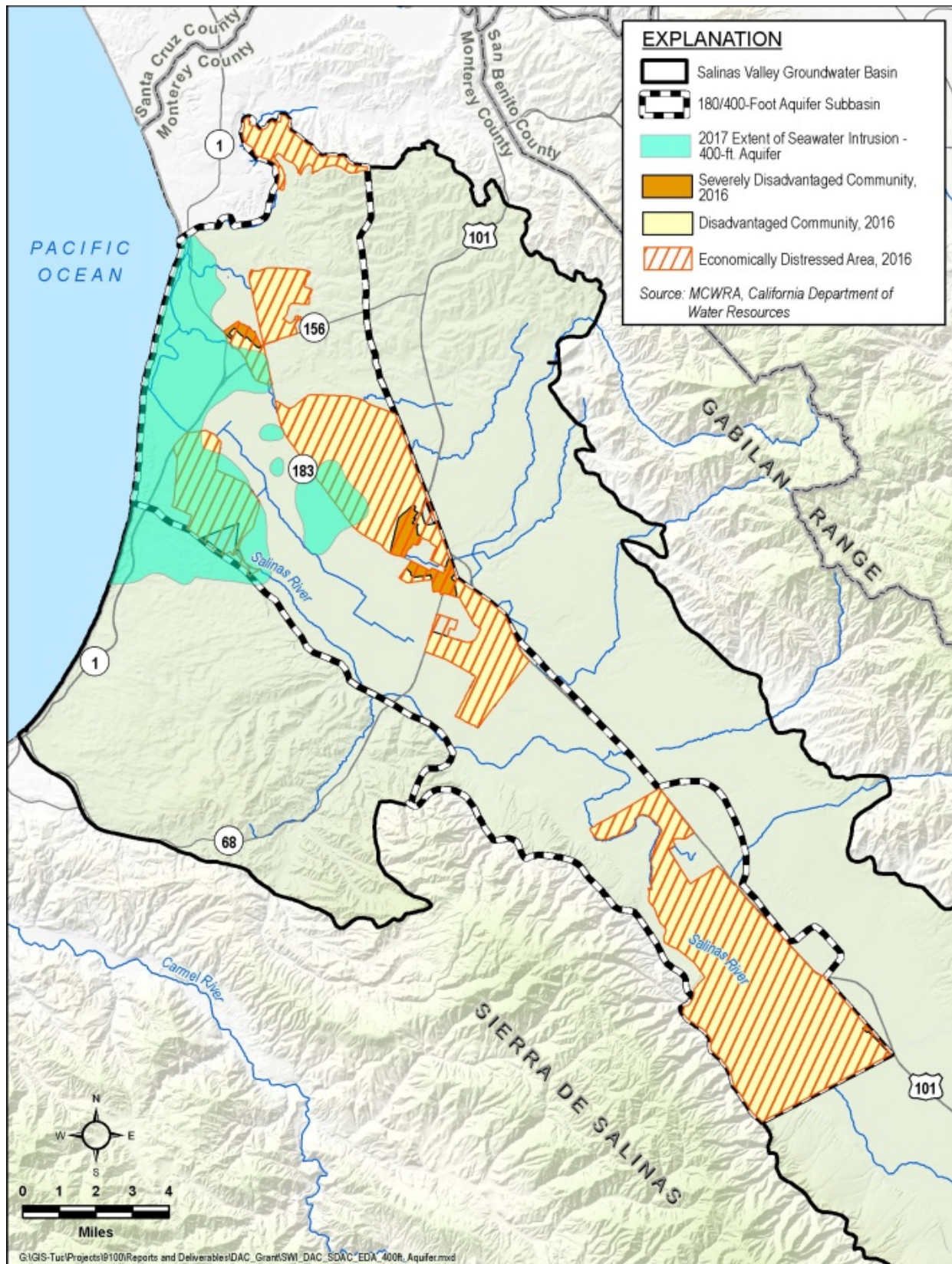


Figure 4. 2017 Extent of Seawater Intrusion in the 400-Foot Aquifer

Other Contaminants of Concern

In addition to nitrates and seawater intrusion, there are a few other contaminants of concern. With the recent passage of Assembly Bill (AB) 1249 (Salas, Chapter 717, Statutes of 2014), the State has recognized the prevalence, and urgency to address, the contamination of drinking water supplies in California by not only nitrate, but specifically by arsenic, perchlorate, and hexavalent chromium. The Greater Monterey County IRWM Regional Water Management Group is currently working with a Technical Advisory Committee, which includes MCDEH and the Central Coast Regional Water Quality Control Board, to identify the extent of nitrate, arsenic, perchlorate, and hexavalent chromium contamination in communities throughout the region. This group will develop a plan to address the contamination from these additional contaminants of concern.

Conclusion

The State of California has recognized the severity of drinking water challenges for DACs with the passage of the 2012 Human Right to Water Act (AB 685), which declared that every person has a right to clean, safe, and affordable drinking water. Further, it emphasized this state-wide focus with the Safe and Affordable Drinking Water Fund in 2019, which provides funding specifically for safe drinking water solutions in DACs that do not have access to safe drinking water.

This appendix highlights the relationship between DACs and groundwater in the Salinas Valley Groundwater Basin, particularly with respect to drinking water. It provides a base for the SVBGSA to engage DACs in a strategic dialogue and support state and local efforts related to drinking water.

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Chapter 3
Appendix 3-A

Water Systems

Table 1. Small Water Systems (2-14 connections)

Water System Name	ID	Connections	Population Served	Subbasin
ABBOTT ST WS #01	2702711	N/A	N/A	180/400 FOOT AQUIFER
AMARAL RD WS #01	2700909	N/A	N/A	180/400 FOOT AQUIFER
AMARAL RD WS #02	2702441	N/A	N/A	180/400 FOOT AQUIFER
ARCHER RD WS #02	2701414	N/A	N/A	180/400 FOOT AQUIFER
ARCHER RD WS #04	2701415	N/A	N/A	180/400 FOOT AQUIFER
ARCHER RD WS #05	2701547	N/A	N/A	180/400 FOOT AQUIFER
ARMSTRONG RD WS #01	2701813	N/A	N/A	180/400 FOOT AQUIFER
AVERY LN WS #01	2701620	N/A	N/A	180/400 FOOT AQUIFER
AVERY LN WS #03	2702159	N/A	N/A	180/400 FOOT AQUIFER
BAUMANN RD WS #02	2702261	N/A	N/A	180/400 FOOT AQUIFER
BAYVIEW RD WS #01	2700505	N/A	N/A	180/400 FOOT AQUIFER
BAYVIEW RD WS #02	2702240	N/A	N/A	180/400 FOOT AQUIFER
BAYVIEW RD WS #04	2700841	N/A	N/A	180/400 FOOT AQUIFER
BAYVIEW RD WS #06	2701609	N/A	N/A	180/400 FOOT AQUIFER
BAYVIEW RD WS #07	2702212	N/A	N/A	180/400 FOOT AQUIFER
BAYVIEW RD WS #08	2700506	N/A	N/A	180/400 FOOT AQUIFER
BLANCO RD WS #04	2702205	N/A	N/A	180/400 FOOT AQUIFER
BLANCO RD WS #06	2701949	N/A	N/A	180/400 FOOT AQUIFER
BLUEROCK VIEW APARTMENTS WS	2701229	N/A	N/A	180/400 FOOT AQUIFER
BORONDA RD WS #05	2701773	N/A	N/A	180/400 FOOT AQUIFER
CABIN OWNERS ASSN WS	2701824	N/A	N/A	180/400 FOOT AQUIFER
CARR RD WS #01	2702130	N/A	N/A	180/400 FOOT AQUIFER
CASTROVILLE BLVD WS #02	2700525	N/A	N/A	180/400 FOOT AQUIFER
CASTROVILLE BLVD WS #04	2700527	N/A	N/A	180/400 FOOT AQUIFER
CASTROVILLE BLVD WS #09	2702385	N/A	N/A	180/400 FOOT AQUIFER
CASTROVILLE BLVD WS #11	2702463	N/A	N/A	180/400 FOOT AQUIFER
CASTROVILLE BLVD WS #12	2702593	N/A	N/A	180/400 FOOT AQUIFER
CASTROVILLE BLVD WS #14	2702632	N/A	N/A	180/400 FOOT AQUIFER
CHUALAR RIVER RD WS #03	2701003	N/A	N/A	180/400 FOOT AQUIFER
CHUALAR RIVER RD WS #04	2702437	N/A	N/A	180/400 FOOT AQUIFER
DEL MONTE FARMS RD WS #01	2700539	N/A	N/A	180/400 FOOT AQUIFER
DEL MONTE FARMS RD WS #02	2700540	N/A	N/A	180/400 FOOT AQUIFER
DEL MONTE FARMS RD WS #05	2700543	N/A	N/A	180/400 FOOT AQUIFER
DEL MONTE FARMS RD WS #06	2700544	N/A	N/A	180/400 FOOT AQUIFER
DEL MONTE FARMS RD WS #08	2701712	N/A	N/A	180/400 FOOT AQUIFER
DEL MONTE FARMS RD WS #09	2702054	N/A	N/A	180/400 FOOT AQUIFER
DEL MONTE FARMS RD WS #10	2702311	N/A	N/A	180/400 FOOT AQUIFER
DEL MONTE FARMS RD WS #11	2701421	N/A	N/A	180/400 FOOT AQUIFER
DEL MONTE FARMS RD WS #12	2701909	N/A	N/A	180/400 FOOT AQUIFER

Water System Name	ID	Connections	Population Served	Subbasin
DEL MONTE FARMS RD WS #13	2702524	N/A	N/A	180/400 FOOT AQUIFER
DESMOND RD WS #09	2702117	N/A	N/A	180/400 FOOT AQUIFER
DESMOND RD WS #11	2702536	N/A	N/A	180/400 FOOT AQUIFER
EDEN LN WS #01	2701650	N/A	N/A	180/400 FOOT AQUIFER
EL CAMINO REAL WS #45	2702058	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN ESTATES WS	2702488	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #06	2701430	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #09	2701618	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #10	2701628	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #14	2701873	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #15	2701507	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #17	2701907	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #18	2702231	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #19	2702303	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #21	2702427	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #22	2702451	N/A	N/A	180/400 FOOT AQUIFER
ELKHORN RD WS #24	2701481	N/A	N/A	180/400 FOOT AQUIFER
ESPINOSA RD WS #01	2701685	N/A	N/A	180/400 FOOT AQUIFER
ESPINOSA RD WS #02	2701770	N/A	N/A	180/400 FOOT AQUIFER
ESPINOSA RD WS #04	2701862	N/A	N/A	180/400 FOOT AQUIFER
ESPINOSA RD WS #05	2701692	N/A	N/A	180/400 FOOT AQUIFER
ESPINOSA RD WS #07	2700568	N/A	N/A	180/400 FOOT AQUIFER
FOOTHILL RD WS #02	2702605	N/A	N/A	180/400 FOOT AQUIFER
FOSTER RD WS #02	2701793	N/A	N/A	180/400 FOOT AQUIFER
GONZALES RIVER RD WS	2701928	N/A	N/A	180/400 FOOT AQUIFER
GOULD RD WS #01	2701064	N/A	N/A	180/400 FOOT AQUIFER
HARKINS RD WS #01	2701848	N/A	N/A	180/400 FOOT AQUIFER
HECTOR GRACIA WS	2701015	N/A	N/A	180/400 FOOT AQUIFER
HIDDEN VALLEY RD WS #01	2700593	N/A	N/A	180/400 FOOT AQUIFER
HIDDEN VALLEY RD WS #05	2700596	N/A	N/A	180/400 FOOT AQUIFER
HIDDEN VALLEY RD WS #06	2701497	N/A	N/A	180/400 FOOT AQUIFER
HIDDEN VALLEY RD WS #08	2701518	N/A	N/A	180/400 FOOT AQUIFER
HIDDEN VALLEY RD WS #10	2701812	N/A	N/A	180/400 FOOT AQUIFER
HIDDEN VALLEY RD WS #13	2701534	N/A	N/A	180/400 FOOT AQUIFER
HIDDEN VALLEY RD WS #14	2701684	N/A	N/A	180/400 FOOT AQUIFER
HIDDEN VALLEY RD WS #15	2701704	N/A	N/A	180/400 FOOT AQUIFER
HIDDEN VALLEY RD WS #16	2702810	N/A	N/A	180/400 FOOT AQUIFER
HILLCREST RD WS #05	2702413	N/A	N/A	180/400 FOOT AQUIFER
HUNTER LN WS #01	2701899	N/A	N/A	180/400 FOOT AQUIFER
HWY 1 WS #06	2701118	N/A	N/A	180/400 FOOT AQUIFER
HWY 101 WS #05	2702436	N/A	N/A	180/400 FOOT AQUIFER

Water System Name	ID	Connections	Population Served	Subbasin
HWY 183 WS #01	2701863	N/A	N/A	180/400 FOOT AQUIFER
KARNER RD WS #01	2700609	N/A	N/A	180/400 FOOT AQUIFER
KARNER RD WS #02	2701984	N/A	N/A	180/400 FOOT AQUIFER
KARNER RD WS #03	2702516	N/A	N/A	180/400 FOOT AQUIFER
LEAFWOOD RD WS #02	2702138	N/A	N/A	180/400 FOOT AQUIFER
LONG VALLEY RD WS #01	2701443	N/A	N/A	180/400 FOOT AQUIFER
LONG VALLEY RD WS #02	2702815	N/A	N/A	180/400 FOOT AQUIFER
MERIDIAN RD WS #01	2700645	N/A	N/A	180/400 FOOT AQUIFER
MERIDIAN RD WS #05	2701393	N/A	N/A	180/400 FOOT AQUIFER
MERIDIAN RD WS #15	2702596	N/A	N/A	180/400 FOOT AQUIFER
MERIDIAN RD WS #16	2702597	N/A	N/A	180/400 FOOT AQUIFER
NASHUA RD WS	2702458	N/A	N/A	180/400 FOOT AQUIFER
OLD STAGE RD WS #16	2702310	N/A	N/A	180/400 FOOT AQUIFER
ORMART RD WS #01	2702217	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #02	2700675	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #03	2700676	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #04	2700677	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #13	2701461	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #15	2701606	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #16	2701621	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #17	2701622	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #18	2701625	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #19	2701629	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #20	2701631	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #25	2701690	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #29	2701696	N/A	N/A	180/400 FOOT AQUIFER
PARADISE RD WS #34	2702473	N/A	N/A	180/400 FOOT AQUIFER
PARSONS RD WS #01	2701766	N/A	N/A	180/400 FOOT AQUIFER
PESANTE RD WS #18	2701983	N/A	N/A	180/400 FOOT AQUIFER
PLAZA SERENA WS	2701636	N/A	N/A	180/400 FOOT AQUIFER
PRUNETUCKY WS	2701639	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #01	2701689	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #02	2701698	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #07	2701744	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #08	2701745	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #09	2701750	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #14	2702248	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #19	2702150	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #20	2701743	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #21	2702193	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #23	2702286	N/A	N/A	180/400 FOOT AQUIFER

Water System Name	ID	Connections	Population Served	Subbasin
RIVER RD WS #24	2702334	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #26	2702334	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #27	2702419	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #29	2702492	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #30	2702622	N/A	N/A	180/400 FOOT AQUIFER
RIVER RD WS #33	2702754	N/A	N/A	180/400 FOOT AQUIFER
RODGERS RD WS #02	2701968	N/A	N/A	180/400 FOOT AQUIFER
RUSSO RD WS #01	2700714	N/A	N/A	180/400 FOOT AQUIFER
RUSSO RD WS #03	2701560	N/A	N/A	180/400 FOOT AQUIFER
RUSSO RD WS #04	2701665	N/A	N/A	180/400 FOOT AQUIFER
SAN JON RD WS #01	2701877	N/A	N/A	180/400 FOOT AQUIFER
SAN JON RD WS #02	2701878	N/A	N/A	180/400 FOOT AQUIFER
SAN JON RD WS #03	2701521	N/A	N/A	180/400 FOOT AQUIFER
SHAFFI LN WS #01	2701786	N/A	N/A	180/400 FOOT AQUIFER
SIMONVILLE WC	2700660	N/A	N/A	180/400 FOOT AQUIFER
SOMAVIA RD WS #02	2700960	N/A	N/A	180/400 FOOT AQUIFER
SPRECKELS LN WS #02	2701679	N/A	N/A	180/400 FOOT AQUIFER
SPRECKELS PLAZA WS	2702375	N/A	N/A	180/400 FOOT AQUIFER
SPRING POINT WS #01	2700758	N/A	N/A	180/400 FOOT AQUIFER
SPRING POINT WS #02	2700759	N/A	N/A	180/400 FOOT AQUIFER
SPRING POINT WS #03	2700760	N/A	N/A	180/400 FOOT AQUIFER
SPRING POINT WS #05	2701479	N/A	N/A	180/400 FOOT AQUIFER
SPRING POINT WS #06	2701602	N/A	N/A	180/400 FOOT AQUIFER
SPRING POINT WS #07	2702502	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #03	2700763	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #04	2700764	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #07	2702238	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #09	2700769	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #12	2701121	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #13	2701854	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #14	2701482	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #15	2701527	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #17	2701600	N/A	N/A	180/400 FOOT AQUIFER
STRAWBERRY RD WS #25	2702781	N/A	N/A	180/400 FOOT AQUIFER
TUCKER RD WS #01	2701554	N/A	N/A	180/400 FOOT AQUIFER
TUCKER RD WS #02	2701661	N/A	N/A	180/400 FOOT AQUIFER
TUCKER RD WS #03	2701902	N/A	N/A	180/400 FOOT AQUIFER
TUCKER RD WS #05	2702216	N/A	N/A	180/400 FOOT AQUIFER
TUCKER RD WS #06	2702239	N/A	N/A	180/400 FOOT AQUIFER
TUMBLEWEED LN WS #01	2702442	N/A	N/A	180/400 FOOT AQUIFER
TUMBLEWEED LN WS #02	2702676	N/A	N/A	180/400 FOOT AQUIFER

Water System Name	ID	Connections	Population Served	Subbasin
VALLEY RD WS #01	2701120	N/A	N/A	180/400 FOOT AQUIFER
VALLEY RD WS #02	2702164	N/A	N/A	180/400 FOOT AQUIFER
WALKER VALLEY WS #02	2700801	N/A	N/A	180/400 FOOT AQUIFER
WALKER VALLEY WS #03	2700802	N/A	N/A	180/400 FOOT AQUIFER
WALKER VALLEY WS #04	2701373	N/A	N/A	180/400 FOOT AQUIFER
WALKER VALLEY WS #06	2701663	N/A	N/A	180/400 FOOT AQUIFER
WALKER VALLEY WS #07	2702387	N/A	N/A	180/400 FOOT AQUIFER
WALKER VALLEY WS #09	2702434	N/A	N/A	180/400 FOOT AQUIFER
WALKER VALLEY WS #10	2702454	N/A	N/A	180/400 FOOT AQUIFER
WALKER VALLEY WS #11	2702498	N/A	N/A	180/400 FOOT AQUIFER
WILLOW RD WS #01	2702501	N/A	N/A	180/400 FOOT AQUIFER

Table 2. Public Water Systems (15 < connections or serving more than 25 people for at least 60 days out of the year)

Water System Name	PWSID	Connections	Population Served	Subbasin	State Water System Classification
ALCO WATER SERVICE	CA2710001	9,272	29,179	180/400 FOOT AQUIFER	C
ASSOCIATED TAGLINE WS	CA2701109	5	70	180/400 FOOT AQUIFER	NTNC
BAUMANN RD WS #01	CA2700842	17	40	180/400 FOOT AQUIFER	C
BERRY DR WS #02	CA2701897	19	30	180/400 FOOT AQUIFER	C
BUD ANTLE MARINA WS	CA2700998	4	150	180/400 FOOT AQUIFER	NTNC
CAL AM WATER COMPANY - CHUALAR	CA2701202	192	736	180/400 FOOT AQUIFER	C
CASTROVILLE CSD	CA2710005	1,952	7,100	180/400 FOOT AQUIFER	C
COLOR SPOT NURSERY WS #01	CA2700853	4	200	180/400 FOOT AQUIFER	NTNC
COLOR SPOT NURSERY WS #02	CA2702482	1	25	180/400 FOOT AQUIFER	NTNC
CONUNDRUM WINERY WS	CA2702641	1	25	180/400 FOOT AQUIFER	NC
CORDA RD WS	CA2701820	19	60	180/400 FOOT AQUIFER	C
CWSC OAK HILLS	CA2710019	894	3,904	180/400 FOOT AQUIFER	C
CWSC SALINAS	CA2710010	24,036	106,858	180/400 FOOT AQUIFER	C
CWSC SALINAS HILLS	CA2710012	2,386	8,213	180/400 FOOT AQUIFER	C
DEL MONTE FARMS RD WS #03	CA2700541	16	55	180/400 FOOT AQUIFER	C
DESMOND RD WS #03	CA2700547	17	55	180/400 FOOT AQUIFER	C
DOLAN RD MWC	CA2700548	40	120	180/400 FOOT AQUIFER	C
DOLAN RD WATER SYSTEM #2	CA2702652	4	50	180/400 FOOT AQUIFER	NTNC

Water System Name	PWSID	Connections	Population Served	Subbasin	State Water System Classification
EL CAMINO MACHINE & WELDING WS	CA2702452	3	28	180/400 FOOT AQUIFER	NTNC
EL CAMINO WC INC	CA2702409	21	90	180/400 FOOT AQUIFER	C
ELKHORN RD WS #04	CA2700579	20	60	180/400 FOOT AQUIFER	C
ELKHORN SCHOOL WS	CA2700577	2	545	180/400 FOOT AQUIFER	NTNC
ESPERANZA RD WS	CA2702615	1	160	180/400 FOOT AQUIFER	NTNC
FIRESTONE BUSINESS PARK WS	CA2701214	1	154	180/400 FOOT AQUIFER	NTNC
FLORICULTURA PACIFIC WS	CA2701152	3	125	180/400 FOOT AQUIFER	NTNC
FOOTHILL WA	CA2702135	18	28	180/400 FOOT AQUIFER	C
GONZALES GAS STATION WS	CA2701542	2	200	180/400 FOOT AQUIFER	NC
GONZALES, CITY OF	CA2710007	1,930	8,383	180/400 FOOT AQUIFER	C
GRAVES SCHOOL WS	CA2702180	2	56	180/400 FOOT AQUIFER	NTNC
GREEN ACRES WA	CA2701647	20	50	180/400 FOOT AQUIFER	C
GROWERS SERVICE ASSN WS (ICE)	CA2702484	40	500	180/400 FOOT AQUIFER	NTNC
GROWERS TRANSPLANTING WS	CA2701153	1	50	180/400 FOOT AQUIFER	NTNC
HARBOR VIEW WA	CA2701498	28	75	180/400 FOOT AQUIFER	C
HARRIS RD WS #10	CA2702704	4	284	180/400 FOOT AQUIFER	NTNC
HIDDEN VALLEY WA	CA2700594	31	51	180/400 FOOT AQUIFER	C
HITCHCOCK RD WS #01	CA2702320	1	175	180/400 FOOT AQUIFER	C
HITCHCOCK RD WS #02	CA2702584	4	25	180/400 FOOT AQUIFER	NTNC
LEAFWOOD COMMUNITY WA	CA2700624	23	66	180/400 FOOT AQUIFER	C
MARINA LANDFILL WS	CA2702453	1	55	180/400 FOOT AQUIFER	NTNC
MERIDIAN RD WS #09	CA2701837	2	35	180/400 FOOT AQUIFER	NTNC
MISIONERO VEGETABLES WS	CA2701946	3	60	180/400 FOOT AQUIFER	NTNC
MONTEREY DUNES MWA	CA2701452	137	280	180/400 FOOT AQUIFER	C
MONTEREY ONE WATER (FORMERLY MRWPCA)	CA2702456	5	73	180/400 FOOT AQUIFER	NTNC
MOSS LANDING HARBOR WS	CA2701515	152	402	180/400 FOOT AQUIFER	C
MOSS LANDING MWC	CA2701683	3	260	180/400 FOOT AQUIFER	NTNC
PAJARO/SUNNY MESA COMMUNITY SERVICES DISTRICT	CA2710020	460	6,500	180/400 FOOT AQUIFER	C
PARADISE LAKE MUTUAL WATER CO.	CA2700674	90	180	180/400 FOOT AQUIFER	C
PARADISE RD WS #21	CA2701633	16	48	180/400 FOOT AQUIFER	C
PEDRAZZI MWC	CA2701364	96	273	180/400 FOOT AQUIFER	C

Water System Name	PWSID	Connections	Population Served	Subbasin	State Water System Classification
RIVER RD WS #25	CA2701063	19	65	180/400 FOOT AQUIFER	C
RIVER RD WS #26	CA2702396	3	45	180/400 FOOT AQUIFER	NC
RIVER RD WS #28	CA2702444	13	25	180/400 FOOT AQUIFER	NC
RIVER RD WS #34	CA2702799	3	53	180/400 FOOT AQUIFER	NC
SPRECKELS LN WS #03	CA2701912	5	50	180/400 FOOT AQUIFER	NTNC
STRAWBERRY RD WS #06	CA2700766	27	78	180/400 FOOT AQUIFER	C
TASCO SPRECKELS WATER COMPANY	CA2710023	327	1,079	180/400 FOOT AQUIFER	C

Chapter 4
Appendix 4-A

ISW Seasonality Analysis

Appendix 4a. ISW Seasonality Analysis

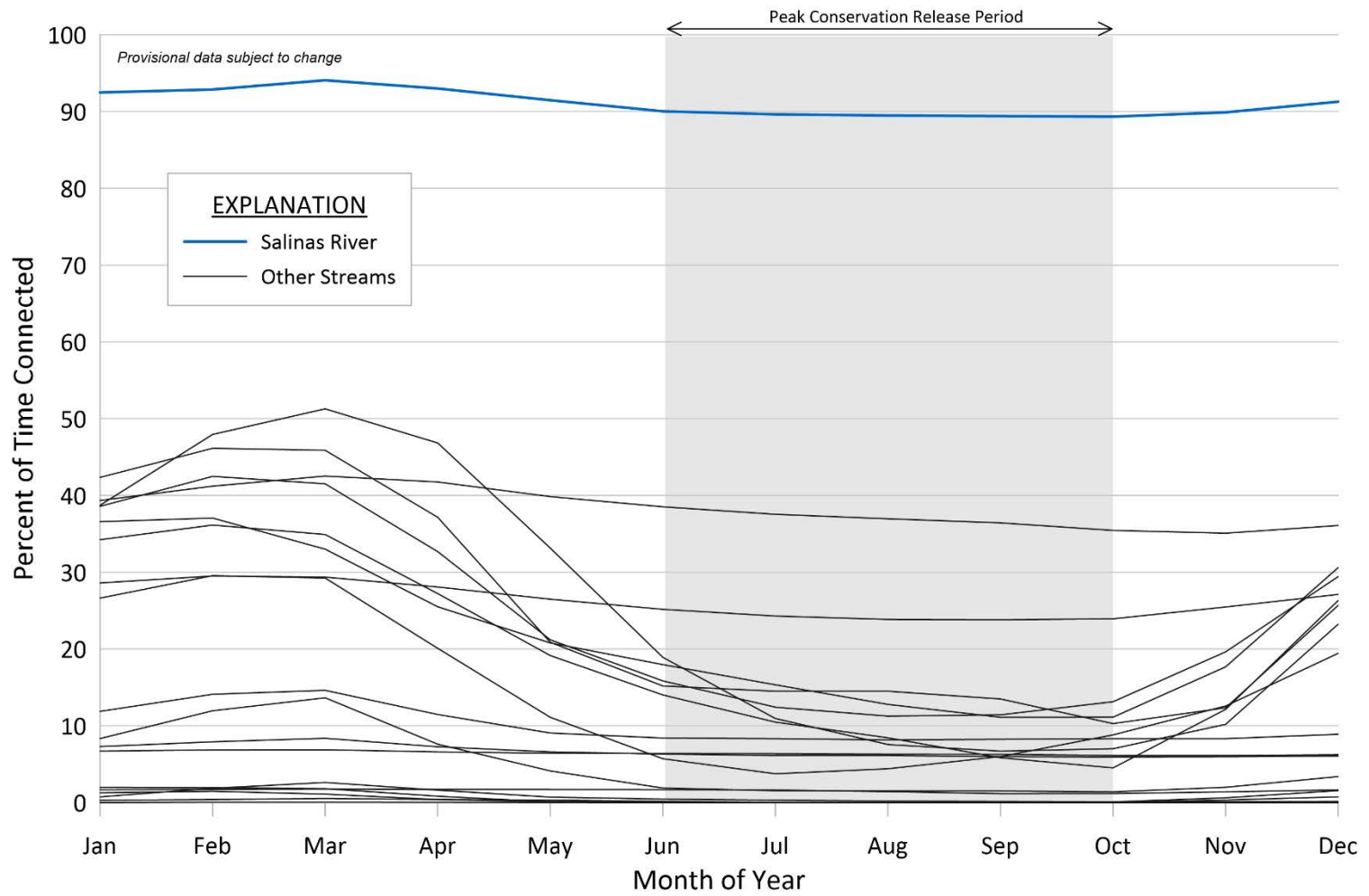
Surface water and groundwater can be hydrologically connected along a stream reach during some months of the year and not others. These temporal variations of interconnected surface water (ISW) during a given year are the result of variations in recharge, precipitation, groundwater pumping, and riparian evapotranspiration. Along the Salinas River, monthly changes in reservoir operations also influence ISW reaches. Hydrologic connectivity in the Salinas Valley is estimated using results from the provisional SVIHM. Along the Salinas River, the timing of reservoir releases is used to determine the months that the ISW sustainable management criteria applies since releases during the peak conservation period (June through September) are intended for groundwater recharge. The ISW delineated along the Salinas River in section 4.4.5.1 of the GSP represent reaches that are connected during a majority (greater than 50%) of months during the non-peak conservation release period (October through May) over the full SVIHM simulation period from 1967 to 2017. However, model results indicate that the ISW length along the Salinas River is virtually the same throughout the year, connected the vast majority of time.

For tributaries or streams away from the Salinas River, reservoir releases have less impact on ISW, if any, than for the Salinas River. To estimate the seasonal variability of ISW for stream reaches away from the Salinas River, a monthly analysis. These locations are the best estimates of where persistent hydrologic connections occur along streams in the Salinas Valley. However, the lateral extents (lengths) of these reaches vary from month to month during the year, as well as from year to year.

To understand whether surface water is connected to groundwater only during certain months, a monthly analysis was undertaken. The monthly analysis produces 2 pieces of information for each month of the year: (1) the average percent of years simulated by the SVIHM that a stream has hydrologic connection, based on the average monthly connectivity of every model grid cell identified as ISW along the stream, and (2) the average extent of where hydrologic connection occurs. **Figure 1** shows the average percent of time when connectivity occurs at any location along a given stream in Salinas Valley. These data show the average temporal connectivity along the entire length of a stream; however, some reaches of the stream have much lower or higher connectivity than indicated by the average values. The results on Figure 1 are most useful for identifying the seasonal trends of connectivity for streams. Tributaries to the river and streams away from the river show seasonal variation in connectivity, with higher average connectivity in the Winter and Spring months and lower average connectivity in the Summer months.

Consistent with the seasonal variations in average time of connectivity, the lengths of ISW along the streams away from the Salinas River are generally longest during the late Winter and Spring months and shortest during the late Summer months. The average ISW length varies during the year in the Langley Area Subbasin and along Arroyo Seco in Forebay Subbasin, with the locations of ISW in 4.4.5.1 representing the stream reaches with more consistent connection. The

lengths of average ISW away from Salinas River in Upper Valley vary very little, if at all, during the year. The average monthly variations and extents are based on results from the provisional SVIHM and are subject to change in future updates to the GSP as additional data increases the understanding regarding ISW extents.



Chapter 5

Appendix 5-A

Hydrographs

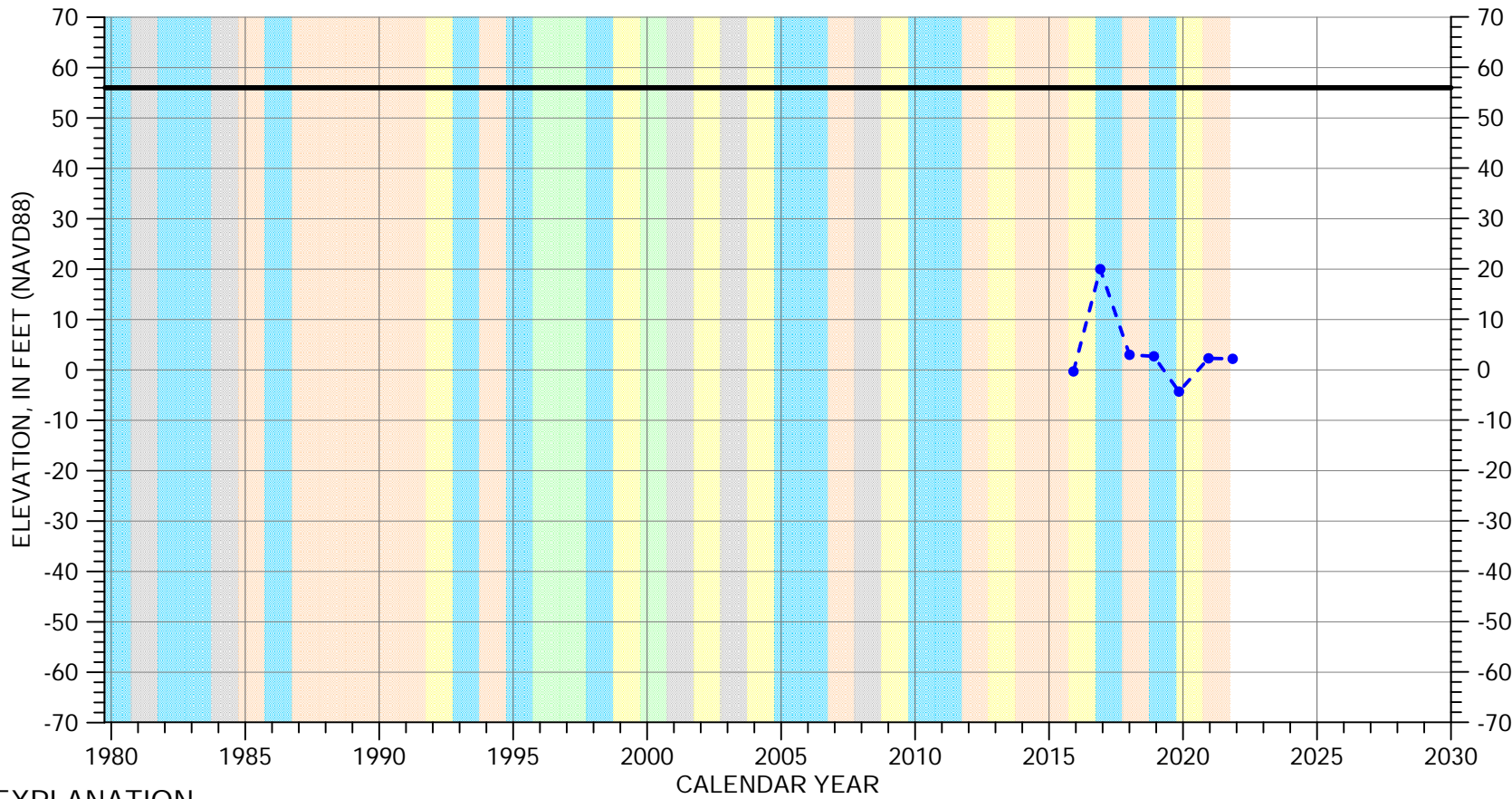
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Hydr_13S_02E-13N01	8
Hydr_13S_02E-19Q03	9
Hydr_13S_02E-21N01	10
Hydr_13S_02E-21Q01	11
Hydr_13S_02E-24N01	12
Hydr_13S_02E-26L01	13
Hydr_13S_02E-27P01	14
Hydr_13S_02E-28L03	15
Hydr_13S_02E-29D03	16
Hydr_13S_02E-29D04	17
Hydr_13S_02E-31N02	18
Hydr_13S_02E-32A02	19
Hydr_13S_02E-32E05	20
Hydr_14S_02E-02C03	21
Hydr_14S_02E-03F03	22
Hydr_14S_02E-03F04	23
Hydr_14S_02E-05F04	24
Hydr_14S_02E-06L01	25
Hydr_14S_02E-08M02	26
Hydr_14S_02E-10P01	27
Hydr_14S_02E-11A02	28
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Hydr_14S_02E-21L01	38
Hydr_14S_02E-22A03	39
Hydr_14S_02E-22L01	40
Hydr_14S_02E-26H01	41
Hydr_14S_02E-26J03	42
Hydr_14S_02E-27A01	43
Hydr_14S_02E-27G03	44
Hydr_14S_02E-28C02	45
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Hydr_15S_02E-01A03	57
Hydr_15S_02E-02G01	58
Hydr_15S_02E-12A01	59
Hydr_15S_02E-12C01	60
Hydr_15S_03E-03R02	61
Hydr_15S_03E-04Q01	62
Hydr_15S_03E-05C02	63
Hydr_15S_03E-08F01	64

Hydr_15S_03E-09E03	65
Hydr_15S_03E-10D04	66
Hydr_15S_03E-13N01	67
Hydr_15S_03E-14P02	68
Hydr_15S_03E-15B01	69
Hydr_15S_03E-16F02	70
Hydr_15S_03E-16M01	71
Hydr_15S_03E-17E02	72
Hydr_15S_03E-17M01	73
Hydr_15S_03E-17P02	74
Hydr_15S_03E-25L01	75
Hydr_15S_03E-26A01	76
Hydr_15S_03E-26F01	77
Hydr_15S_03E-28B02	78
Hydr_15S_04E-29Q02	79
Hydr_15S_04E-31A02	80
Hydr_16S_04E-04C01	81
Hydr_16S_04E-05M02	82
Hydr_16S_04E-08H03	83
Hydr_16S_04E-10R02	84
Hydr_16S_04E-11D51	85
Hydr_16S_04E-13R02	86
Hydr_16S_04E-15D01	87
Hydr_16S_04E-15R02	88
Hydr_16S_04E-25G01	89
Hydr_16S_04E-27B02	90
Hydr_16S_05E-30E01	91
Hydr_16S_05E-30J02	92
Hydr_16S_05E-31M01	93
Hydr_17S_04E-01D01	94

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 12S/02E-33H02

180/400-Foot Aquifer Subbasin

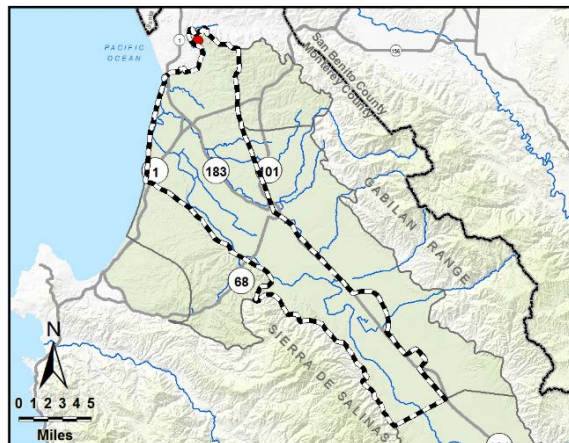


EXPLANATION

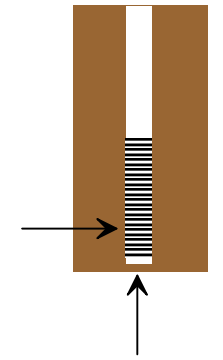
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



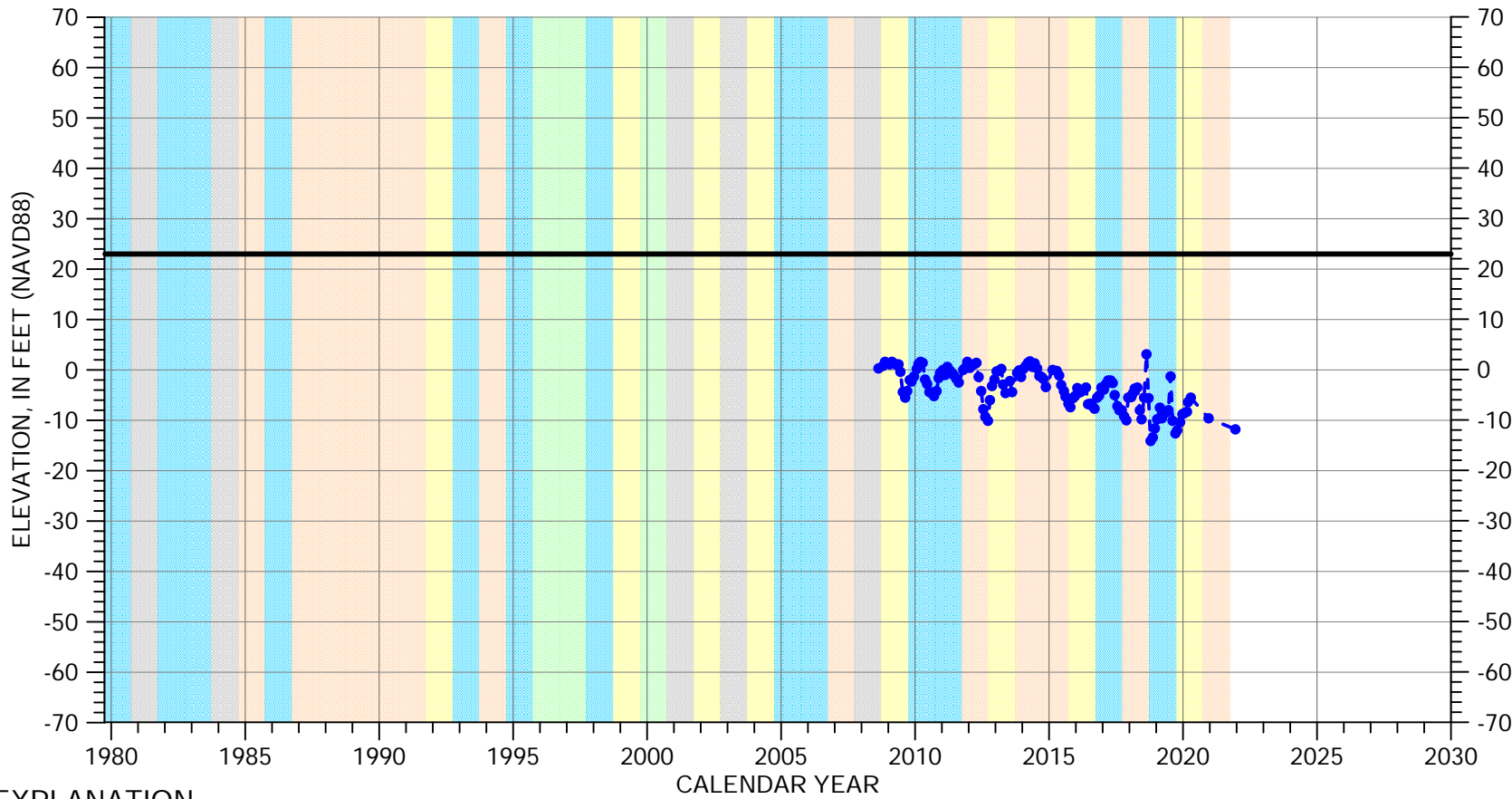
Perforated from
-234 to -514 feet msl



Well bottom
-524 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/01E-36J02

180/400-Foot Aquifer Subbasin

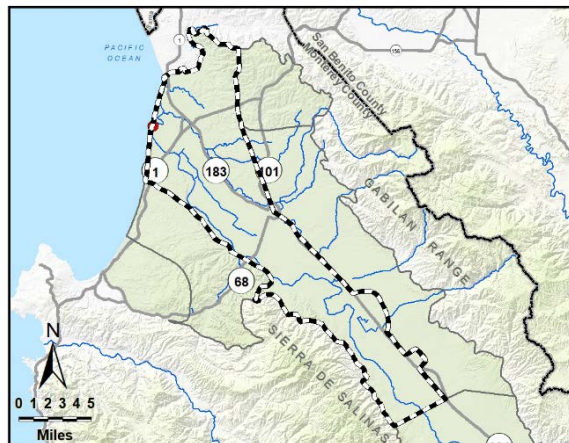


EXPLANATION

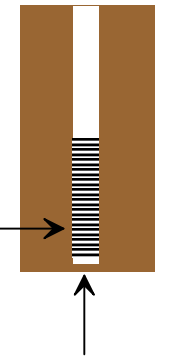
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| <ul style="list-style-type: none"> DRY DRY - NORMAL NORMAL | <ul style="list-style-type: none"> WET - NORMAL WET |
|---|---|



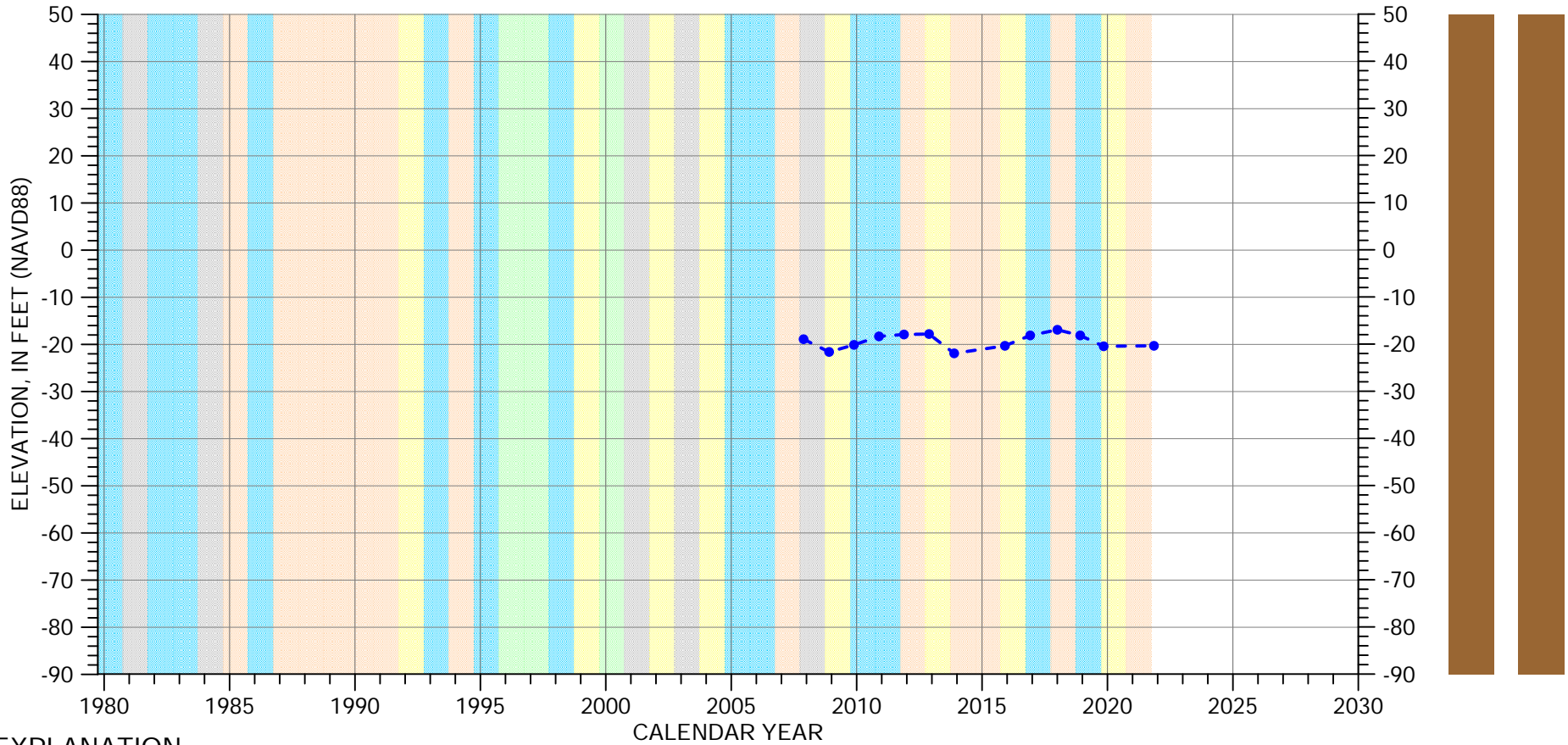
Perforated from
-1278 to -1338 feet msl



Well bottom
-1341 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-10K01

180/400-Foot Aquifer Subbasin

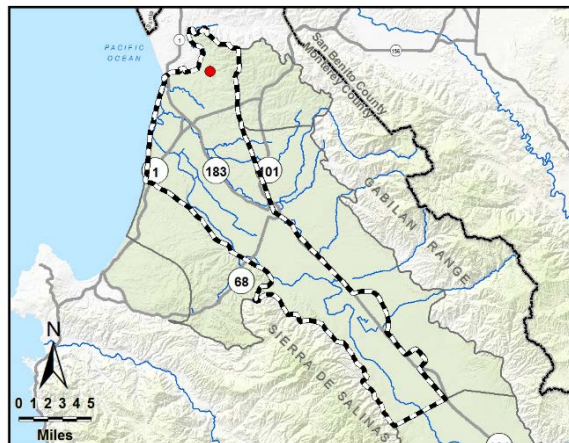


EXPLANATION

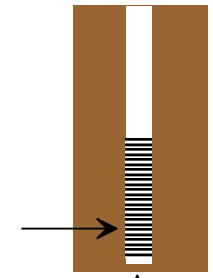
- - ● - Groundwater Elevation
- - Suspect Measurement
- Land Surface (100 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



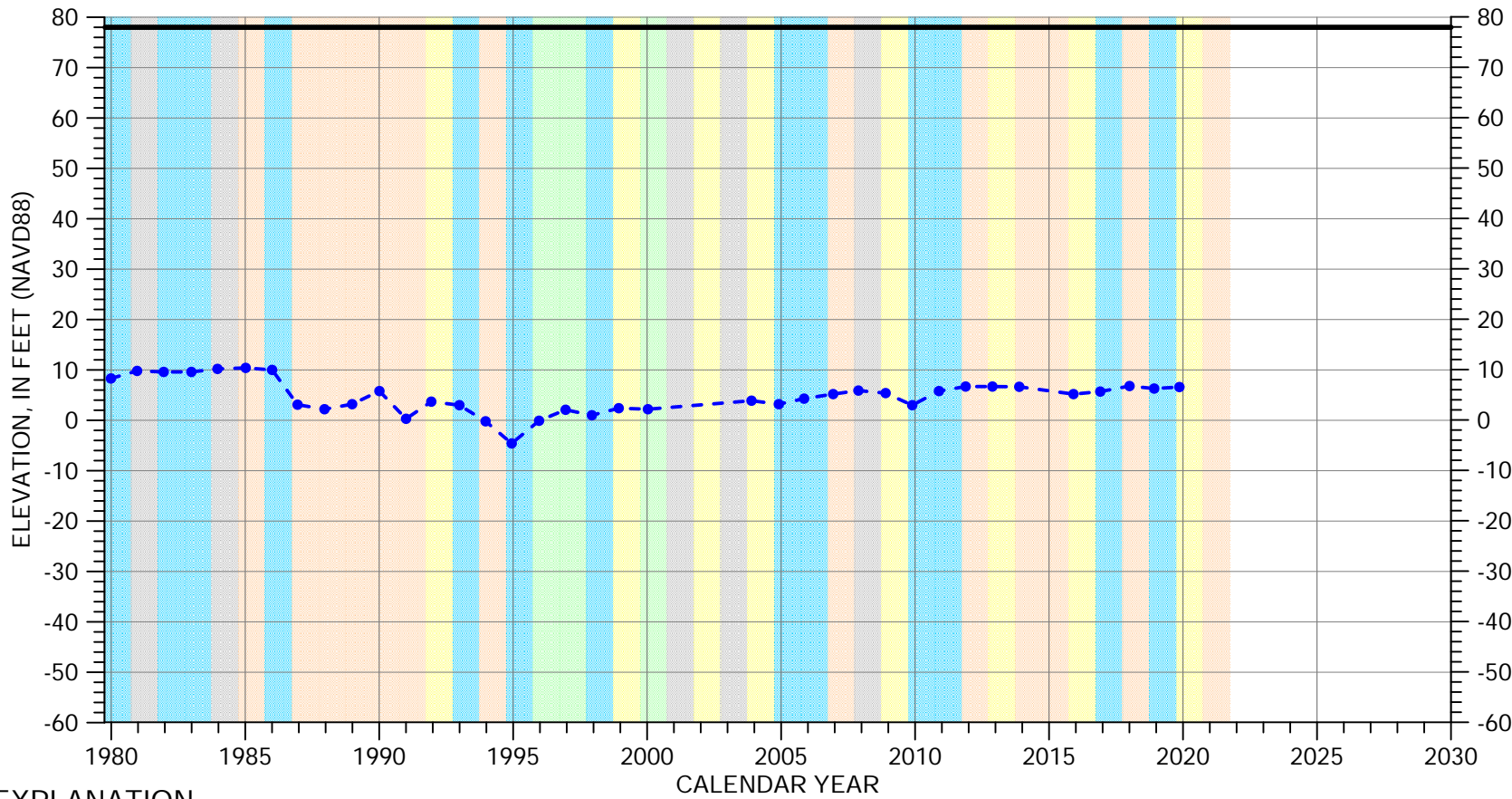
Perforated from
-280 to -560 feet msl



Well bottom
-560 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-13N01

180/400-Foot Aquifer Subbasin

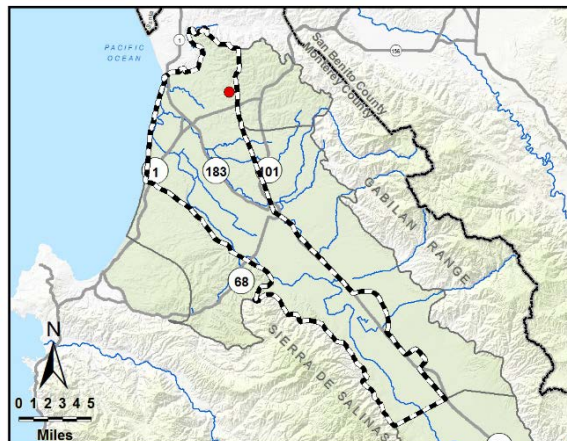


EXPLANATION

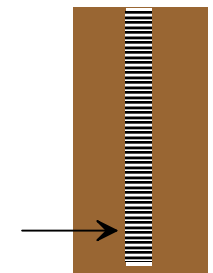
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



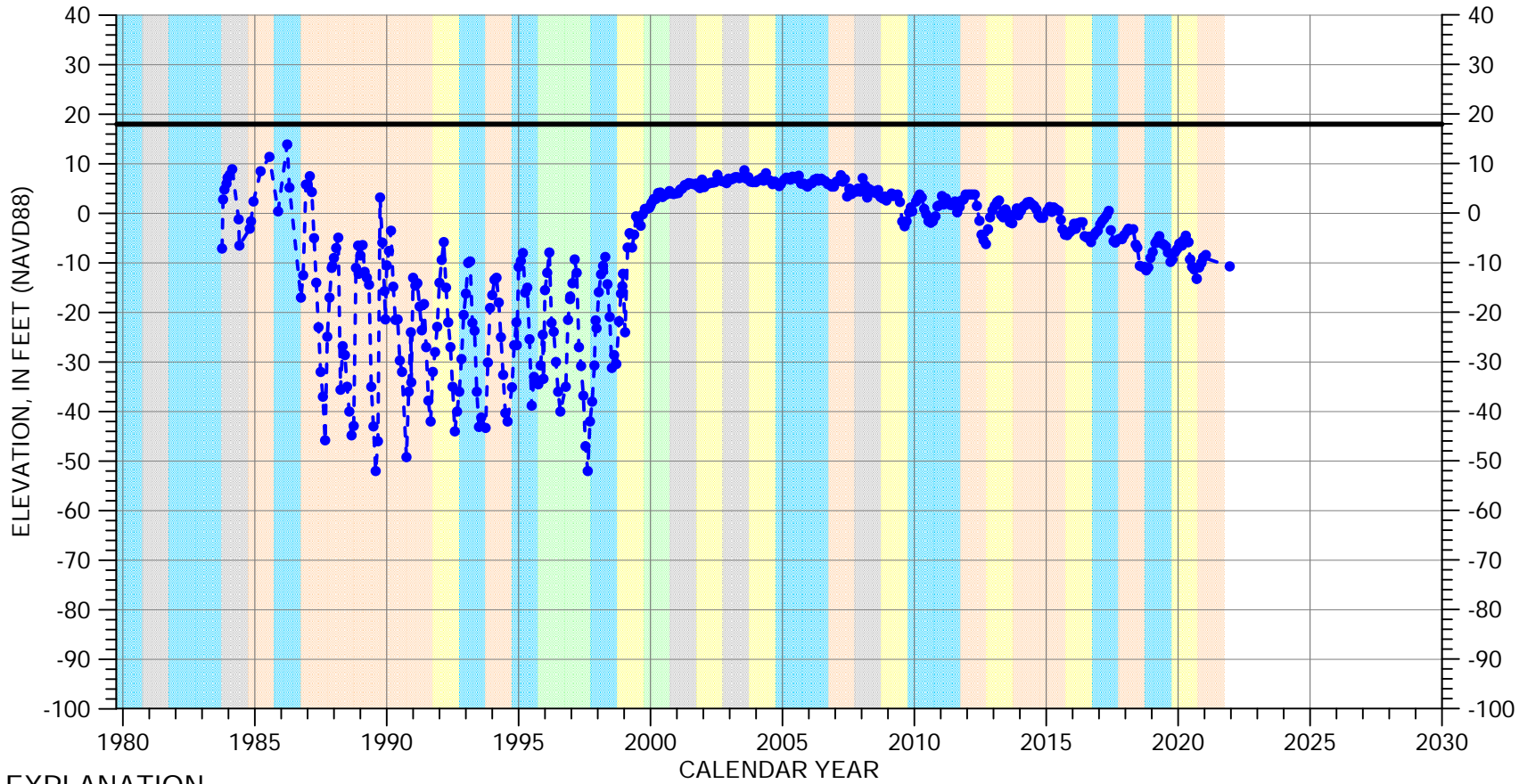
Perforated from
-54 to -114 feet msl



Well bottom
-122 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-19Q03

180/400-Foot Aquifer Subbasin

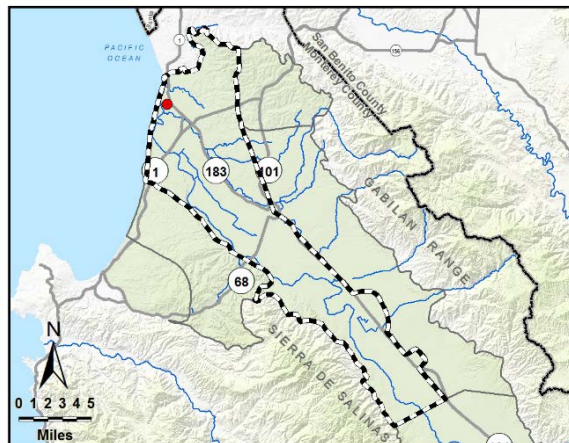


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



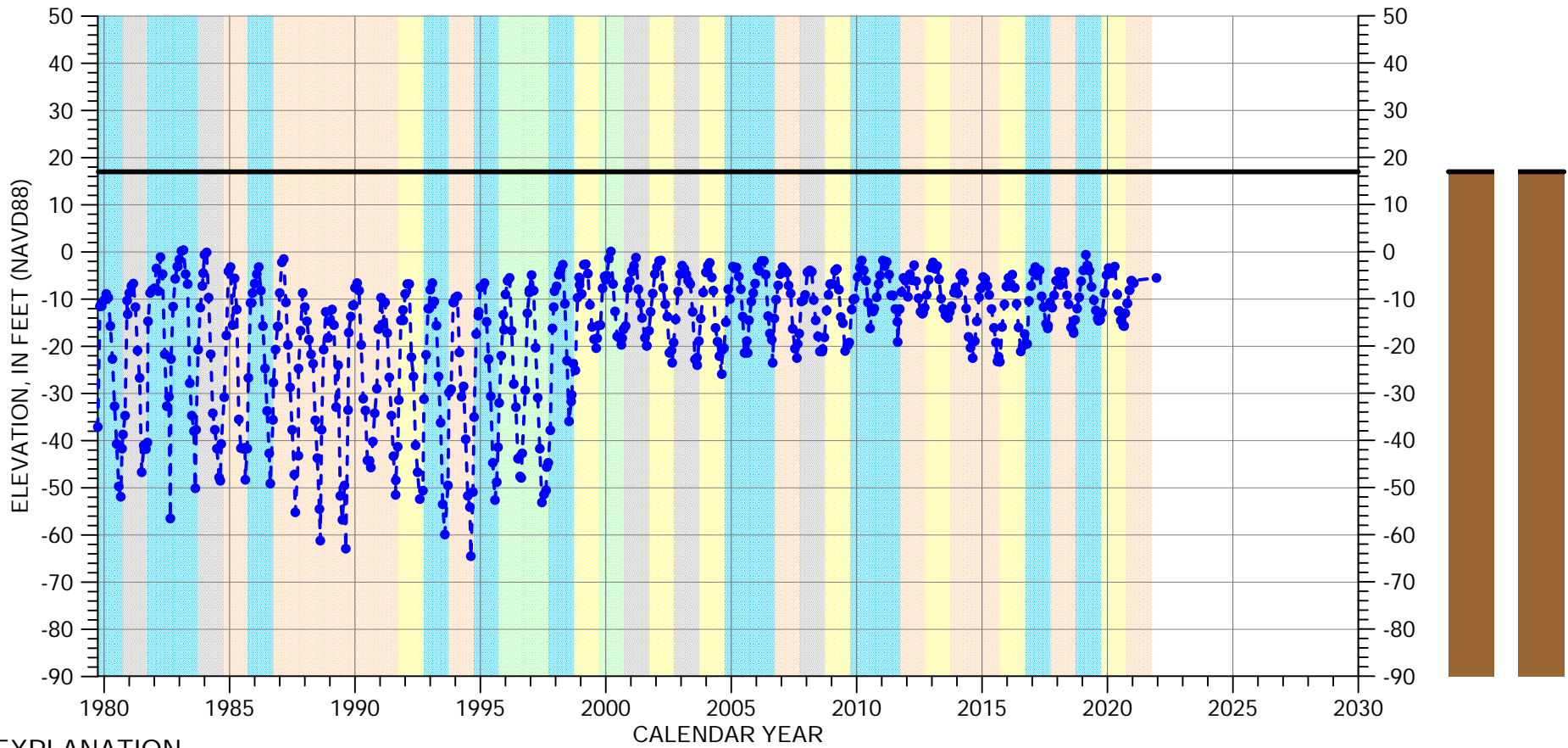
Perforated from
-1202 to -1532 feet msl



Well bottom
-1544 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-21N01

180/400-Foot Aquifer Subbasin

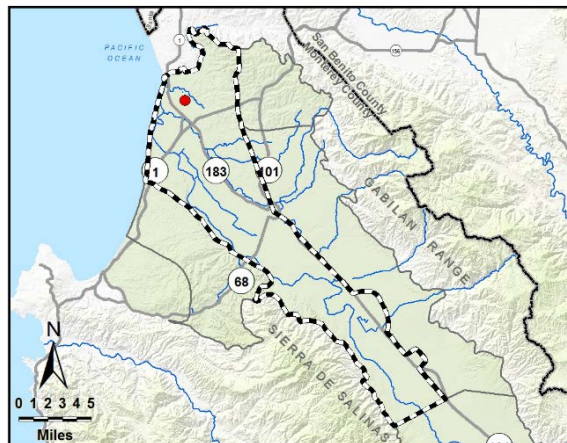


EXPLANATION

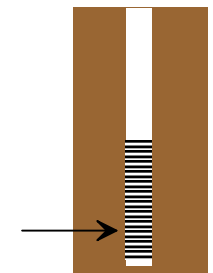
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



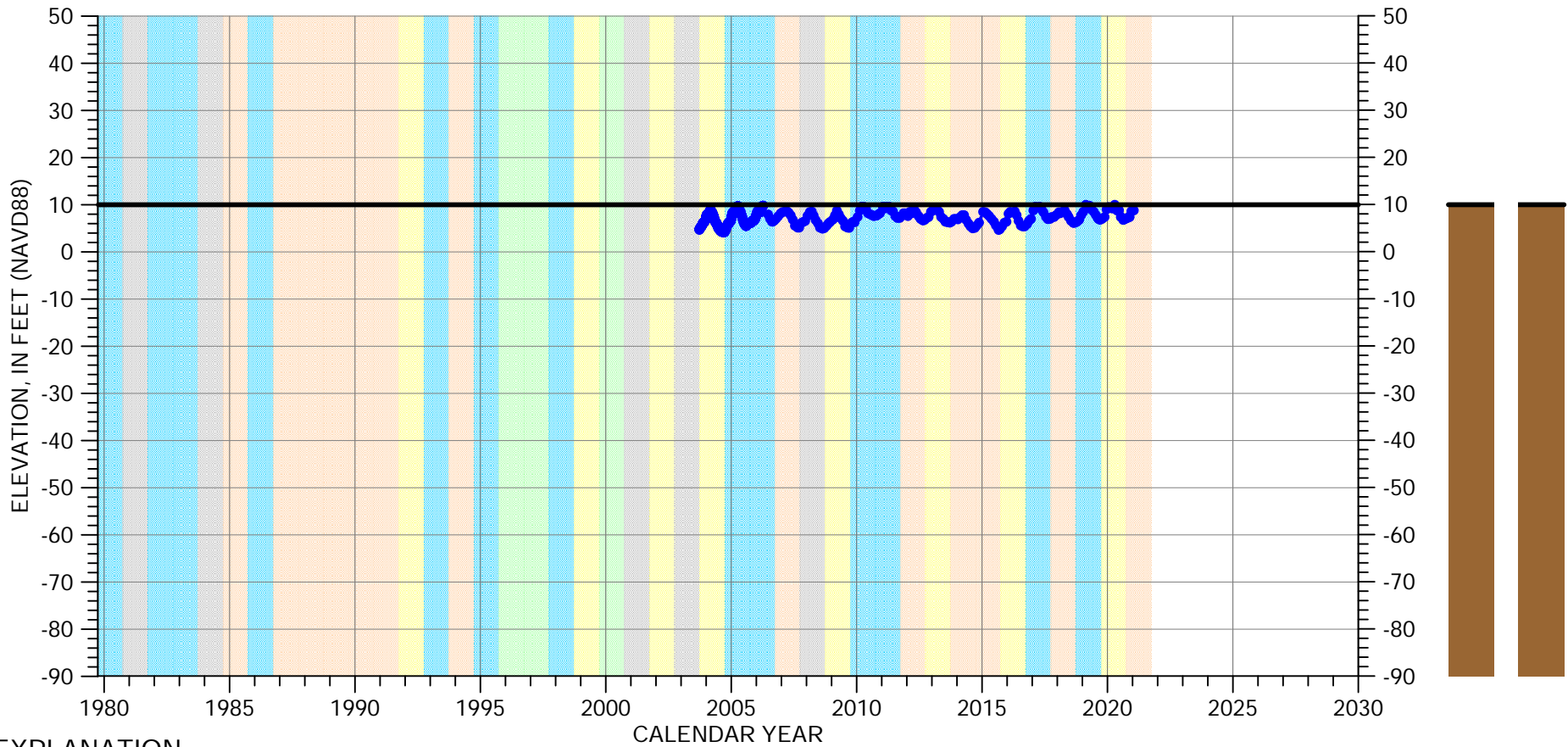
Perforated from
-352 to -533 feet msl



Well bottom
-533 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-21Q01

180/400-Foot Aquifer Subbasin

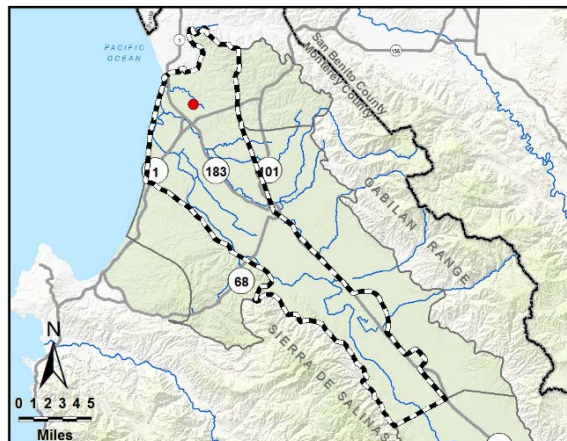


EXPLANATION

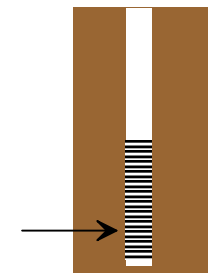
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



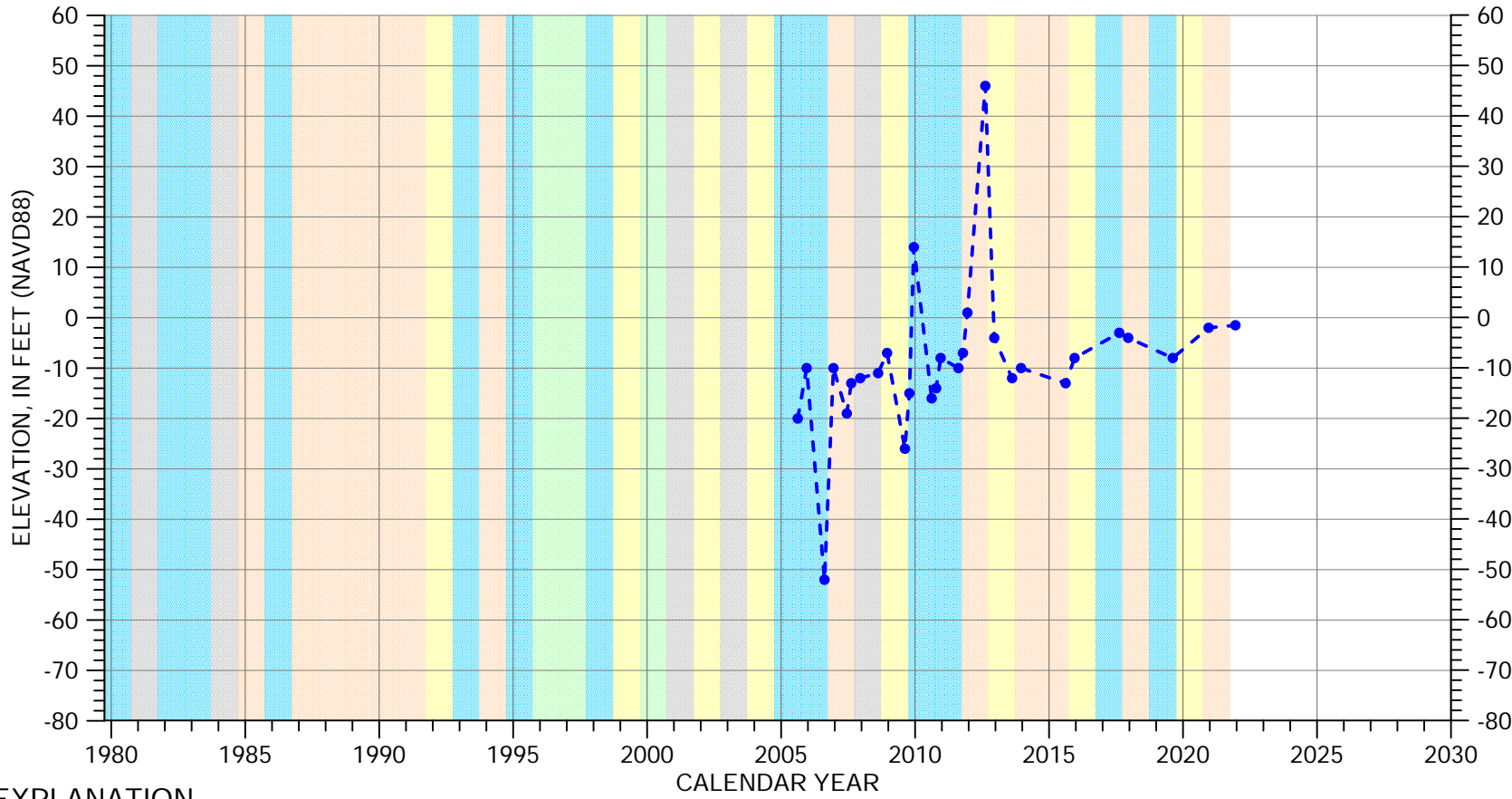
Perforated from
-95 to -145 feet msl



Well bottom
-147 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-24N01

180/400-Foot Aquifer Subbasin

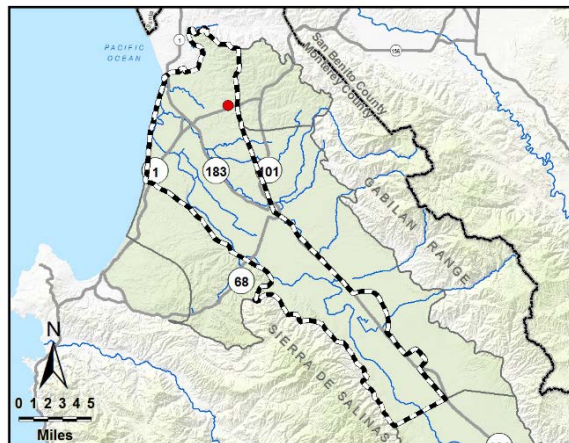


EXPLANATION

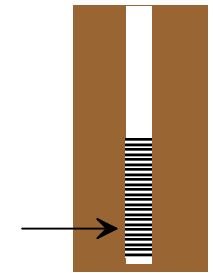
- Groundwater Elevation
- Suspect Measurement
- Land Surface (162 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



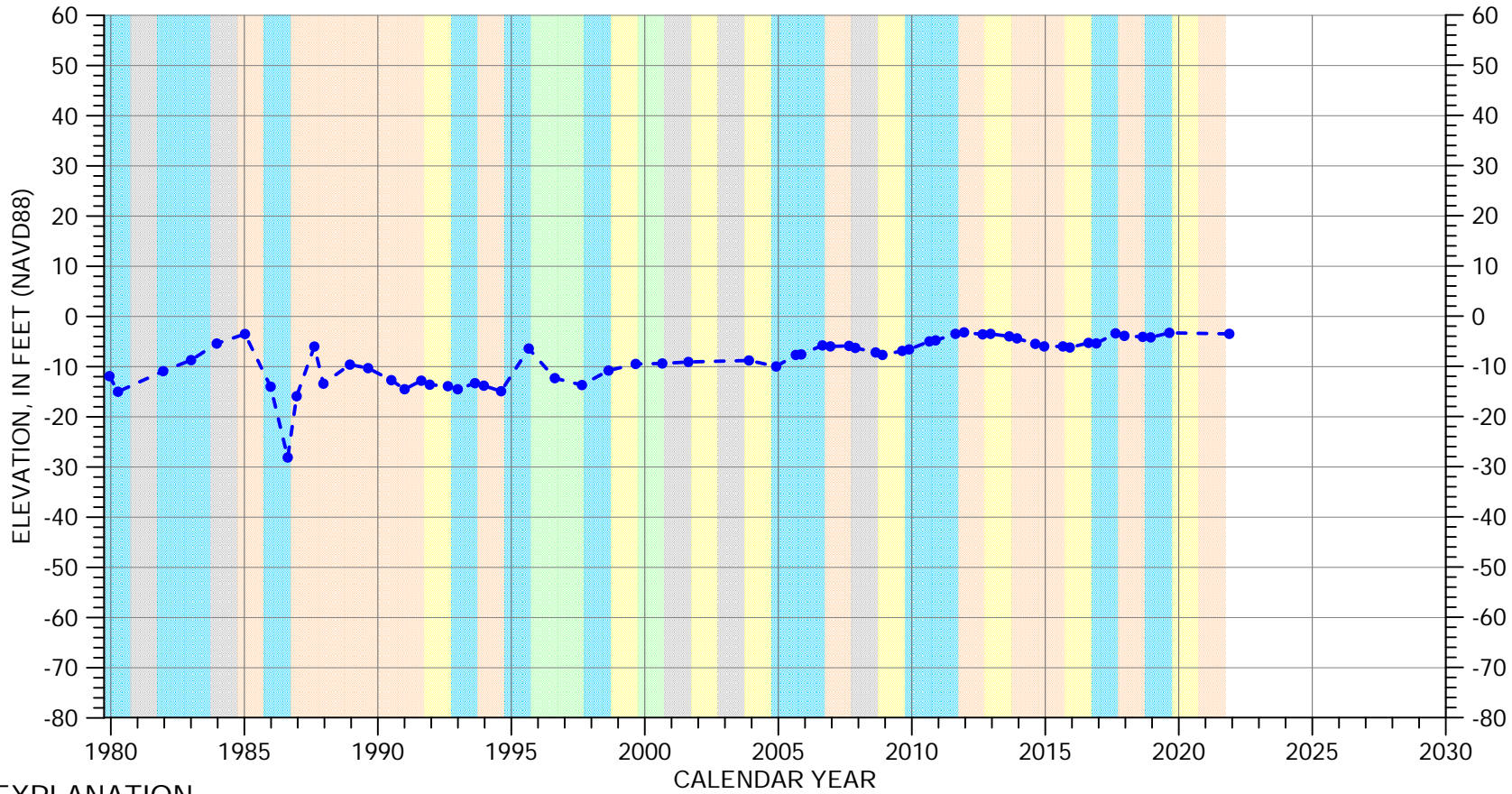
Perforated from
-138 to -438 feet msl



Well bottom
-438 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-26L01

180/400-Foot Aquifer Subbasin

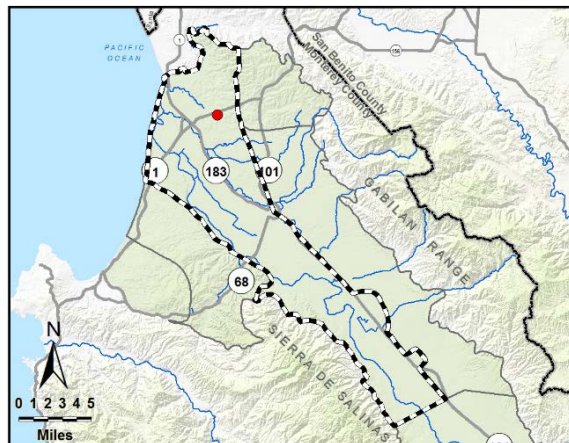


EXPLANATION

- - - ● Groundwater Elevation
- Suspect Measurement
- Land Surface (109 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



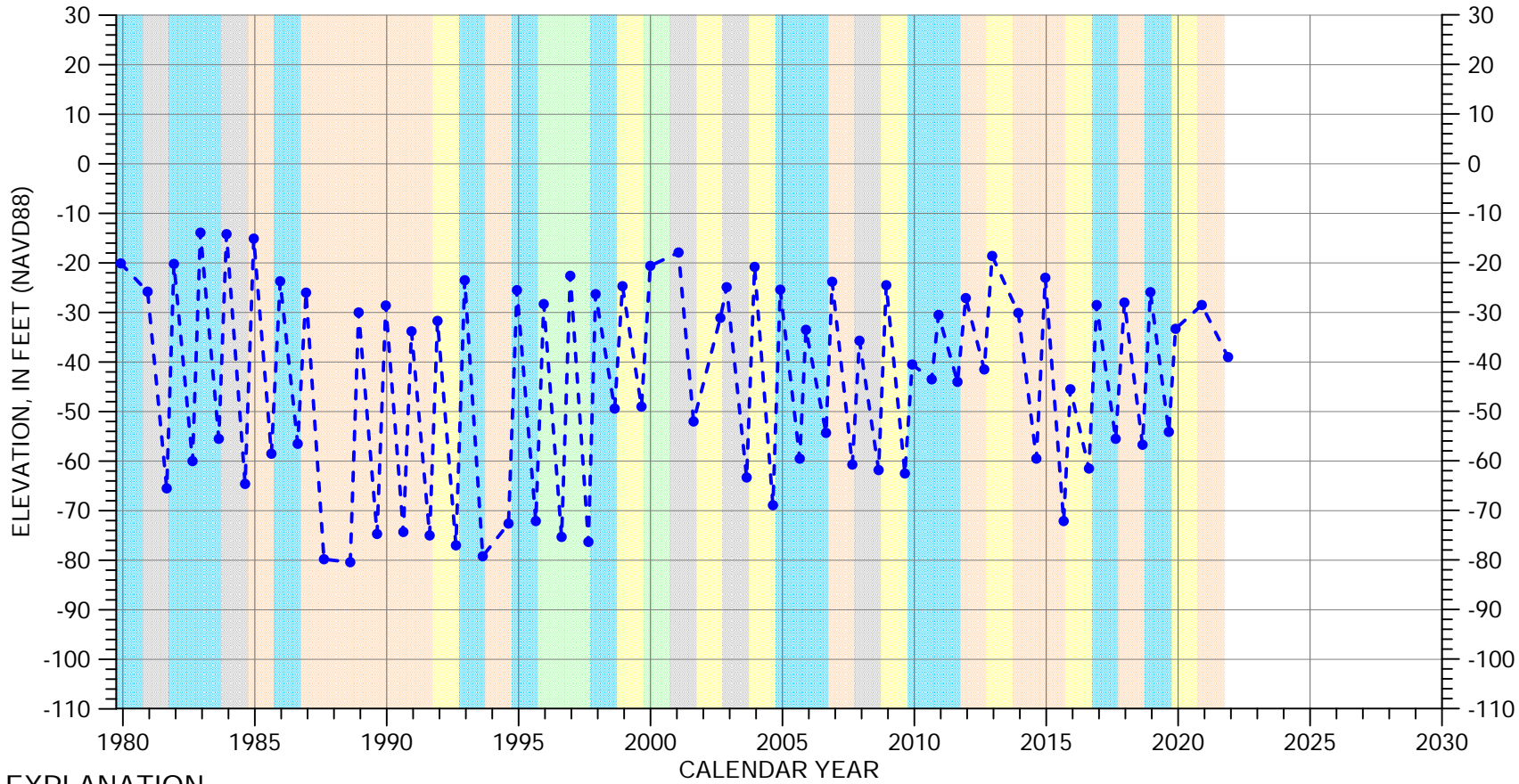
Perforated interval
unknown



Well bottom
-141 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-27P01

180/400-Foot Aquifer Subbasin

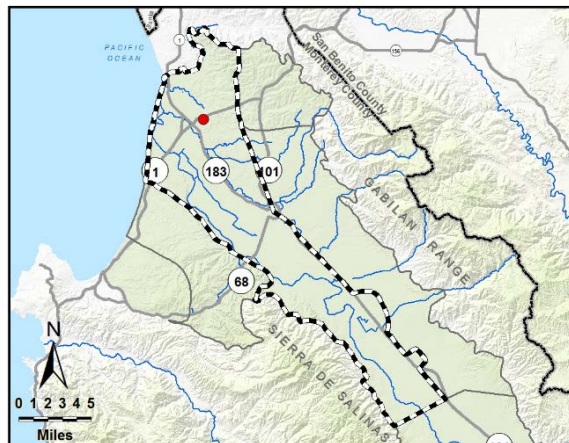


EXPLANATION

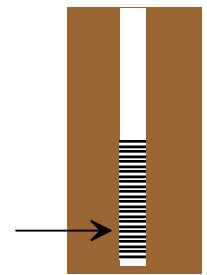
- Groundwater Elevation
- Suspect Measurement
- Land Surface (55 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



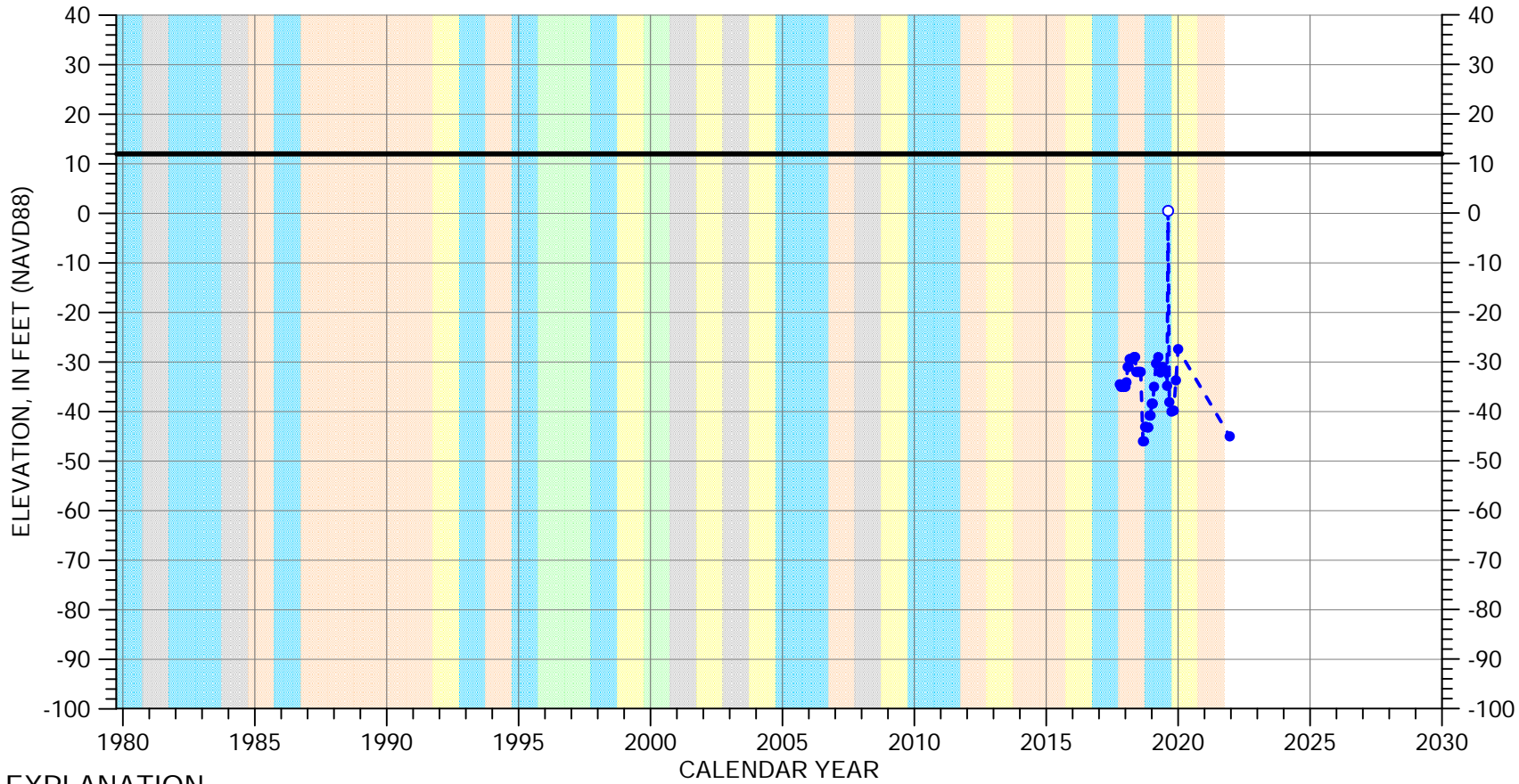
Perforated from
-361 to -521 feet msl



Well bottom
-555 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-28L03

180/400-Foot Aquifer Subbasin

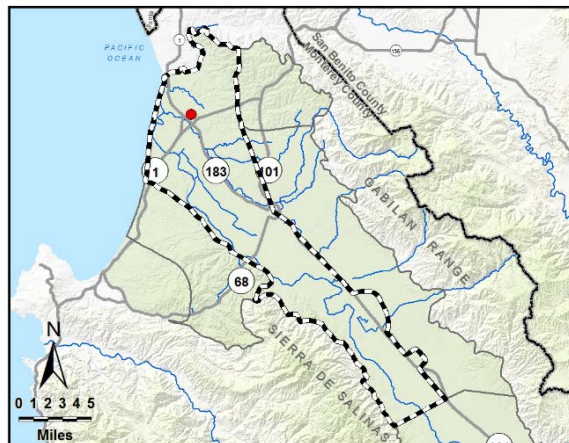


EXPLANATION

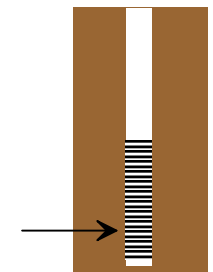
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



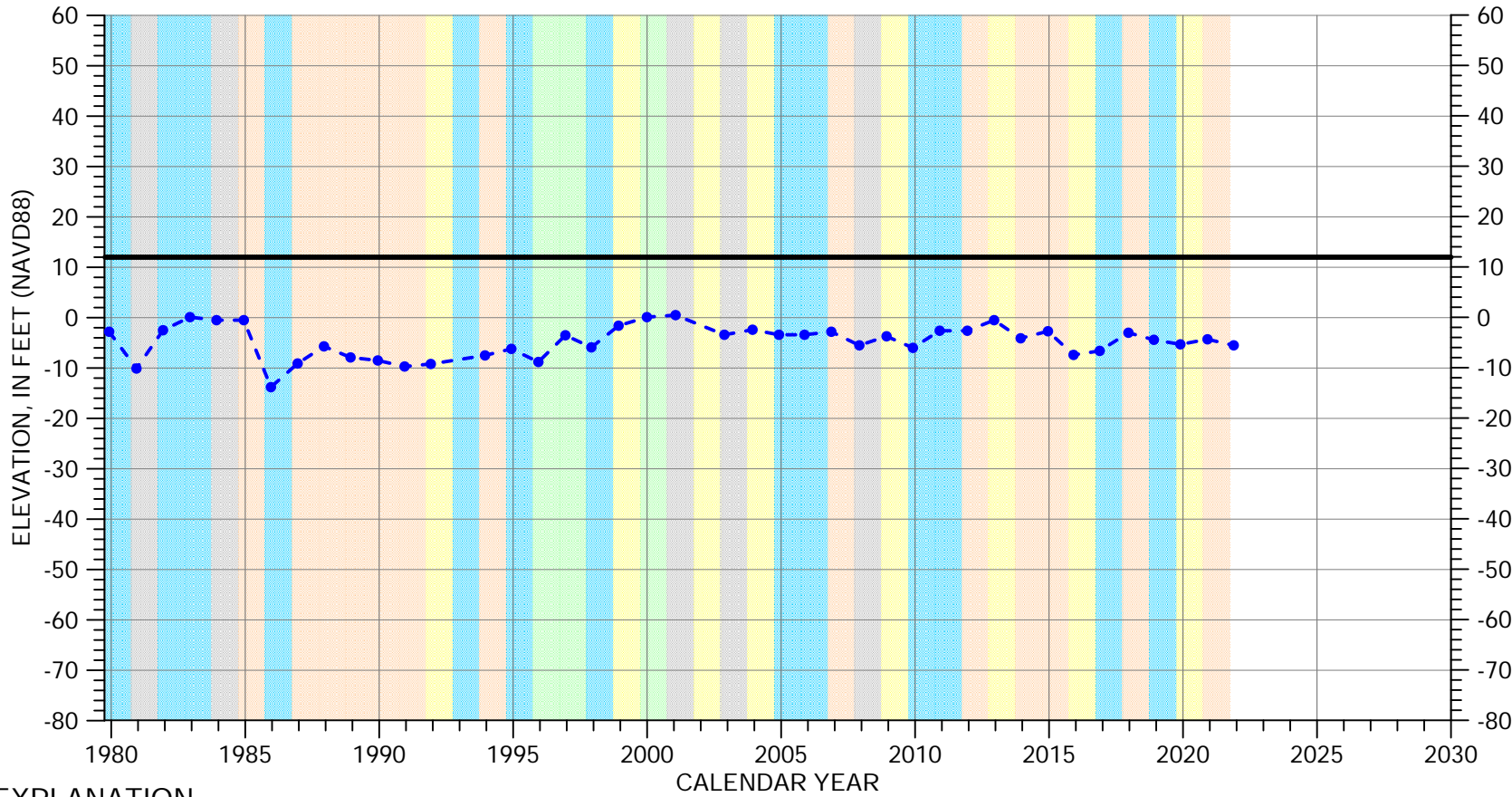
Multiple perforated intervals from -1068 to -1438 feet msl



Well bottom -1448 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-29D03

180/400-Foot Aquifer Subbasin

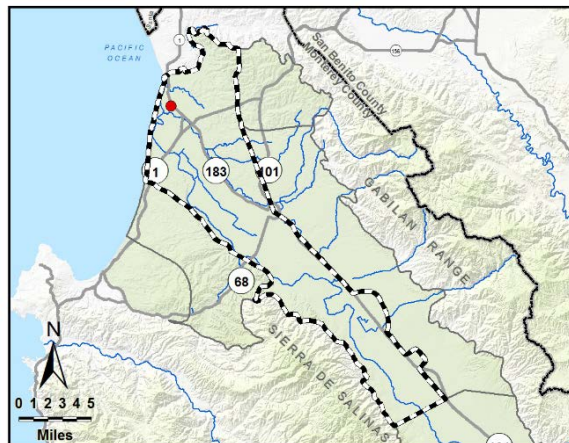


EXPLANATION

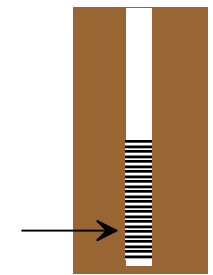
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



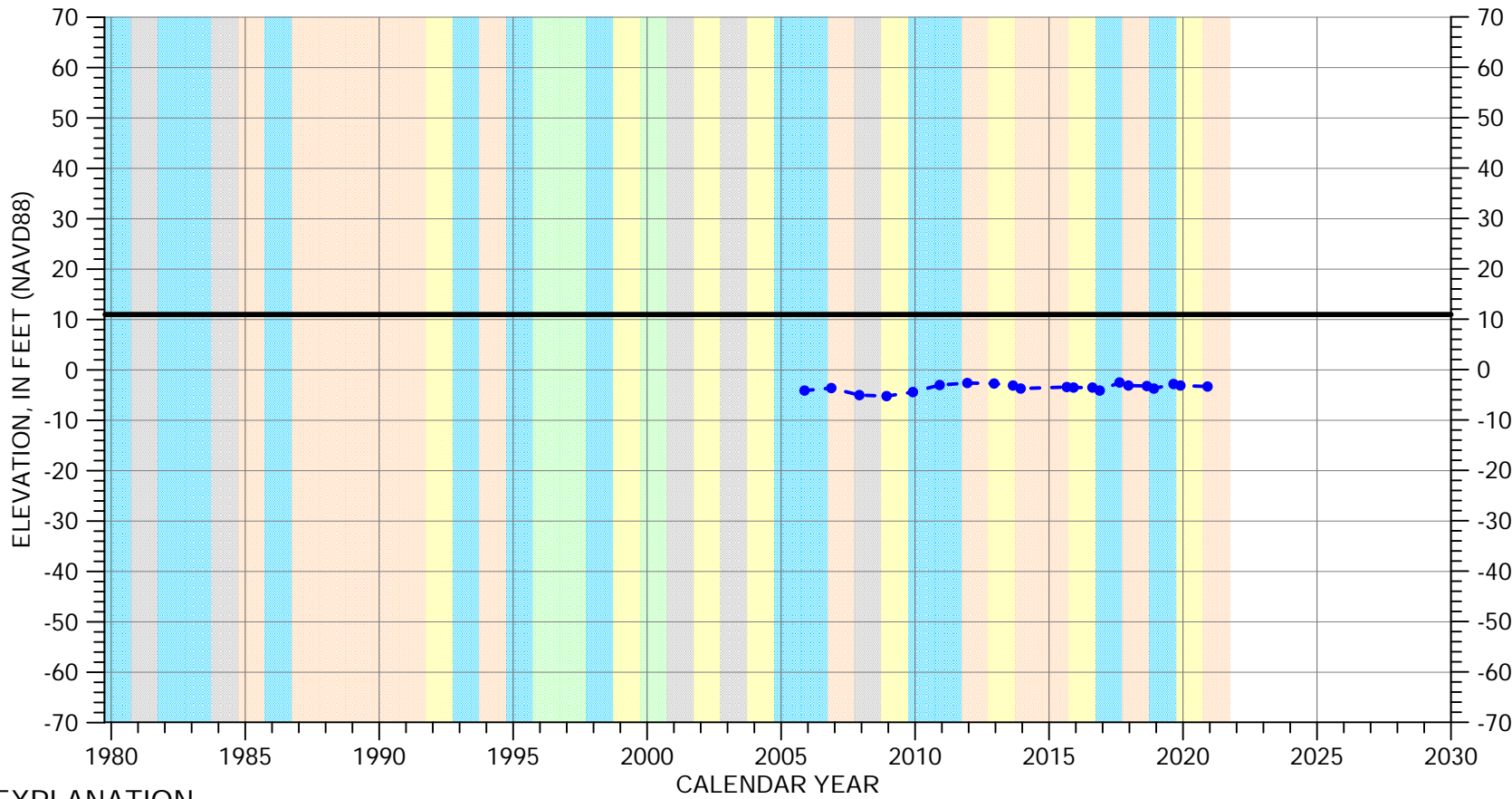
Multiple perforated intervals from -423 to -623 feet msl



Well bottom -623 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-29D04

180/400-Foot Aquifer Subbasin

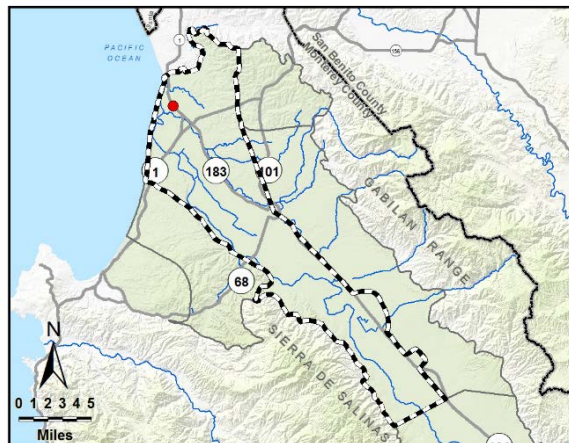


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



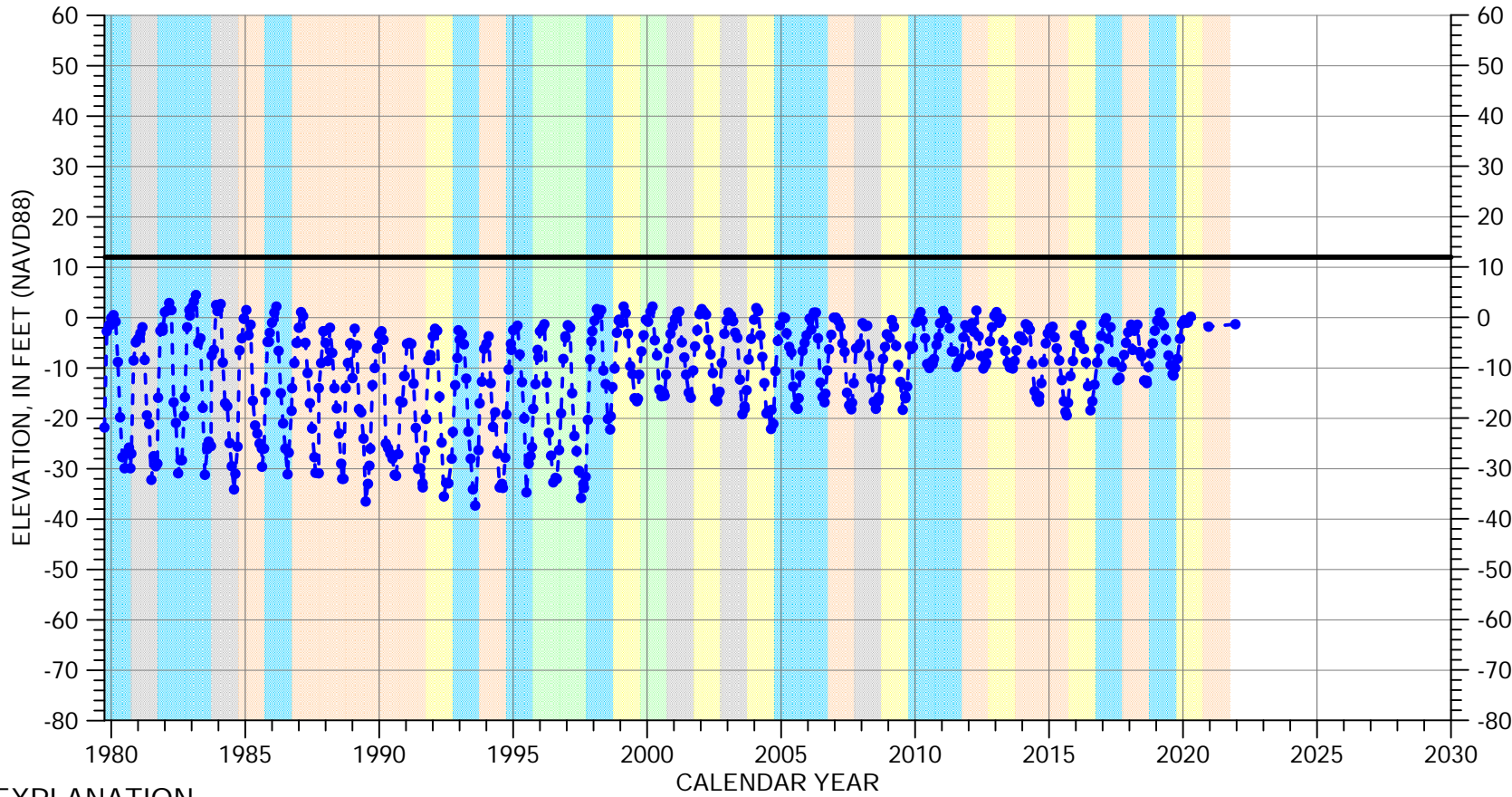
Perforated interval
unknown



Well bottom
-2179 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-31N02

180/400-Foot Aquifer Subbasin

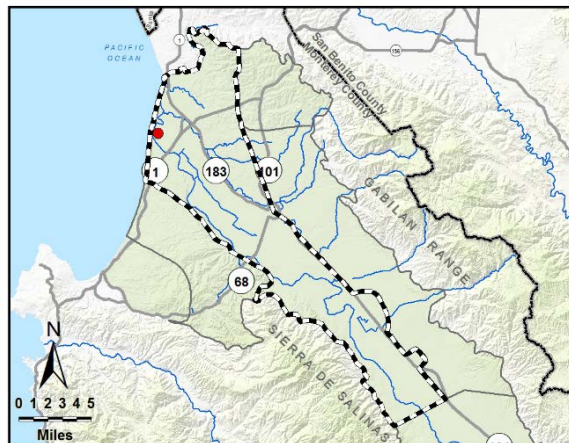


EXPLANATION

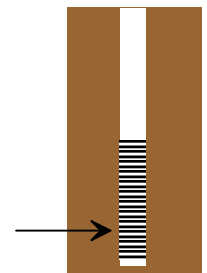
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



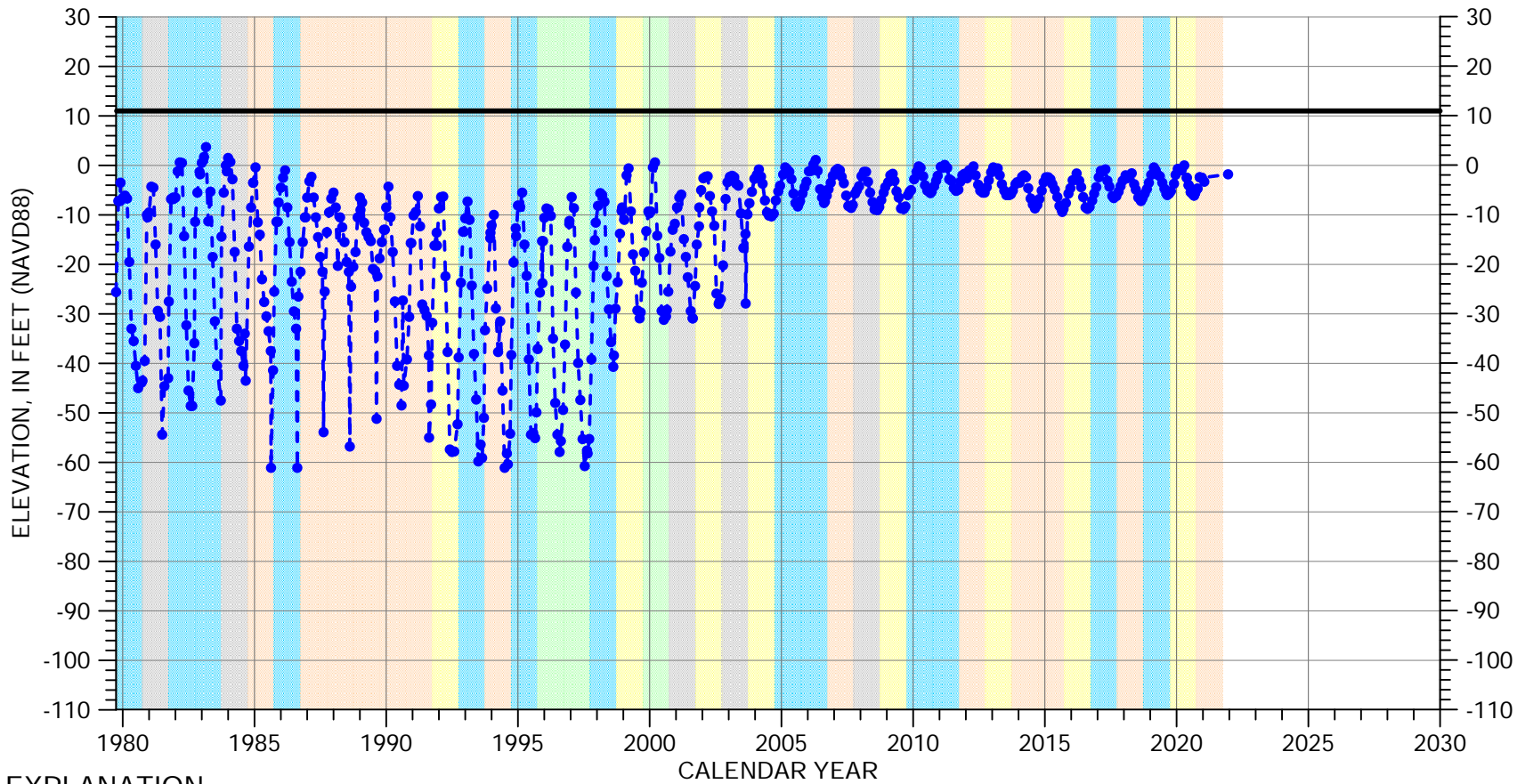
Perforated from
-314 to -518 feet msl



Well bottom
-566 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-32A02

180/400-Foot Aquifer Subbasin

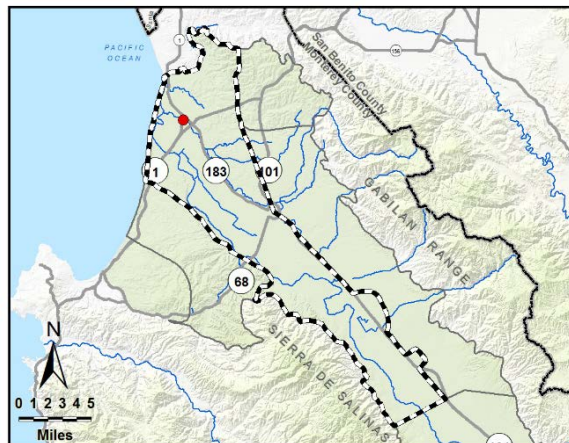


EXPLANATION

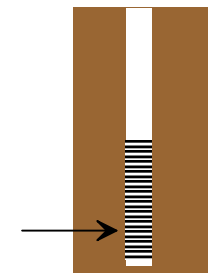
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



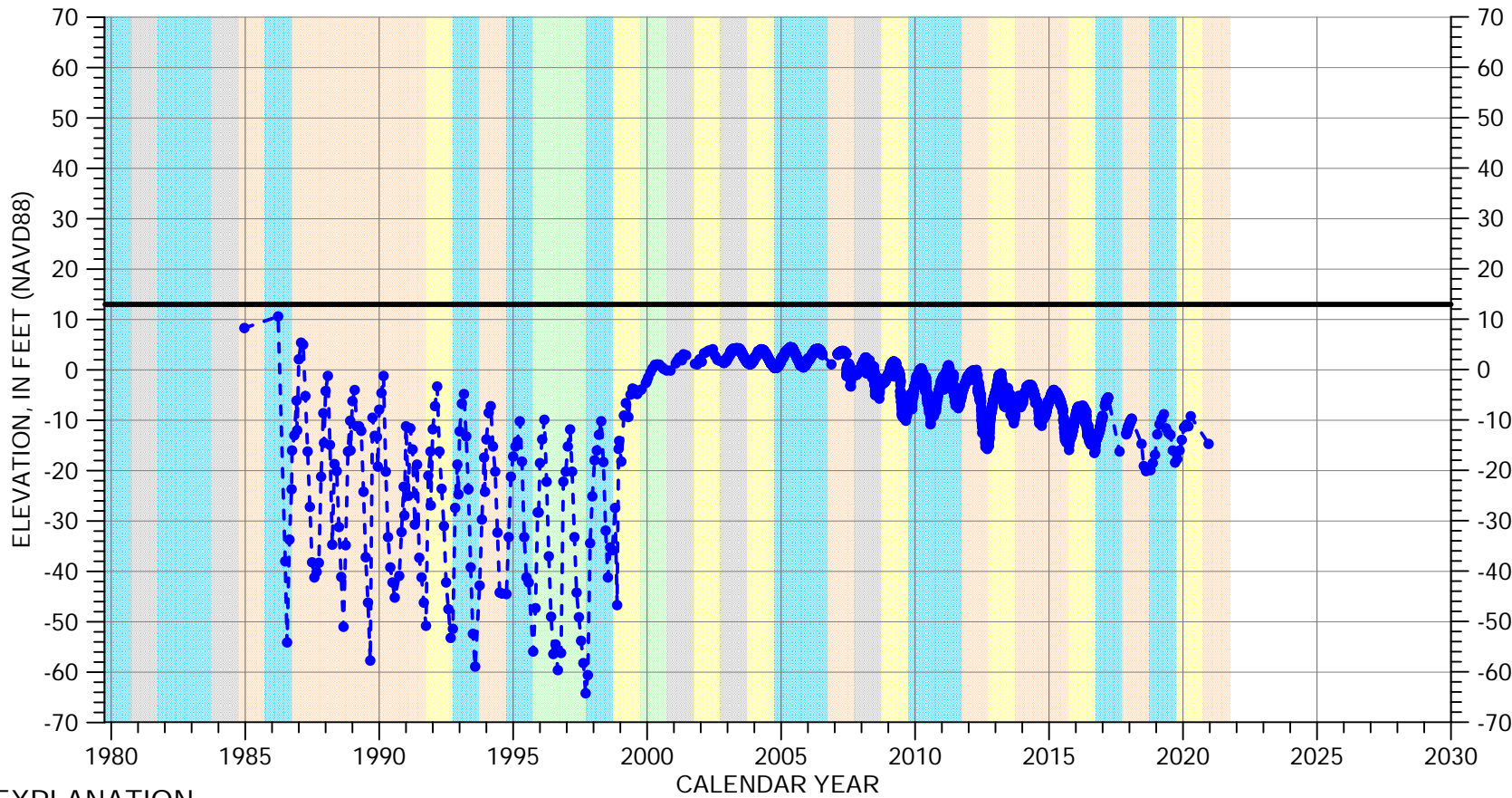
Perforated from
-289 to -589 feet msl



Well bottom
-589 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-32E05

180/400-Foot Aquifer Subbasin

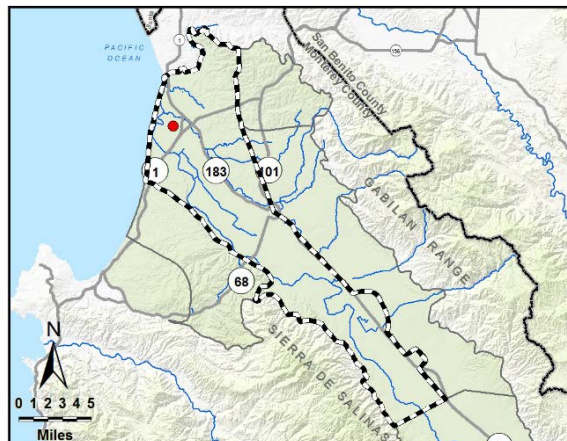


EXPLANATION

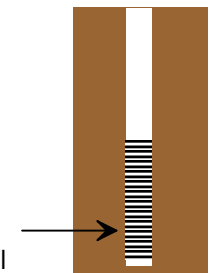
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



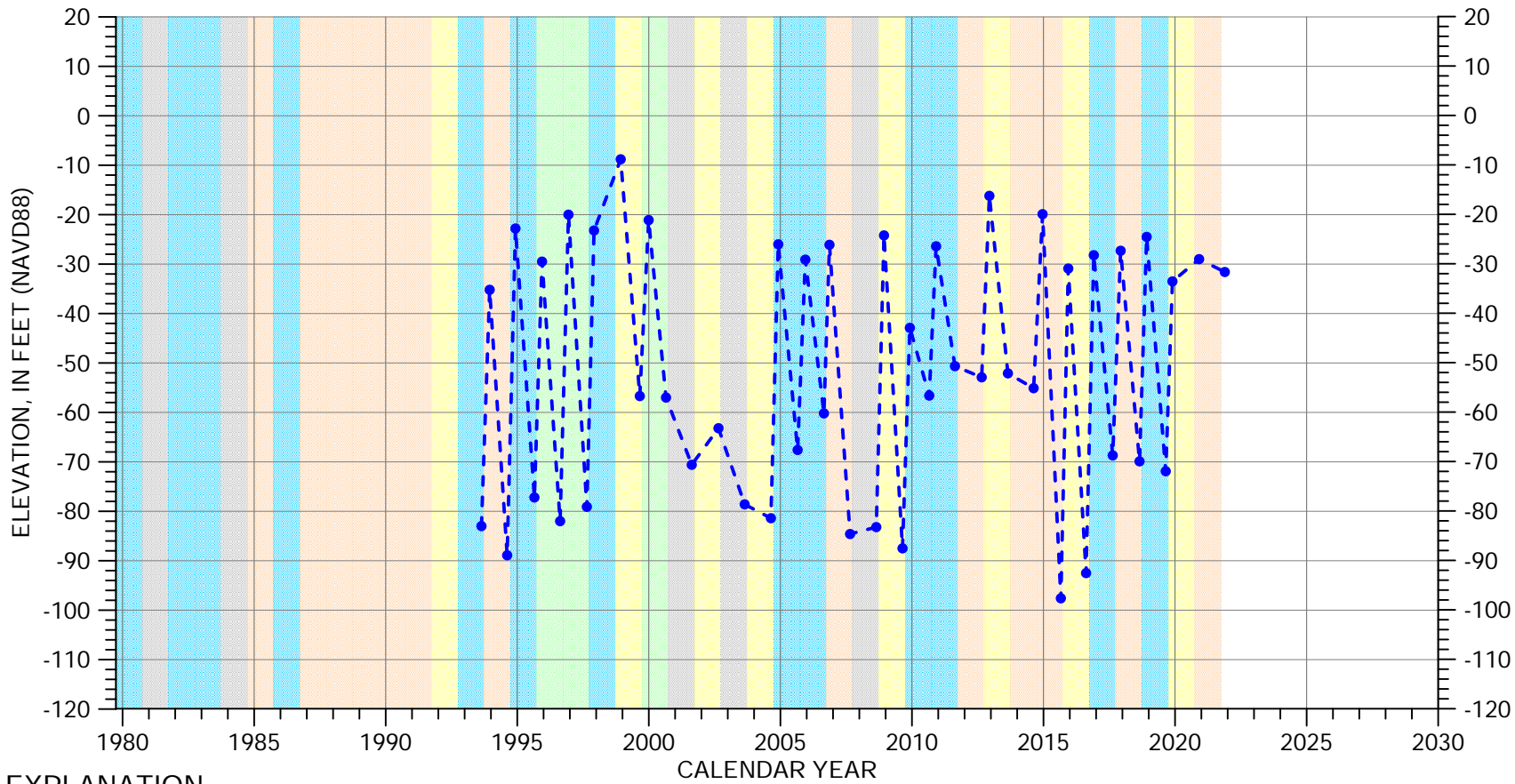
Perforated from
-756 to -1566 feet msl



Well bottom
-1631 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-02C03

180/400-Foot Aquifer Subbasin

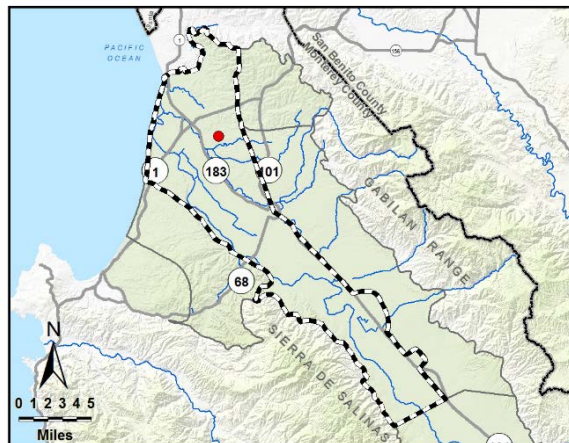


EXPLANATION

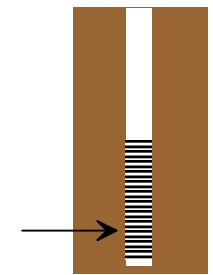
- Groundwater Elevation
- Suspect Measurement
- Land Surface (66 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



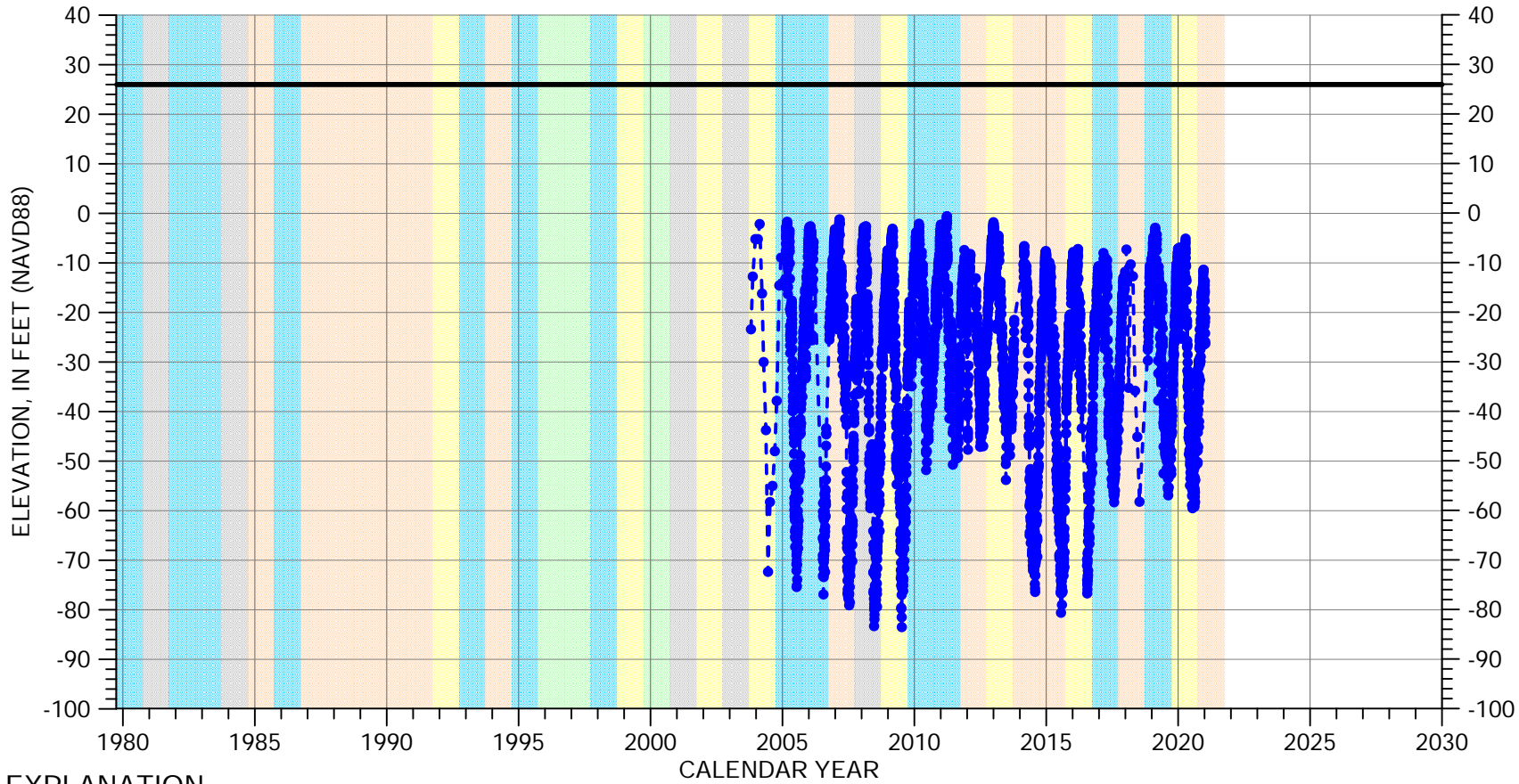
Multiple perforated intervals from -335 to -775 feet msl



Well bottom -775 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-03F03

180/400-Foot Aquifer Subbasin

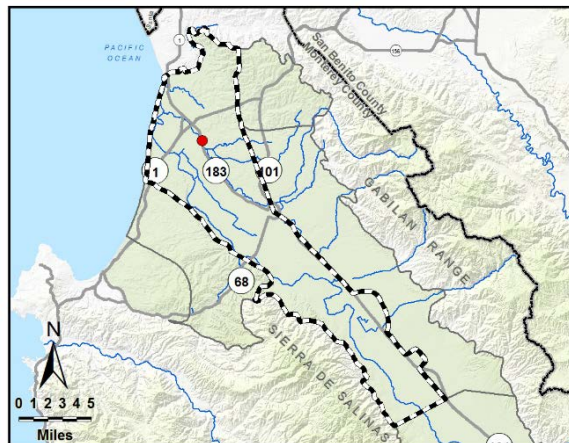


EXPLANATION

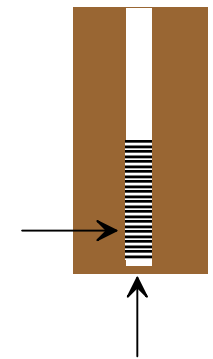
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



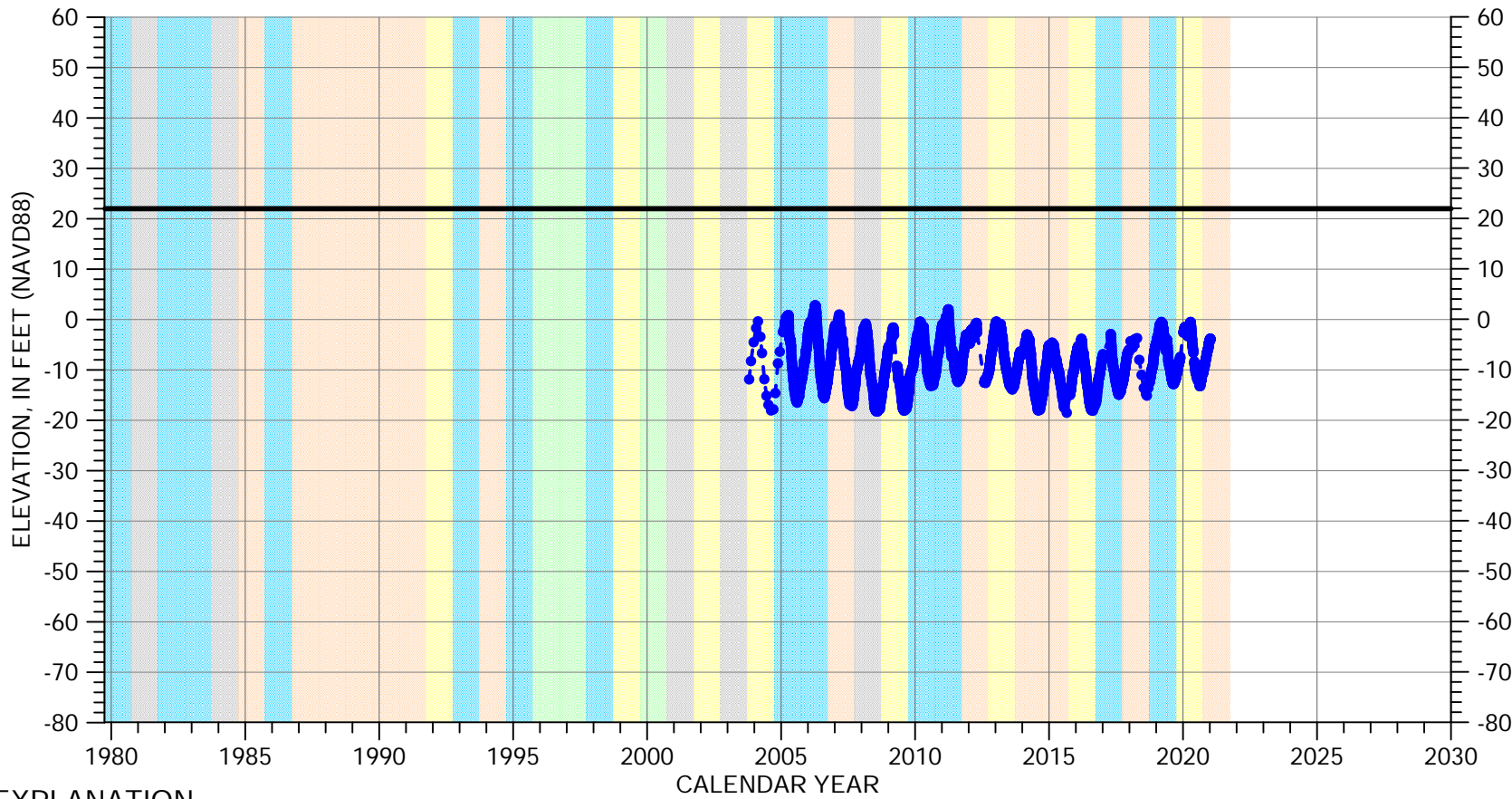
Perforated from
-395 to -425 feet msl



Well bottom
-430 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-03F04

180/400-Foot Aquifer Subbasin

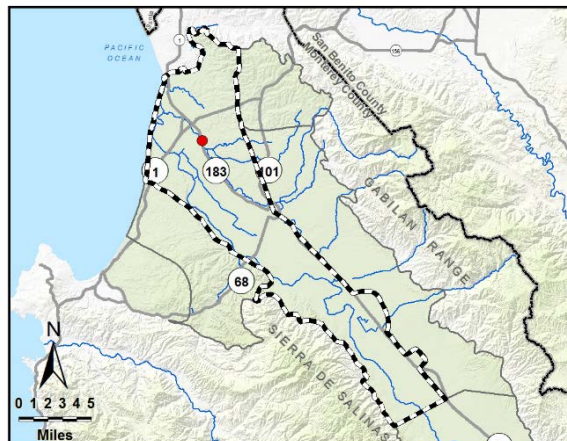


EXPLANATION

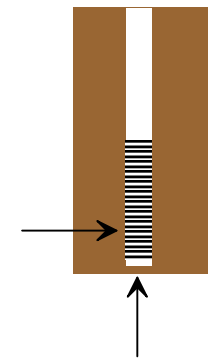
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



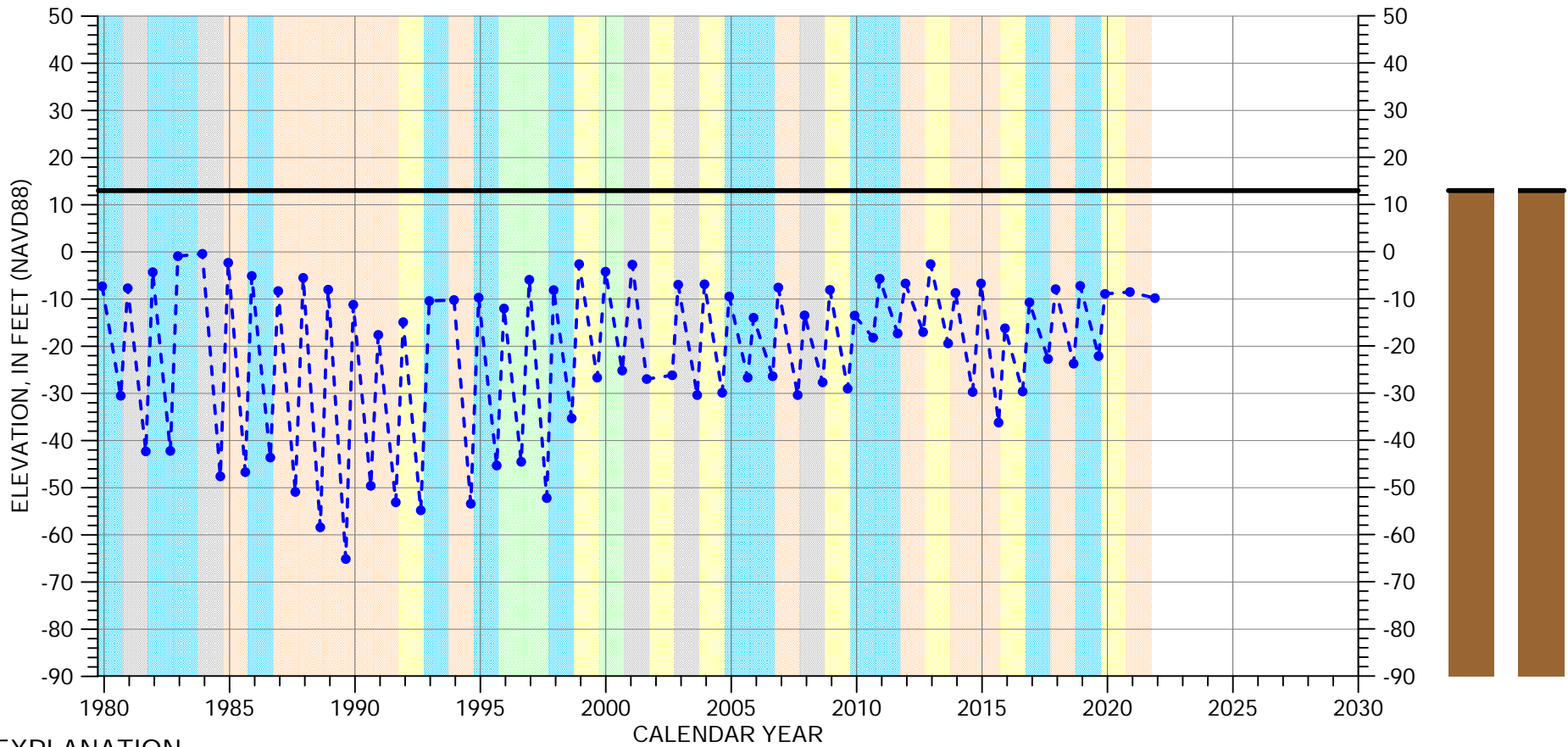
Perforated from
-133 to -183 feet msl



Well bottom
-184 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-05F04

180/400-Foot Aquifer Subbasin

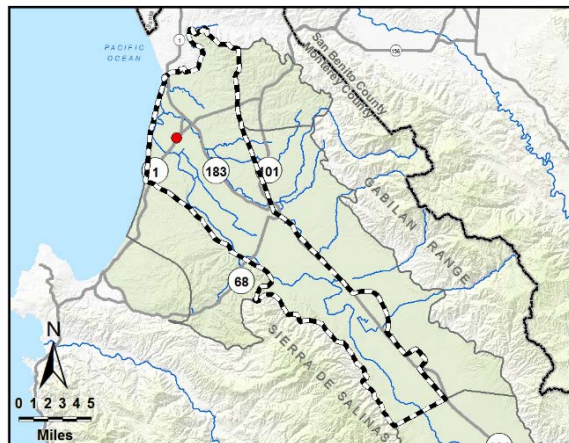


EXPLANATION

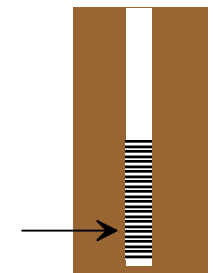
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



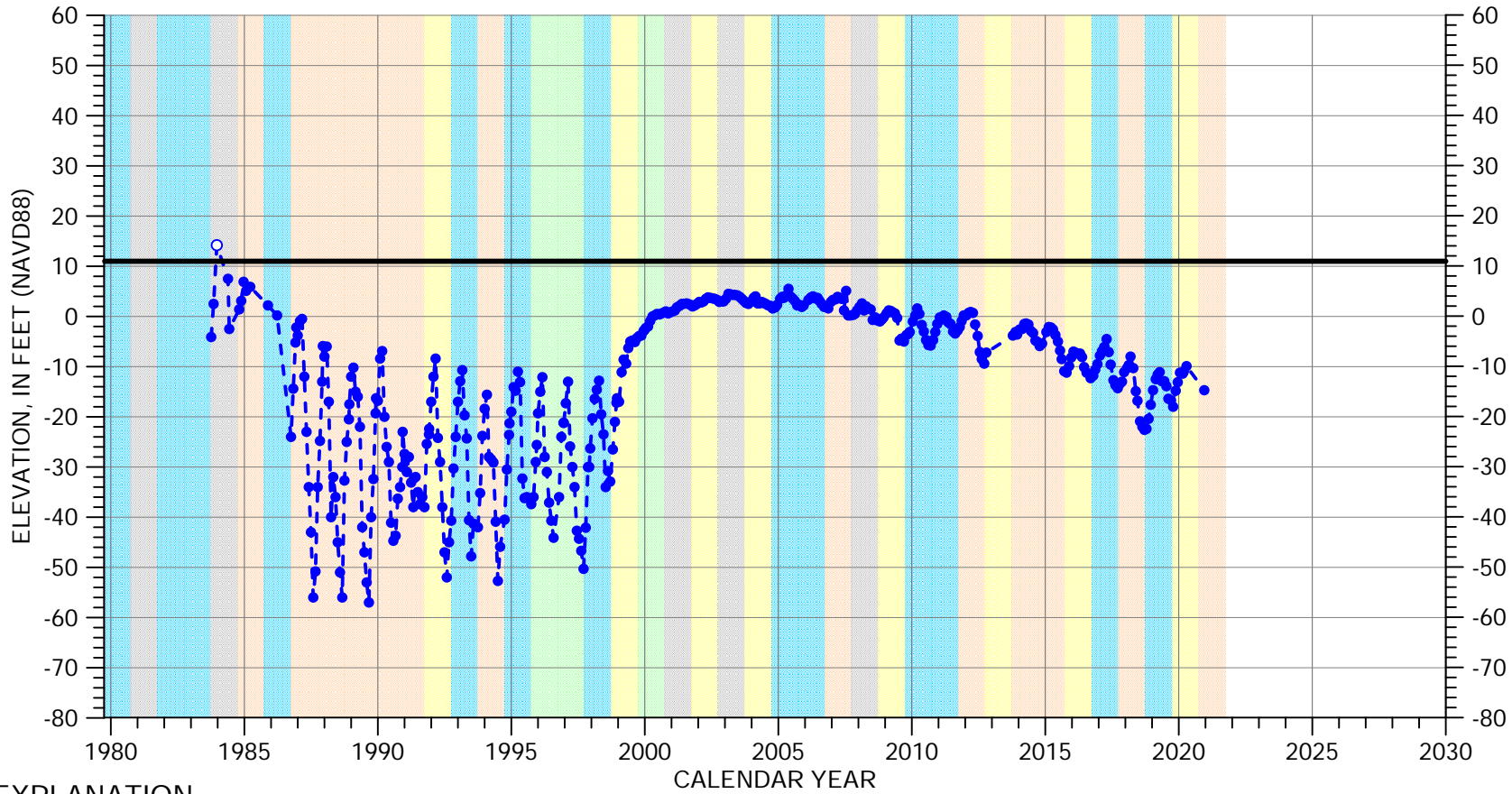
Multiple perforated intervals from -392 to -520 feet msl



Well bottom -568 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-06L01

180/400-Foot Aquifer Subbasin

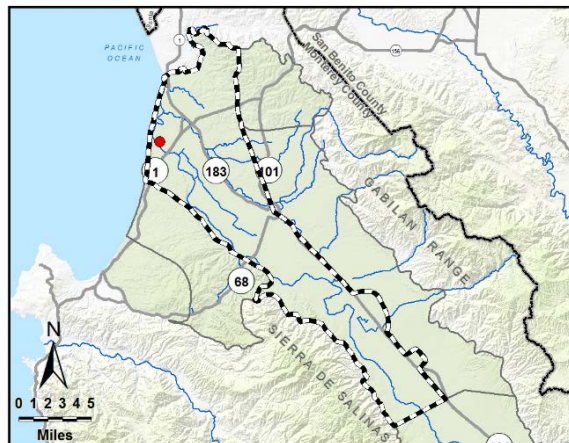


EXPLANATION

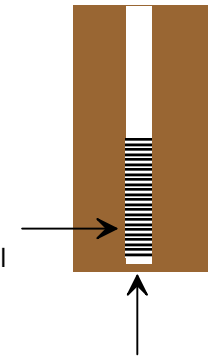
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



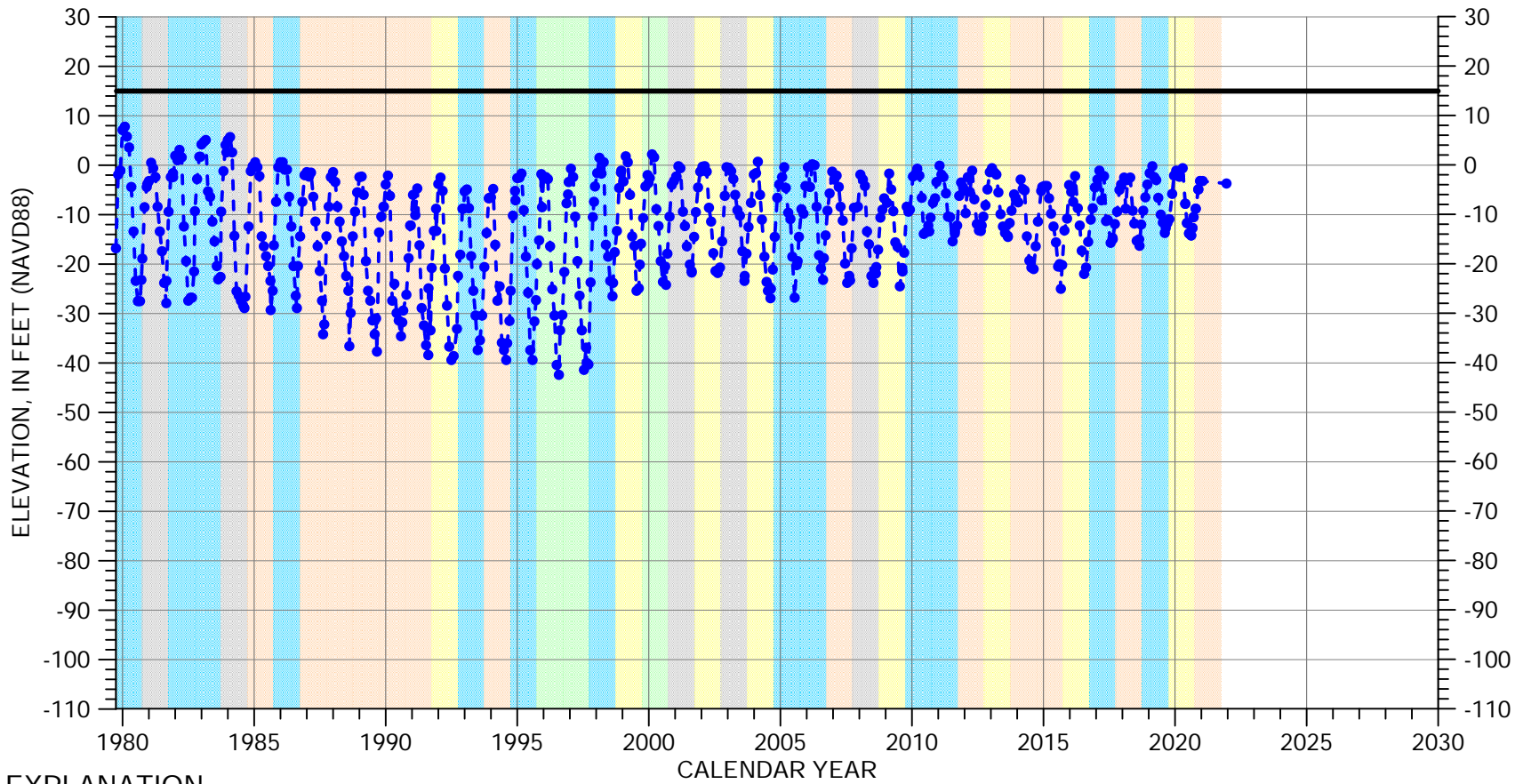
Perforated from
-852 to -1532 feet msl



Well bottom
-1552 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-08M02

180/400-Foot Aquifer Subbasin

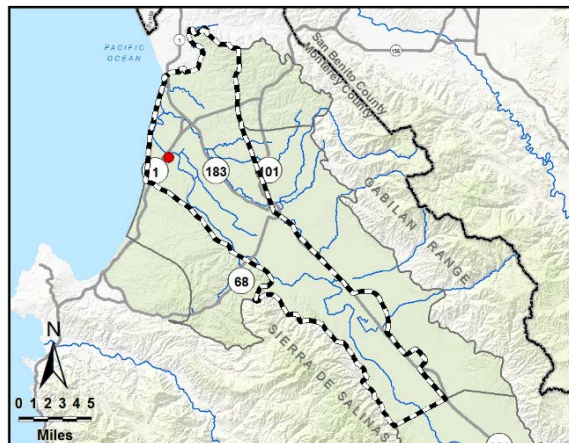


EXPLANATION

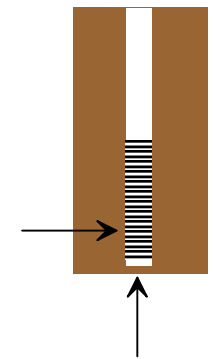
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



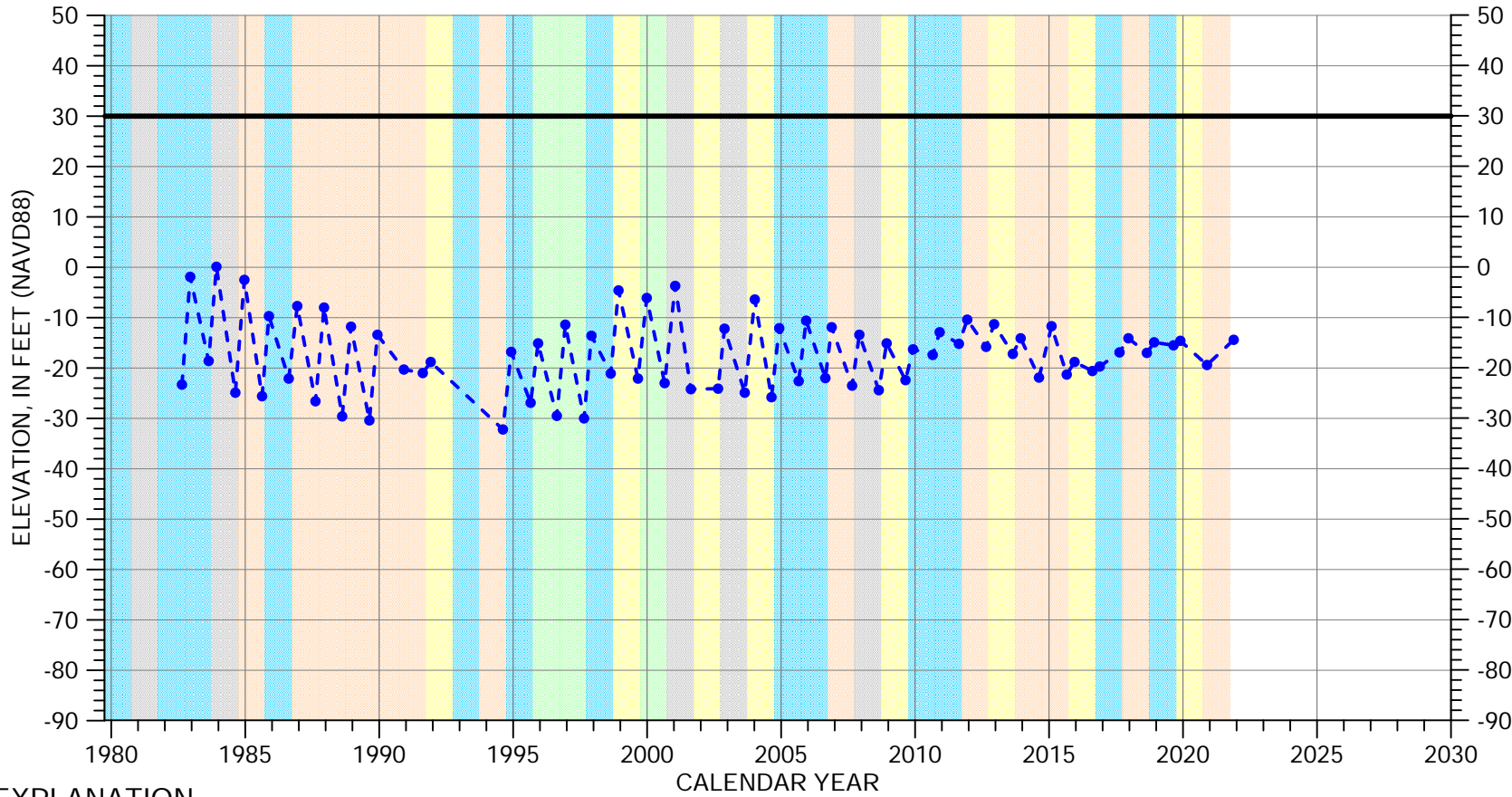
Perforated from
-299 to -441 feet msl



Well bottom
-485 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-10P01

180/400-Foot Aquifer Subbasin

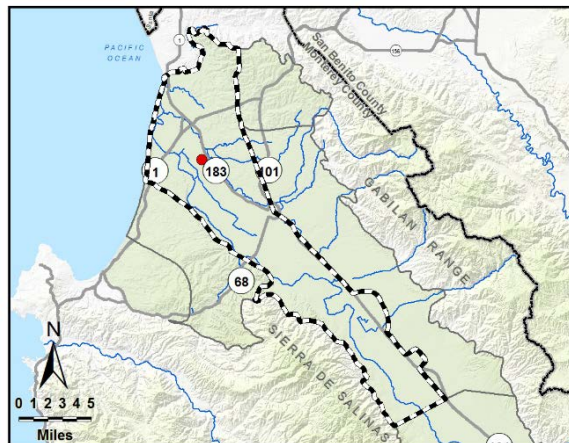


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



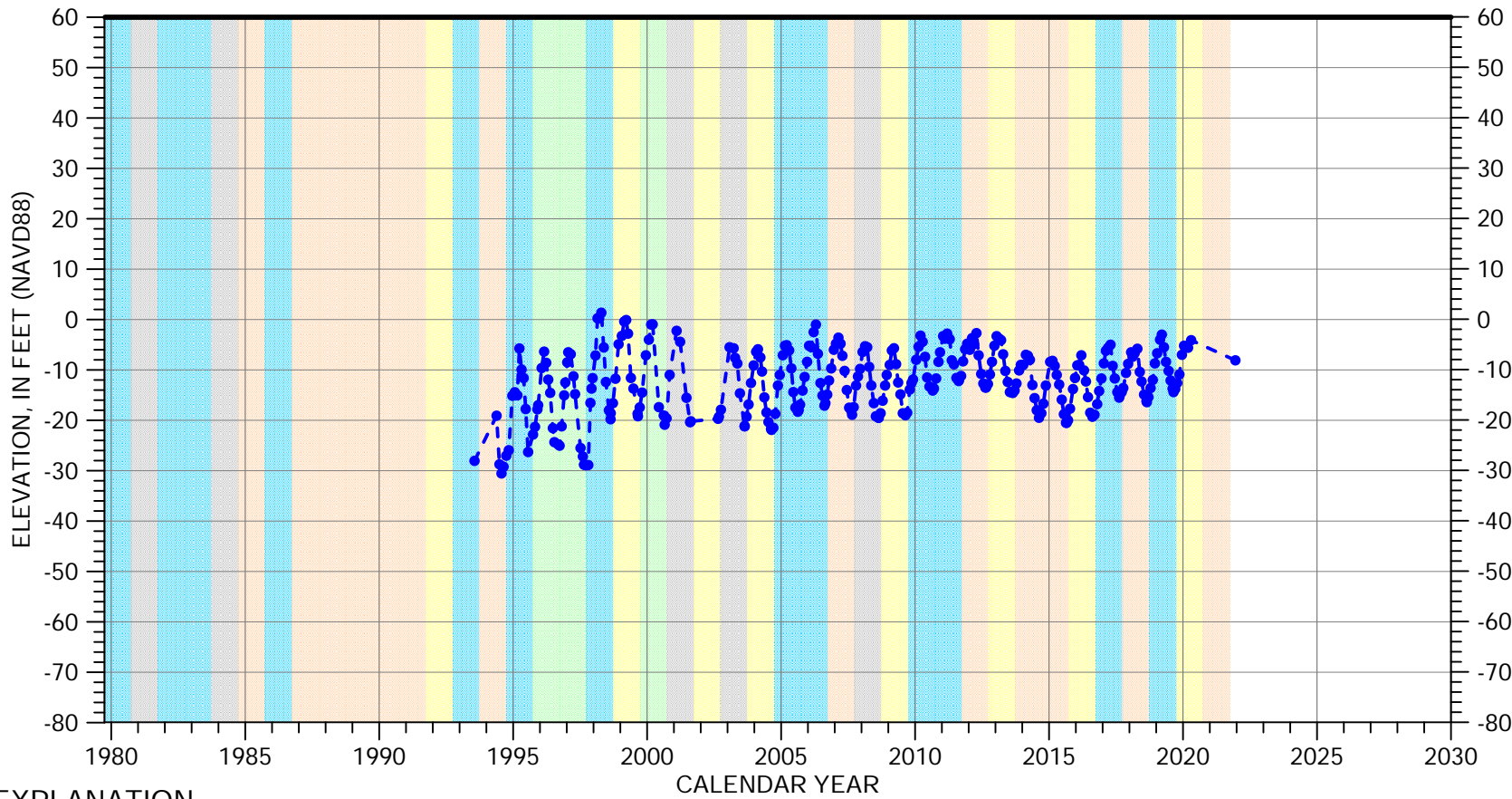
Perforated interval
unknown



Well bottom
-167 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-11A02

180/400-Foot Aquifer Subbasin

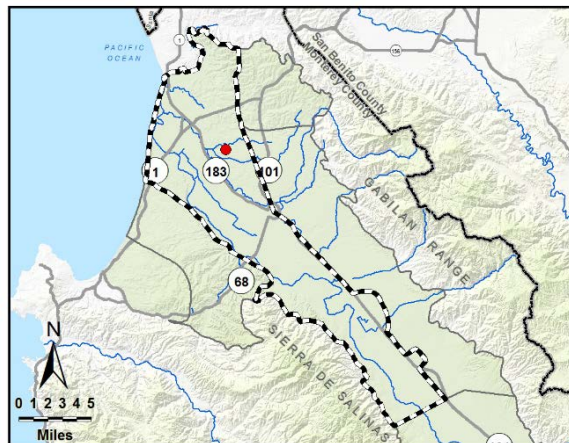


EXPLANATION

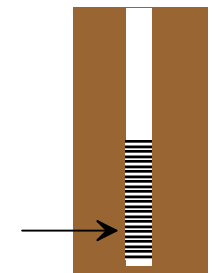
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



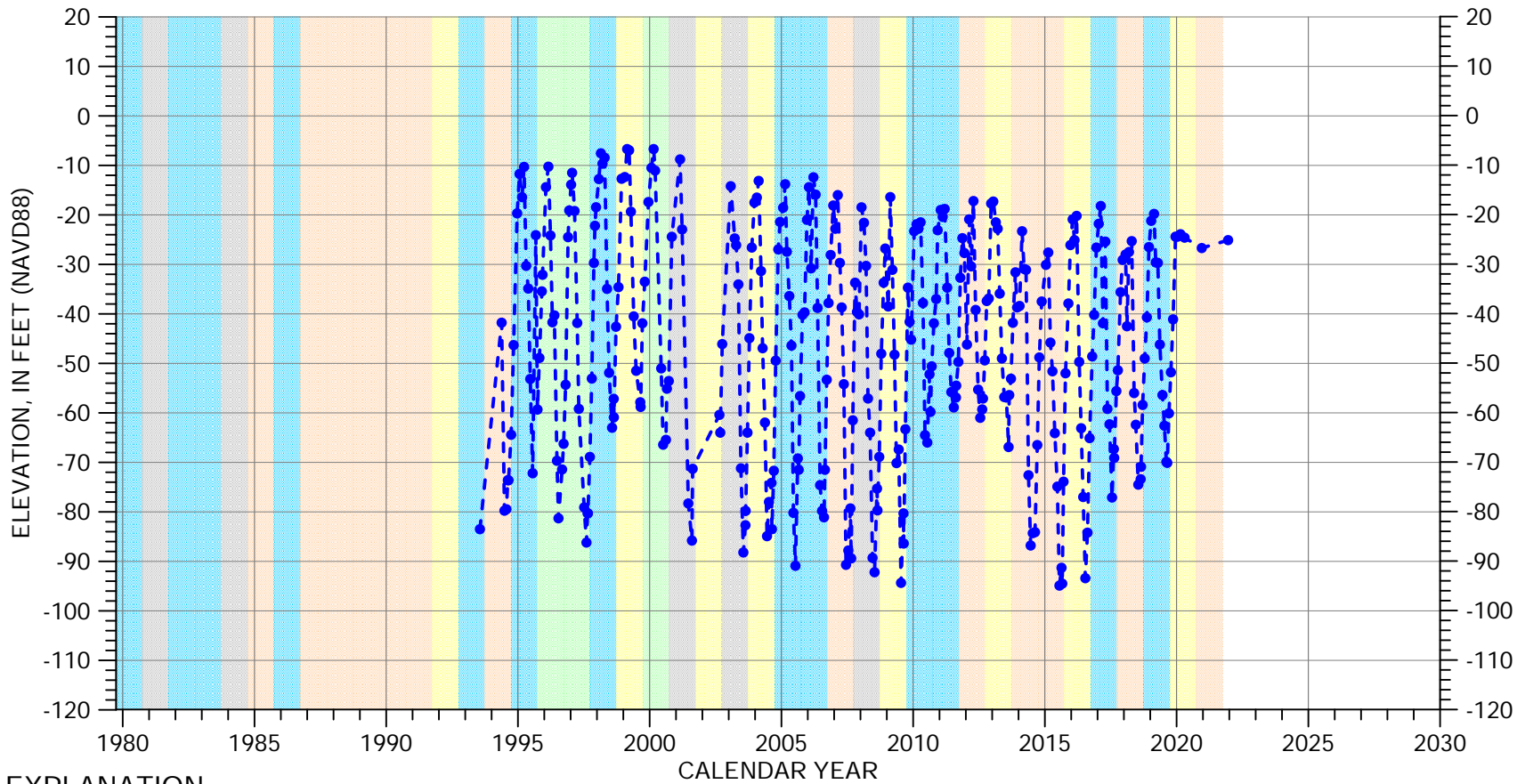
Multiple perforated intervals from -131 to -181 feet msl



Well bottom -191 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-11A04

180/400-Foot Aquifer Subbasin

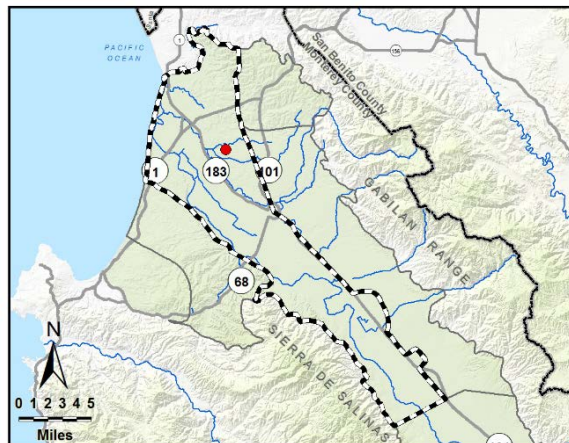


EXPLANATION

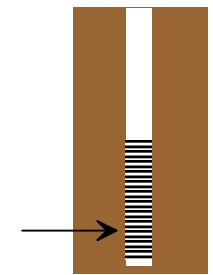
- Groundwater Elevation
- Suspect Measurement
- Land Surface (59 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



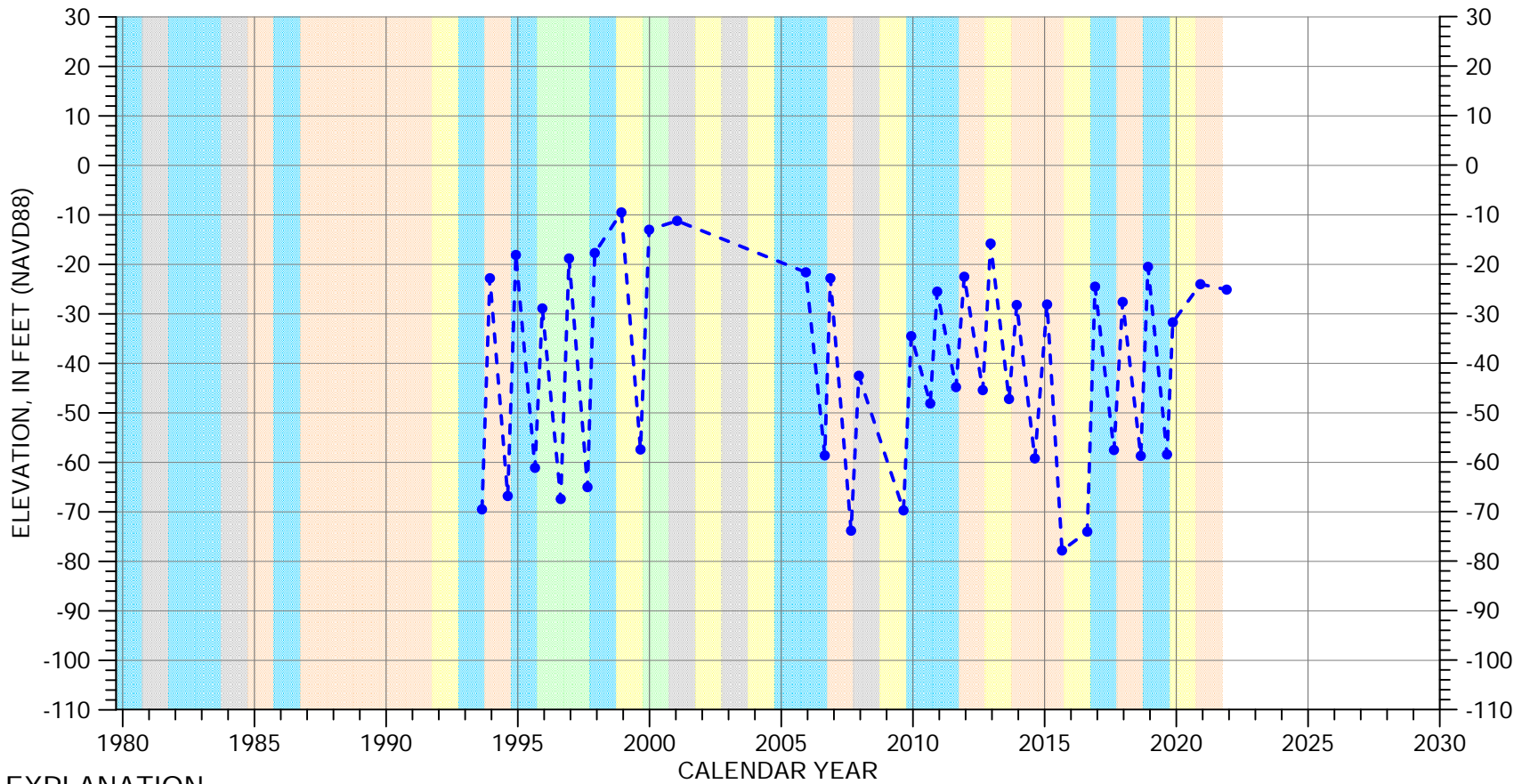
Multiple perforated intervals from -391 to -421 feet msl



Well bottom -431 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-11M03

180/400-Foot Aquifer Subbasin

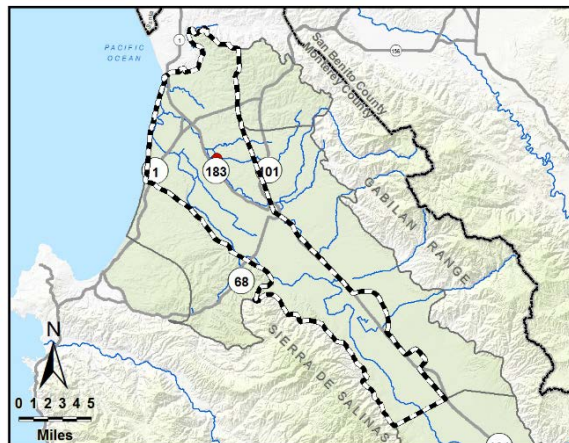


EXPLANATION

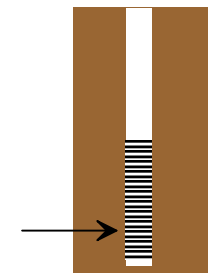
- Groundwater Elevation
- Suspect Measurement
- Land Surface (38 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| <ul style="list-style-type: none"> DRY DRY - NORMAL NORMAL | <ul style="list-style-type: none"> WET - NORMAL WET |
|---|---|



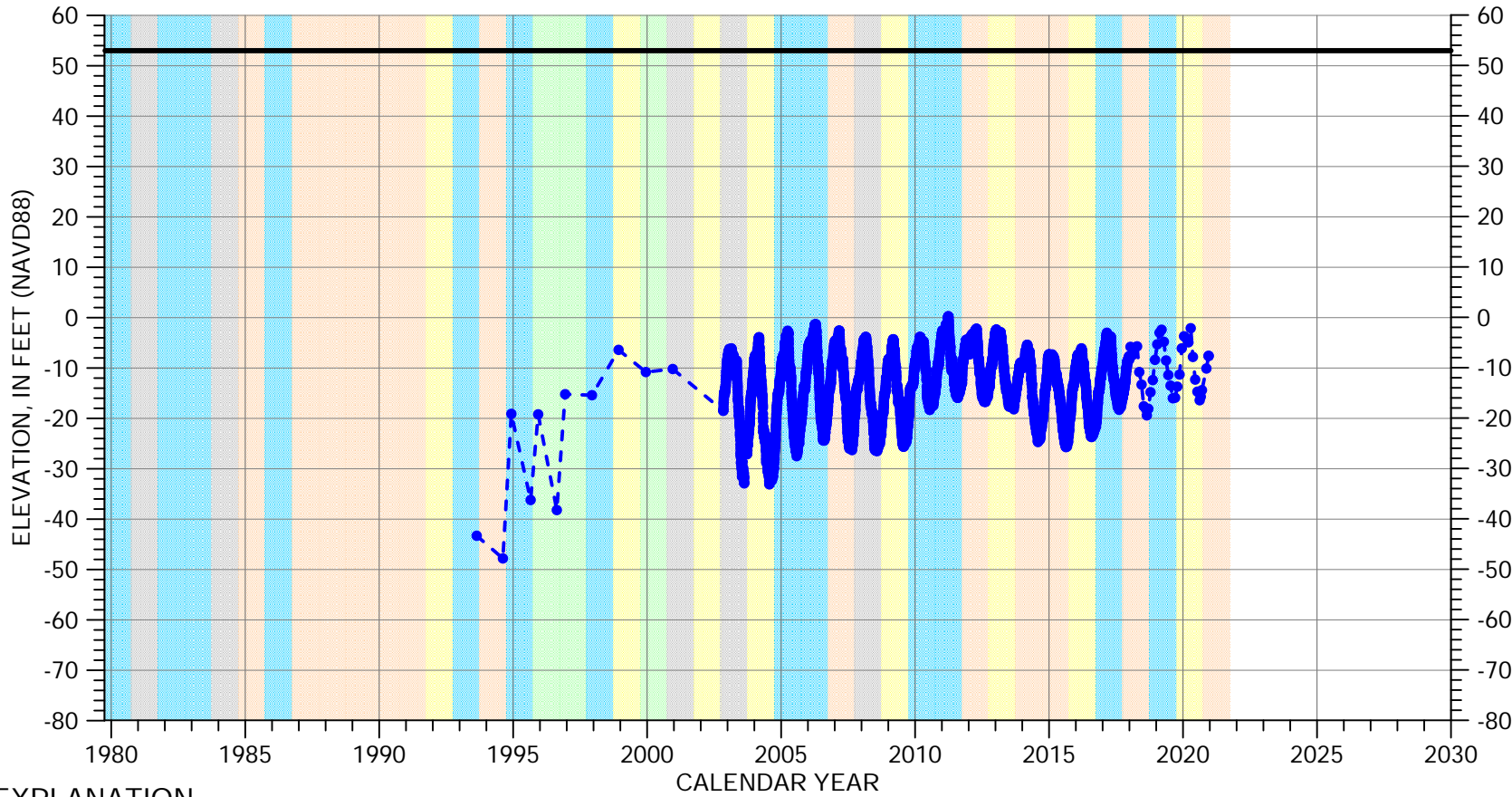
Multiple perforated intervals from -358 to -618 feet msl



Well bottom -618 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-12B02

180/400-Foot Aquifer Subbasin

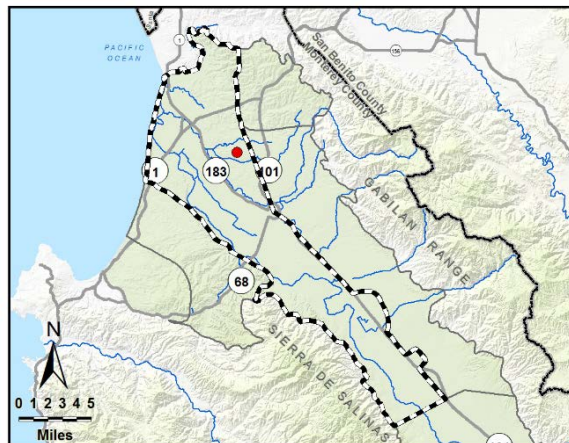


EXPLANATION

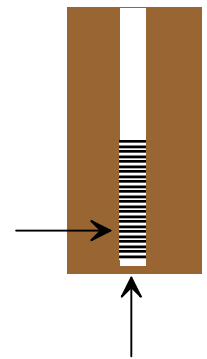
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



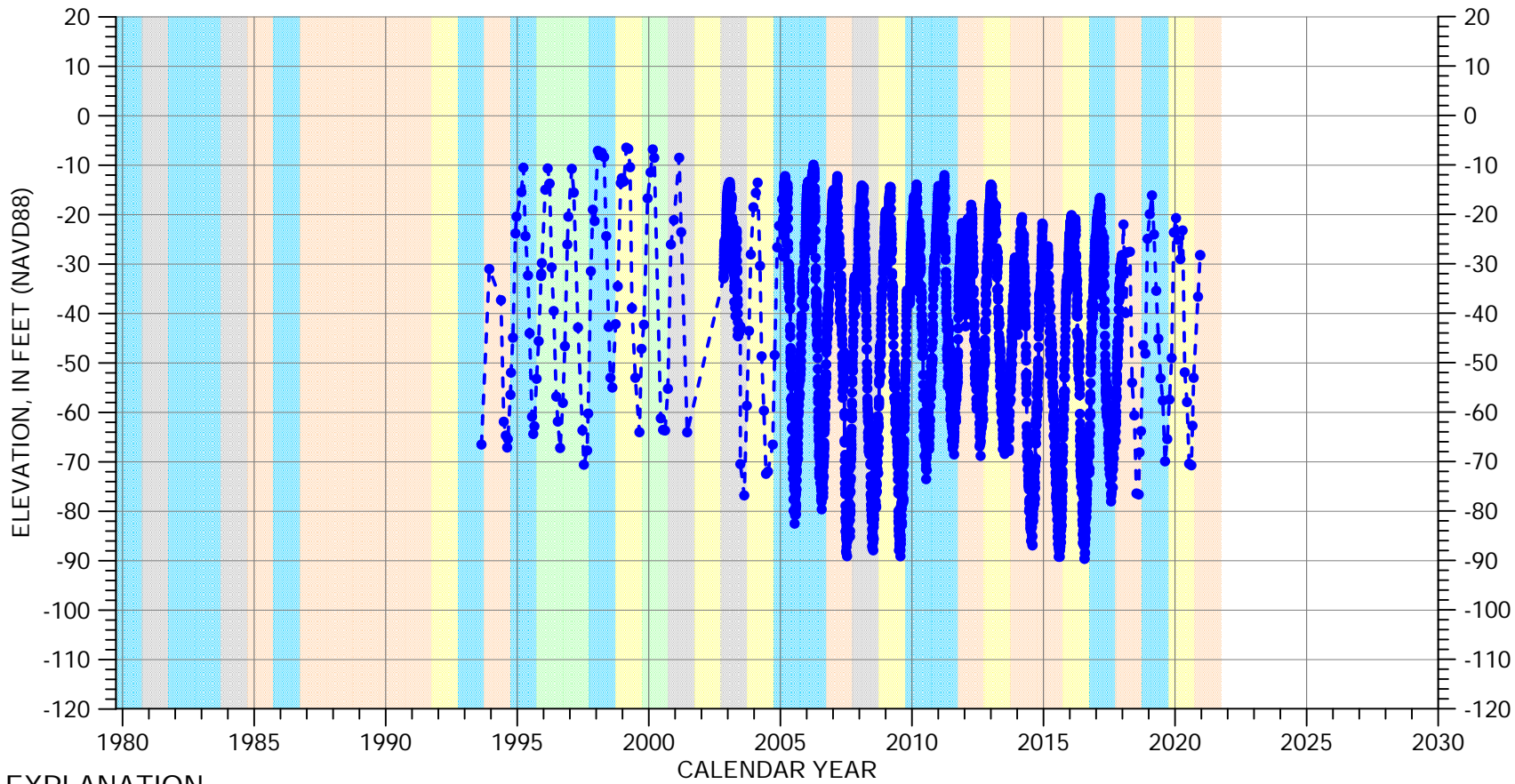
Perforated from
-157 to -207 feet msl



Well bottom
-212 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-12B03

180/400-Foot Aquifer Subbasin

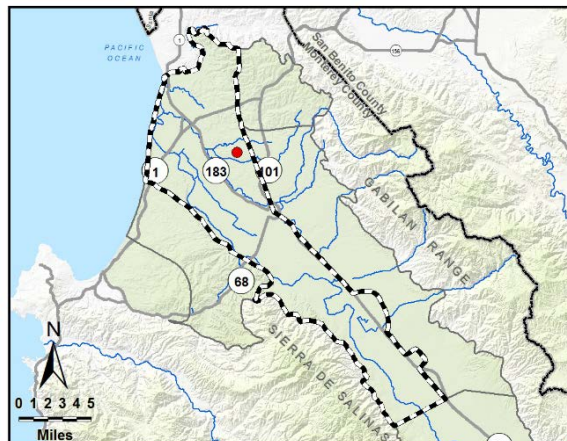


EXPLANATION

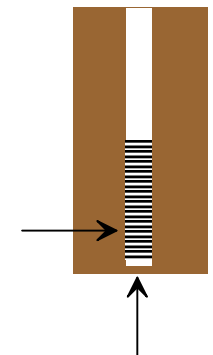
- Groundwater Elevation
- Suspect Measurement
- Land Surface (53 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------|--------------|
| Orange | DRY | Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Cyan | WET |
| Grey | NORMAL | | |



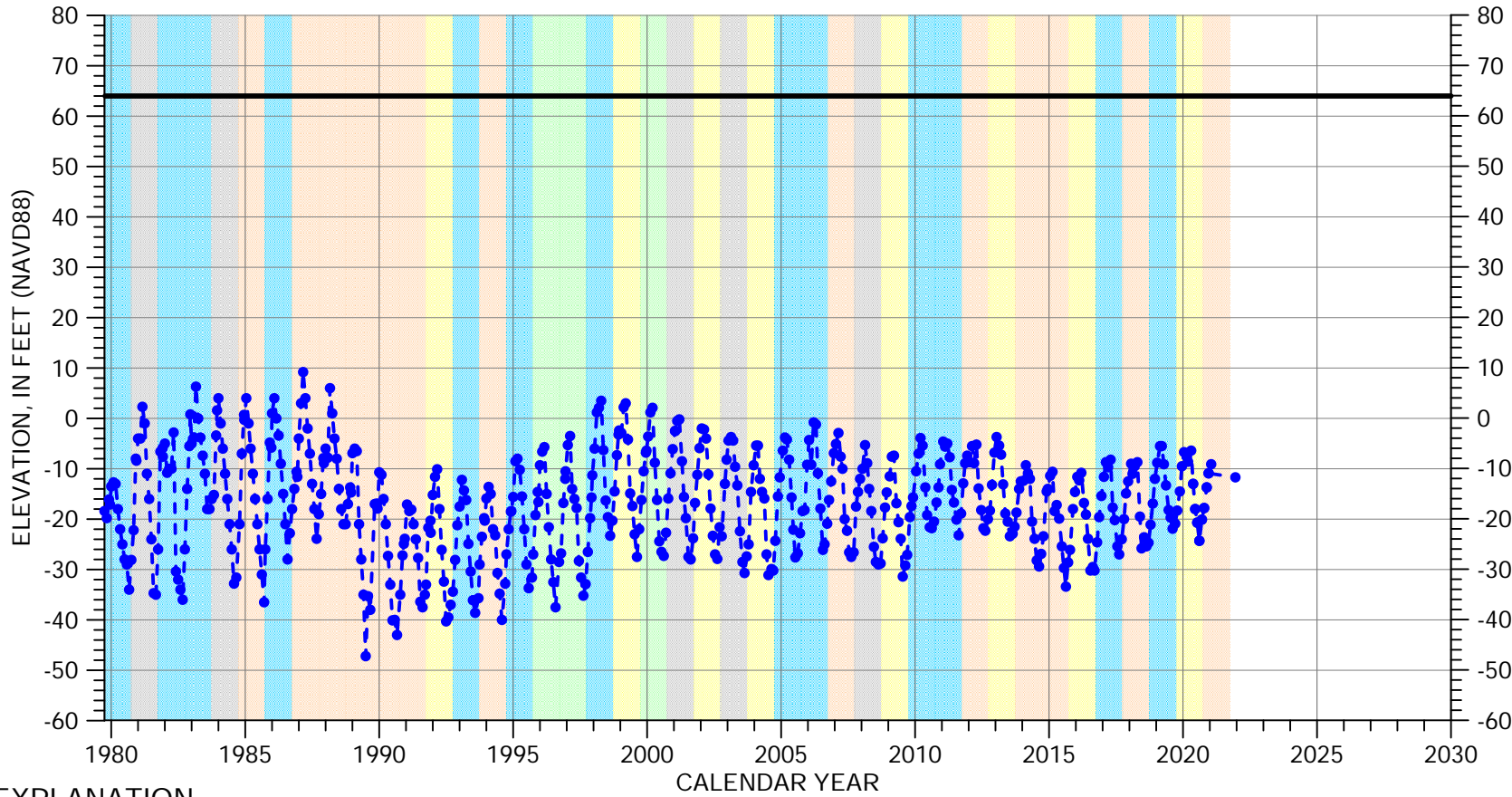
Perforated from
-297 to -327 feet msl



Well bottom
-337 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-12Q01

180/400-Foot Aquifer Subbasin

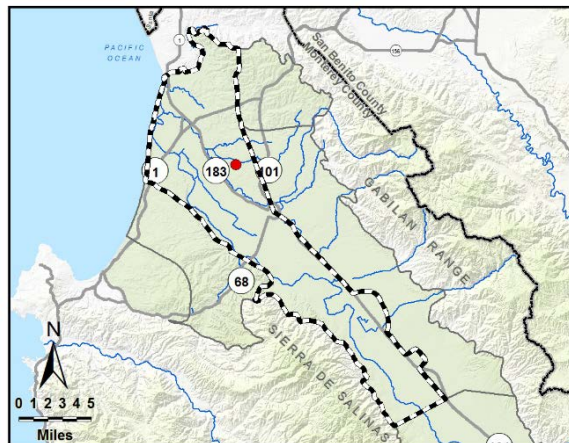


EXPLANATION

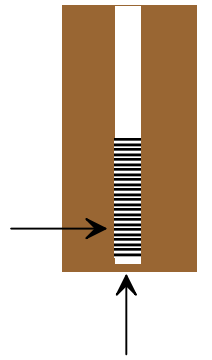
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



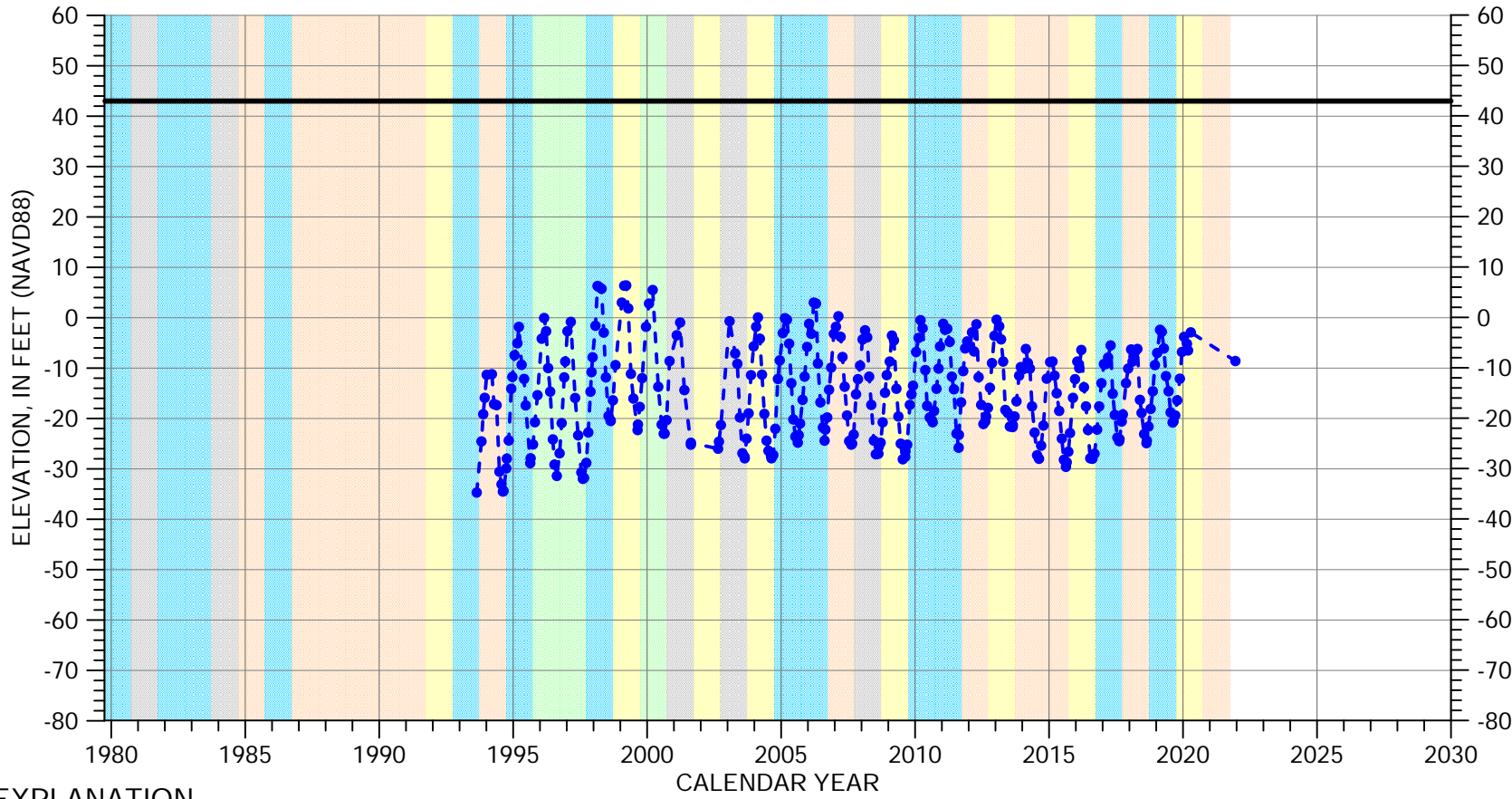
Perforated from
-209 to -228 feet msl



Well bottom
-555 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-13F03

180/400-Foot Aquifer Subbasin

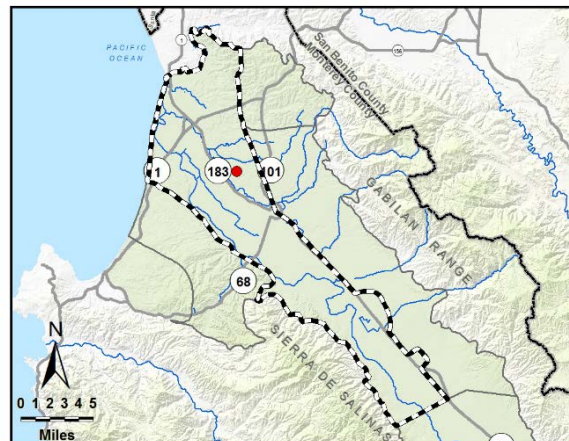


EXPLANATION

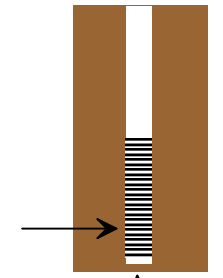
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



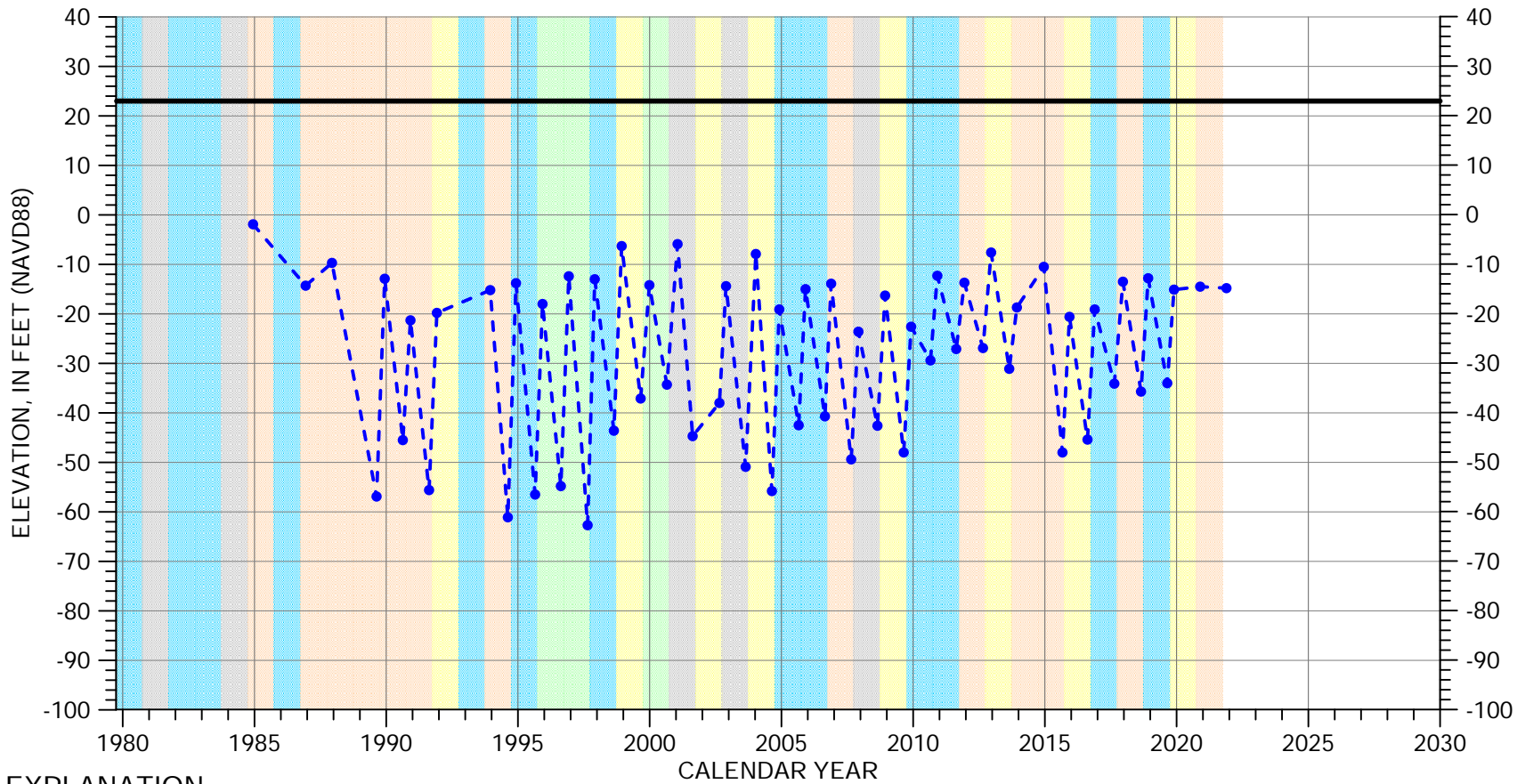
Multiple perforated intervals from -185 to -225 feet msl



Well bottom -235 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-16A02

180/400-Foot Aquifer Subbasin

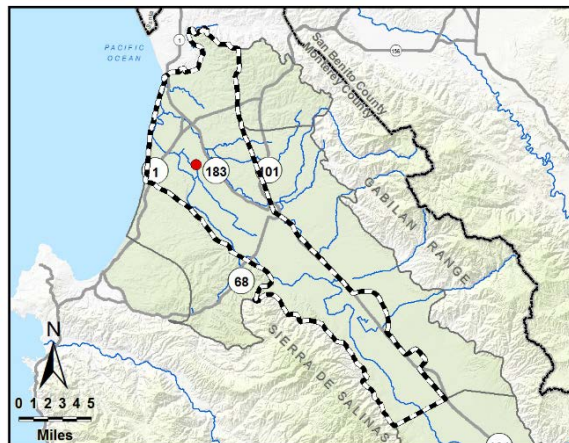


EXPLANATION

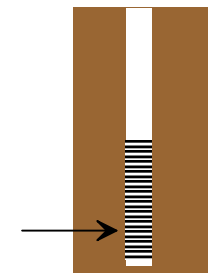
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



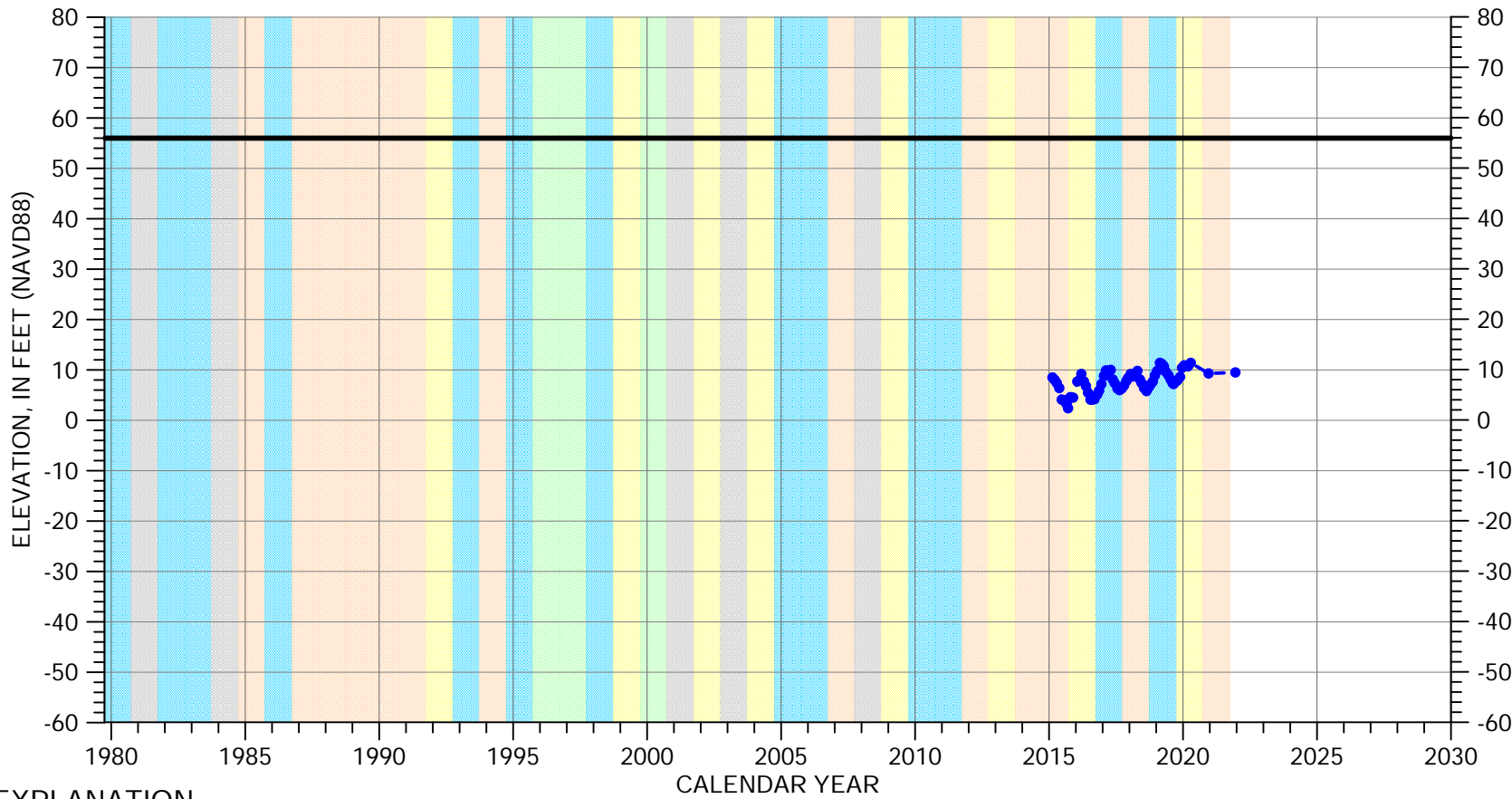
Multiple perforated intervals from -409 to -597 feet msl



Well bottom -648 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-17C02

180/400-Foot Aquifer Subbasin

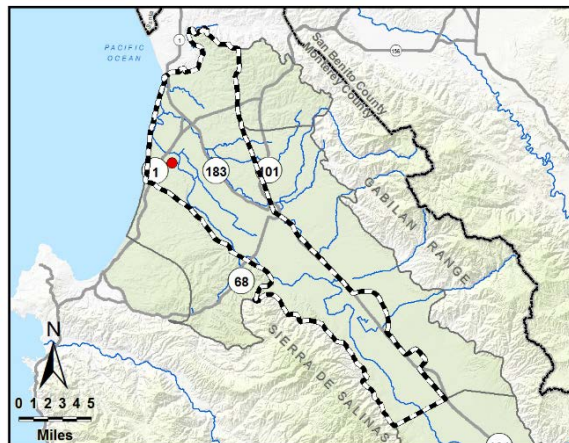


EXPLANATION

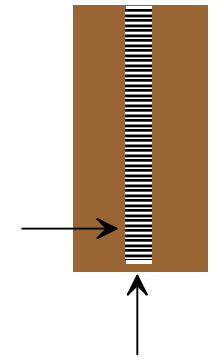
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| <ul style="list-style-type: none"> DRY DRY - NORMAL NORMAL | <ul style="list-style-type: none"> WET - NORMAL WET |
|---|---|



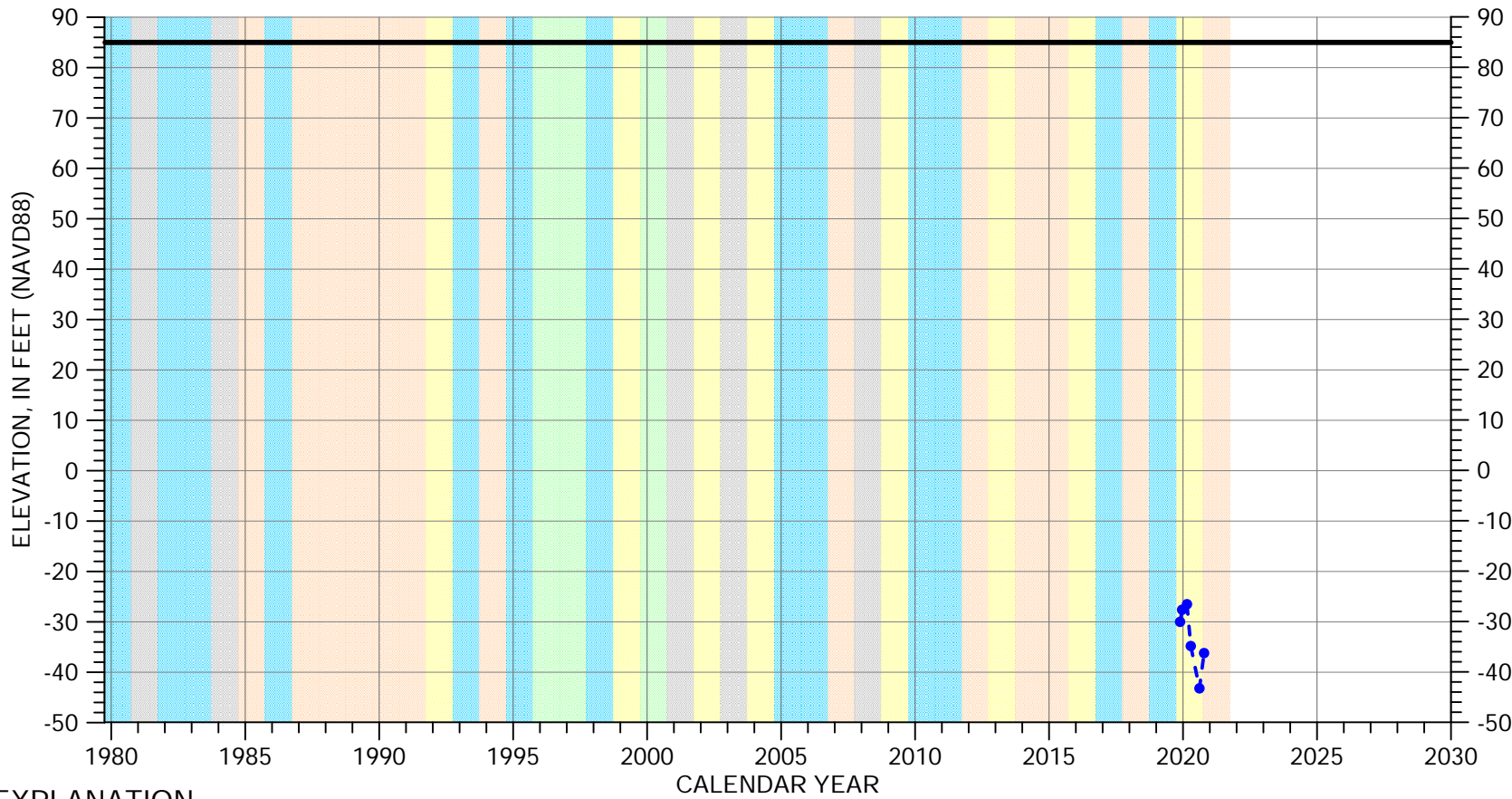
Perforated from
-24 to -84 feet msl



Well bottom
-84 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-18B01

180/400-Foot Aquifer Subbasin

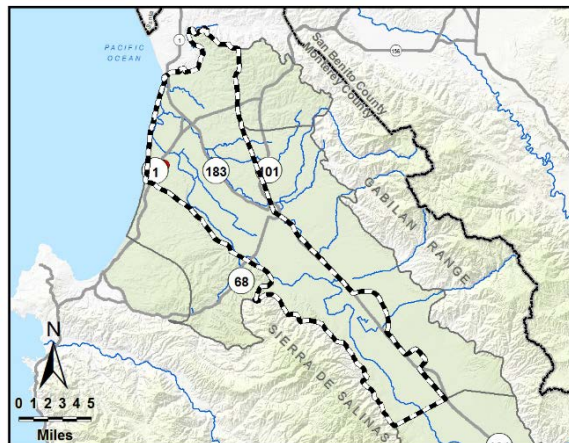


EXPLANATION

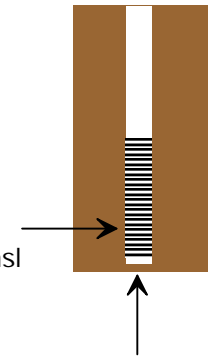
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



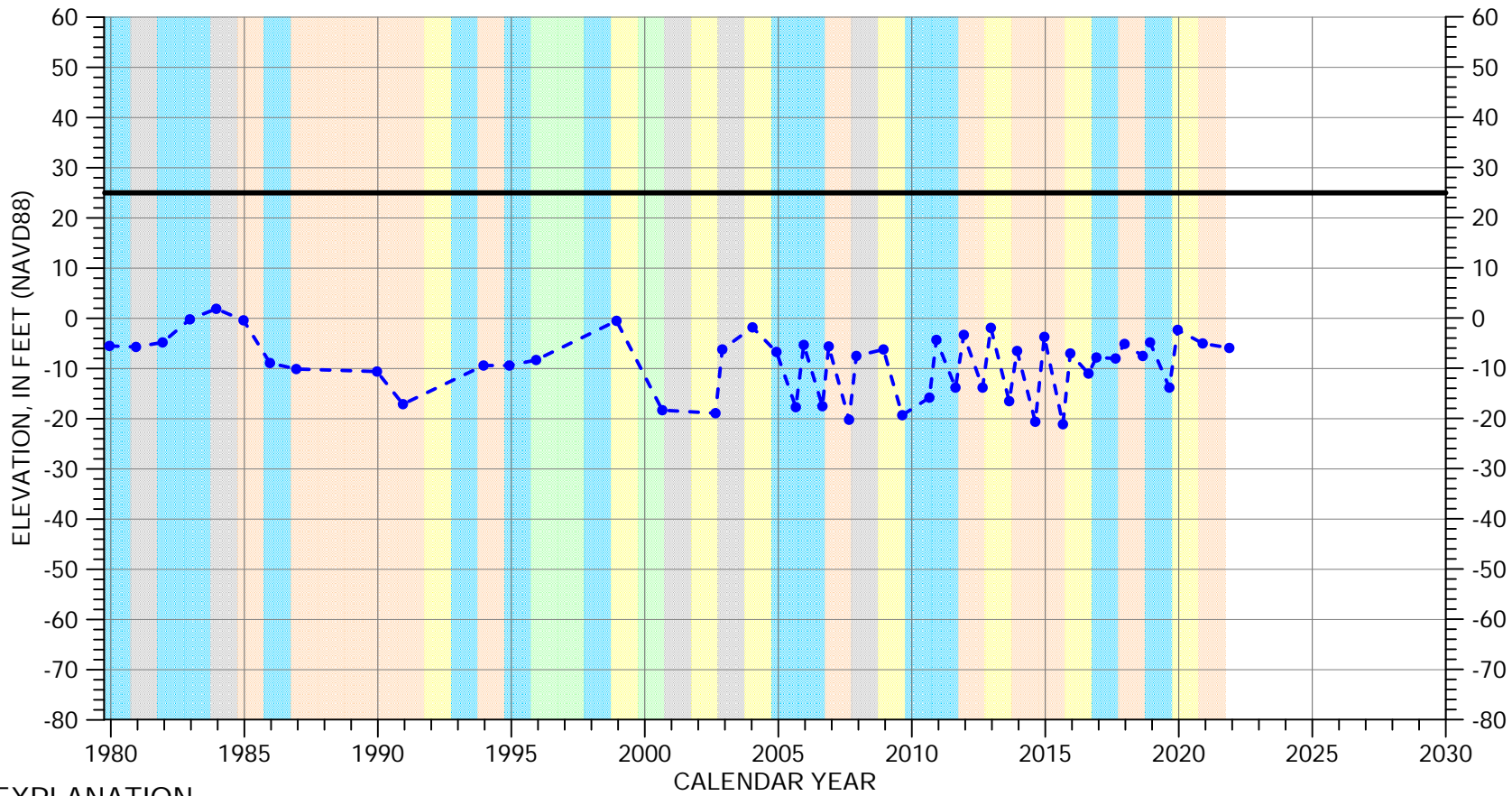
Perforated from
-1035 to -1595 feet msl



Well bottom
-1615 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-21L01

180/400-Foot Aquifer Subbasin

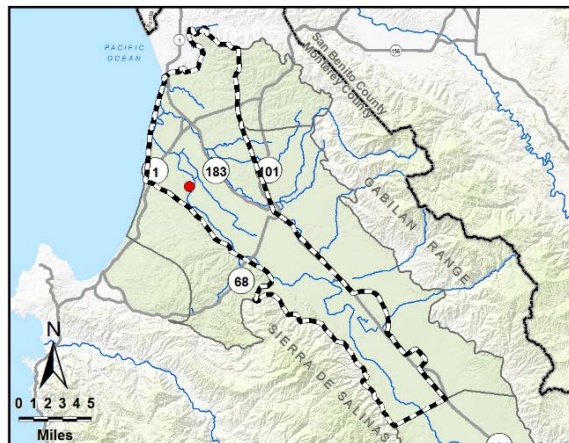


EXPLANATION

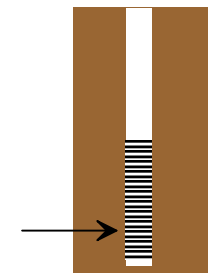
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



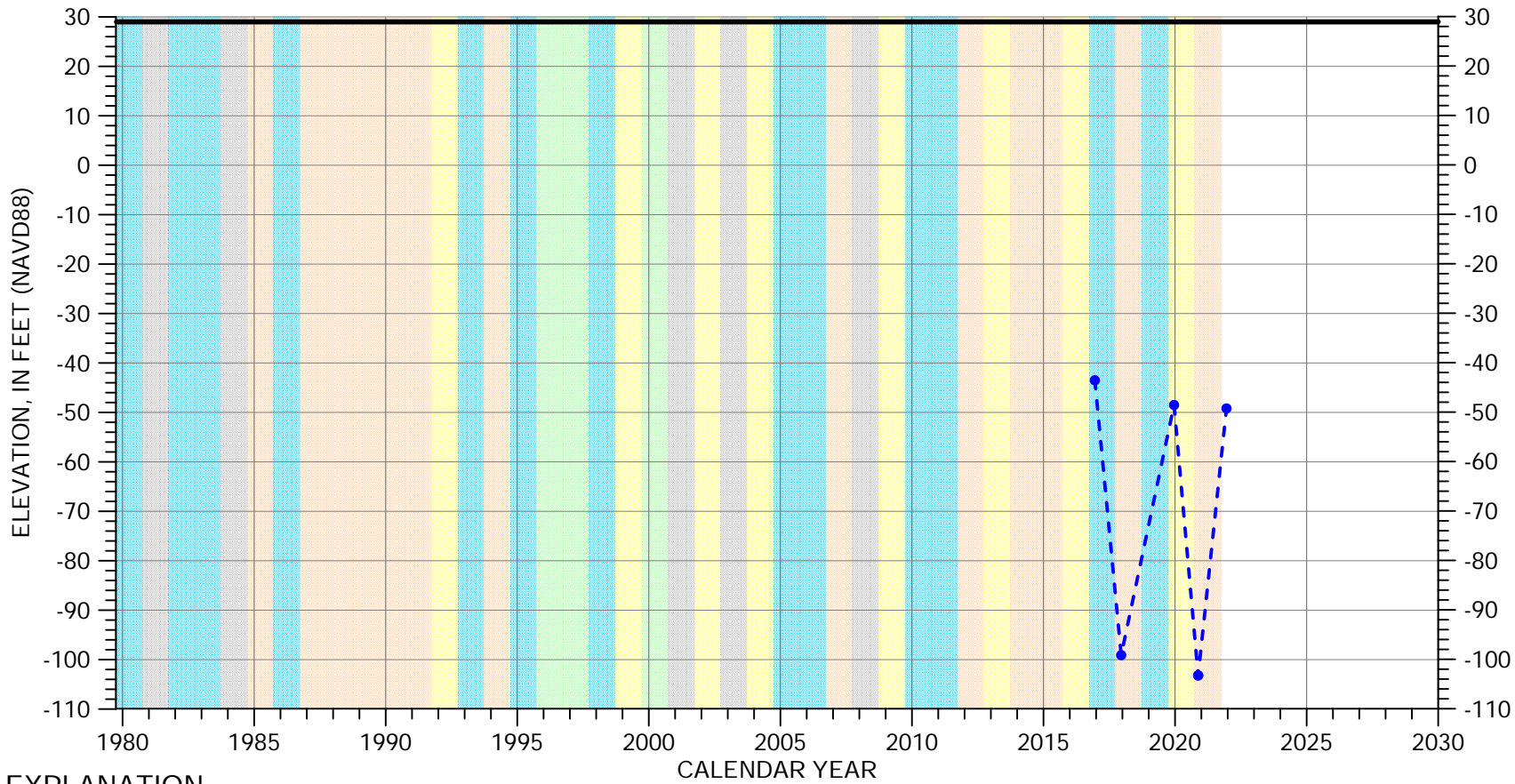
Multiple perforated intervals from -147 to -242 feet msl



Well bottom -222 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-22A03

180/400-Foot Aquifer Subbasin

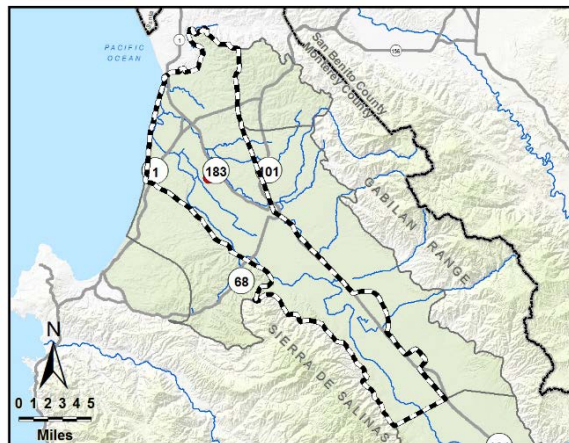


EXPLANATION

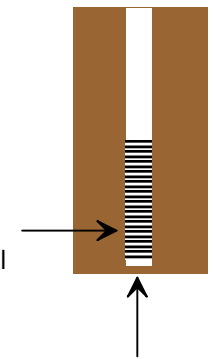
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



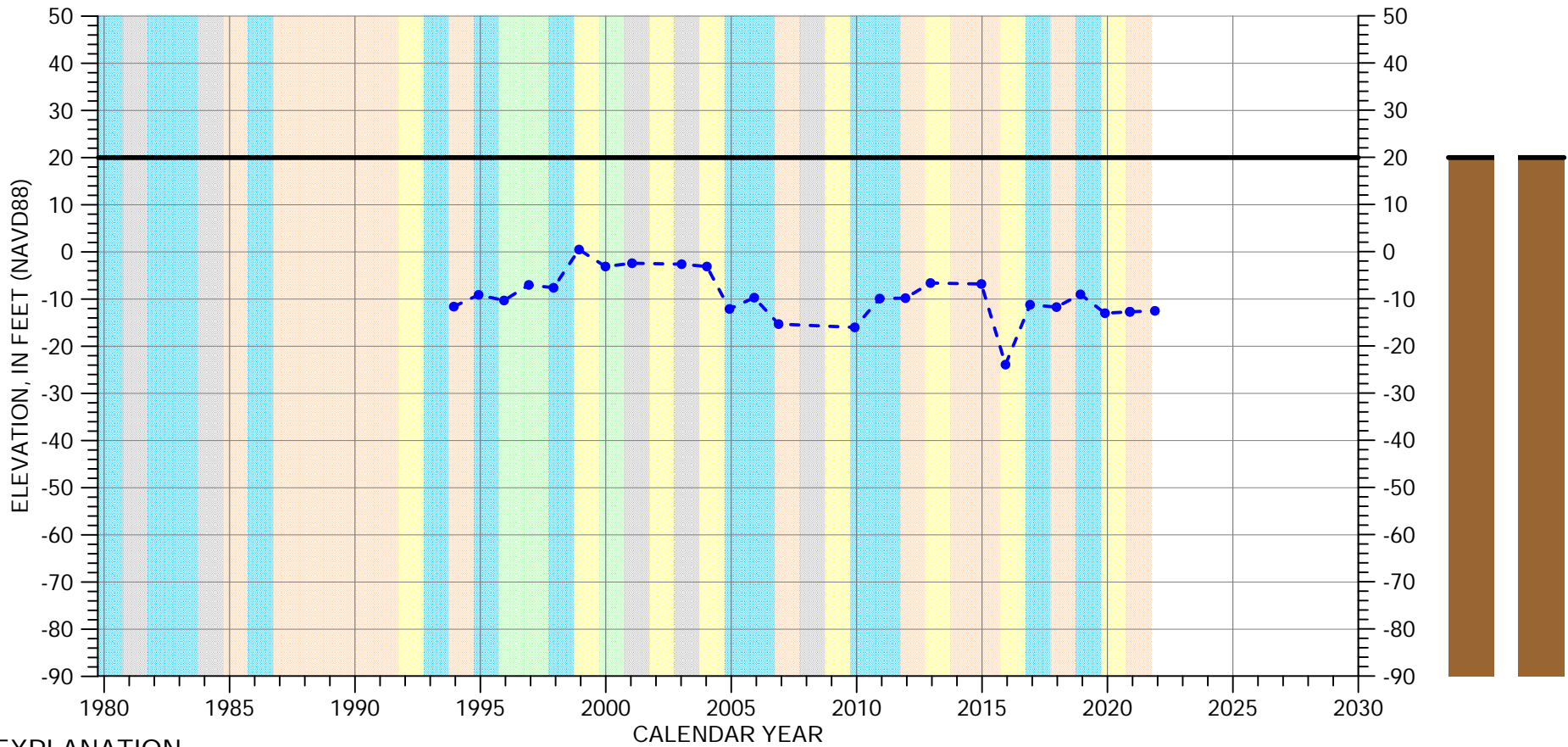
Perforated from
-951 to -1611 feet msl



Well bottom
-1611 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-22L01

180/400-Foot Aquifer Subbasin

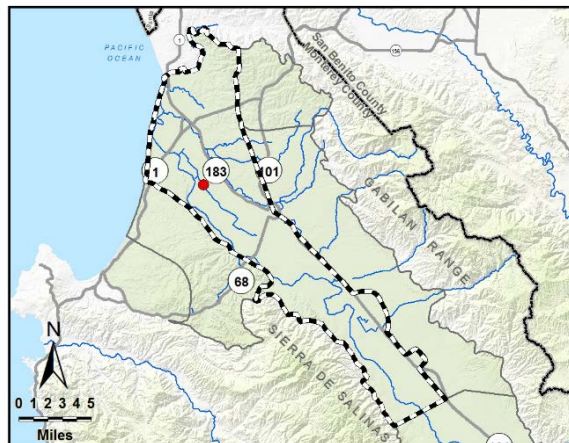


EXPLANATION

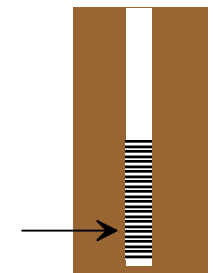
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



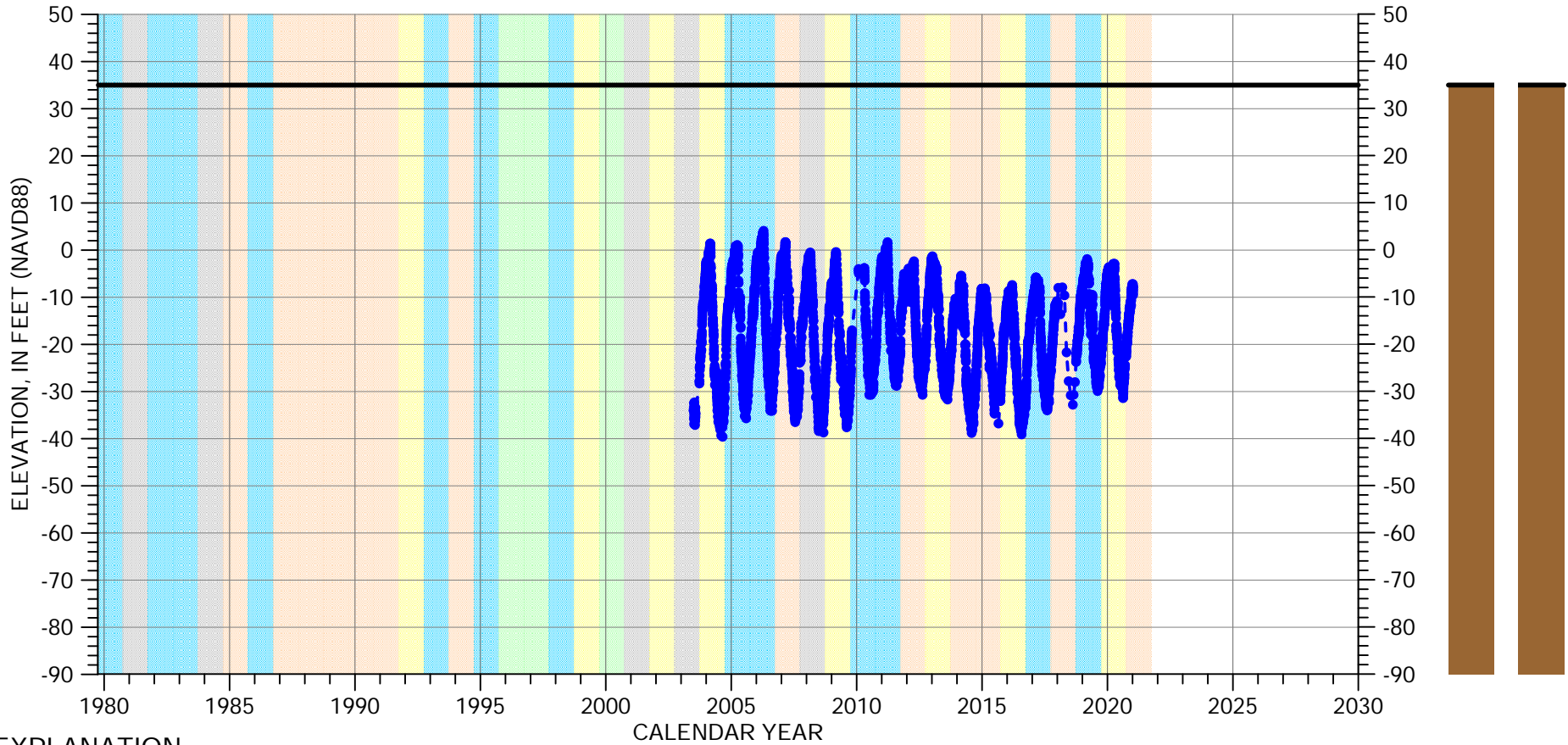
Multiple perforated intervals from -400 to -660 feet msl



Well bottom -660 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-26H01

180/400-Foot Aquifer Subbasin

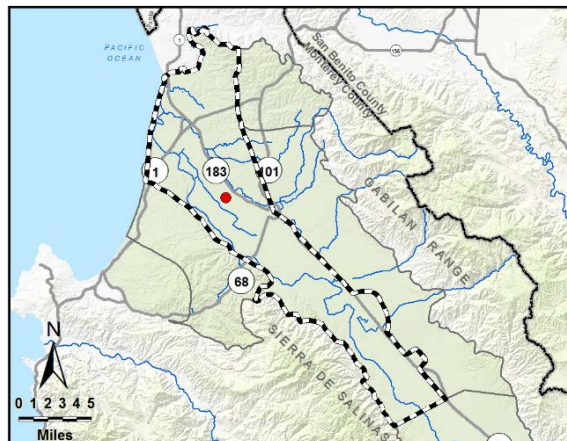


EXPLANATION

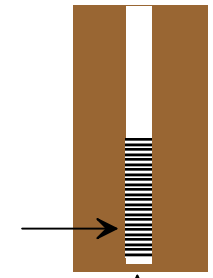
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



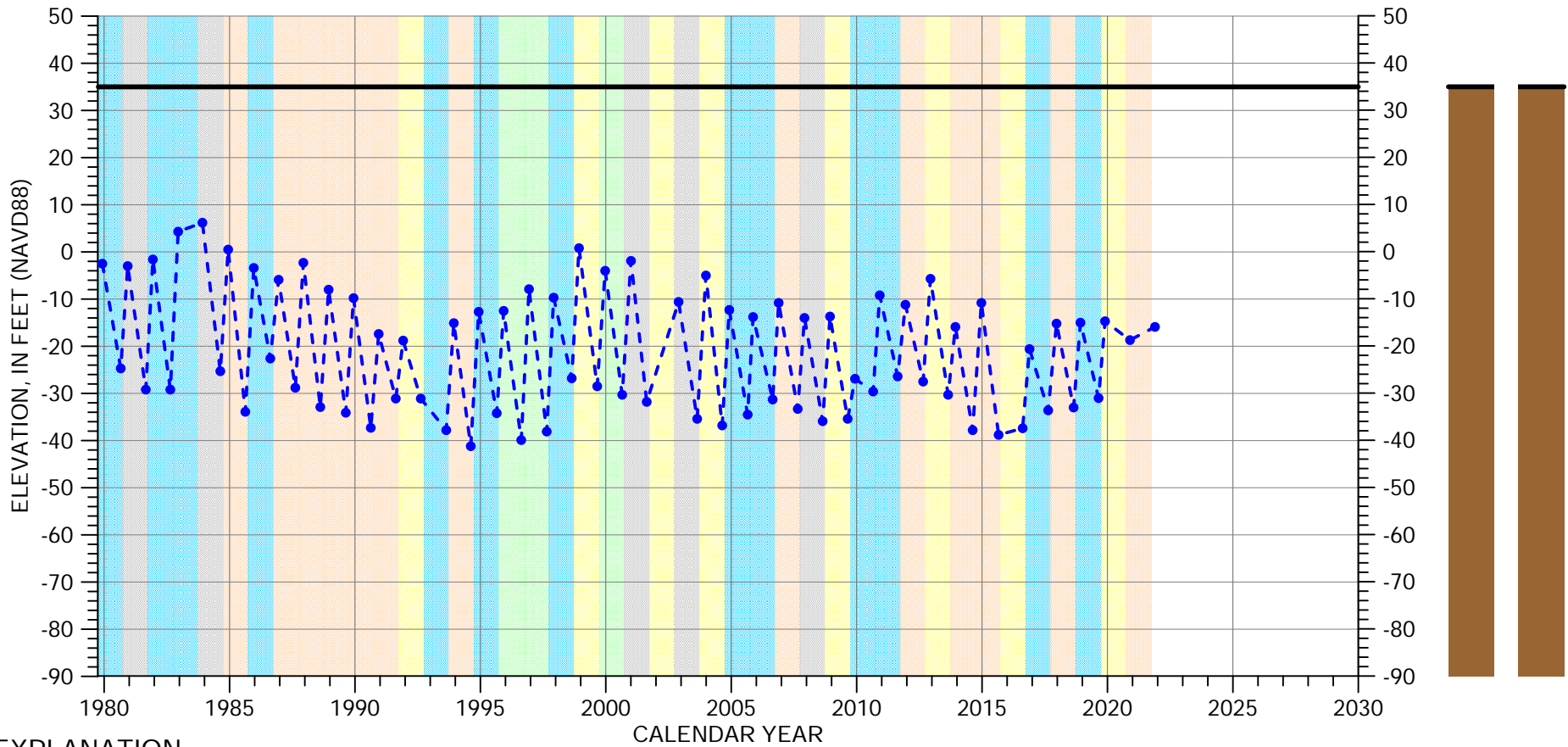
Perforated from
-252 to -302 feet msl



Well bottom
-304 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-26J03

180/400-Foot Aquifer Subbasin

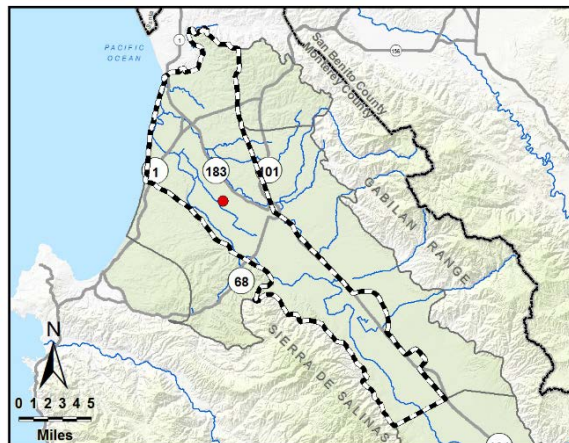


EXPLANATION

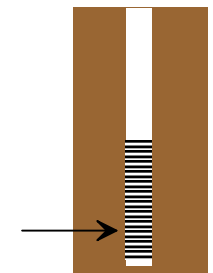
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



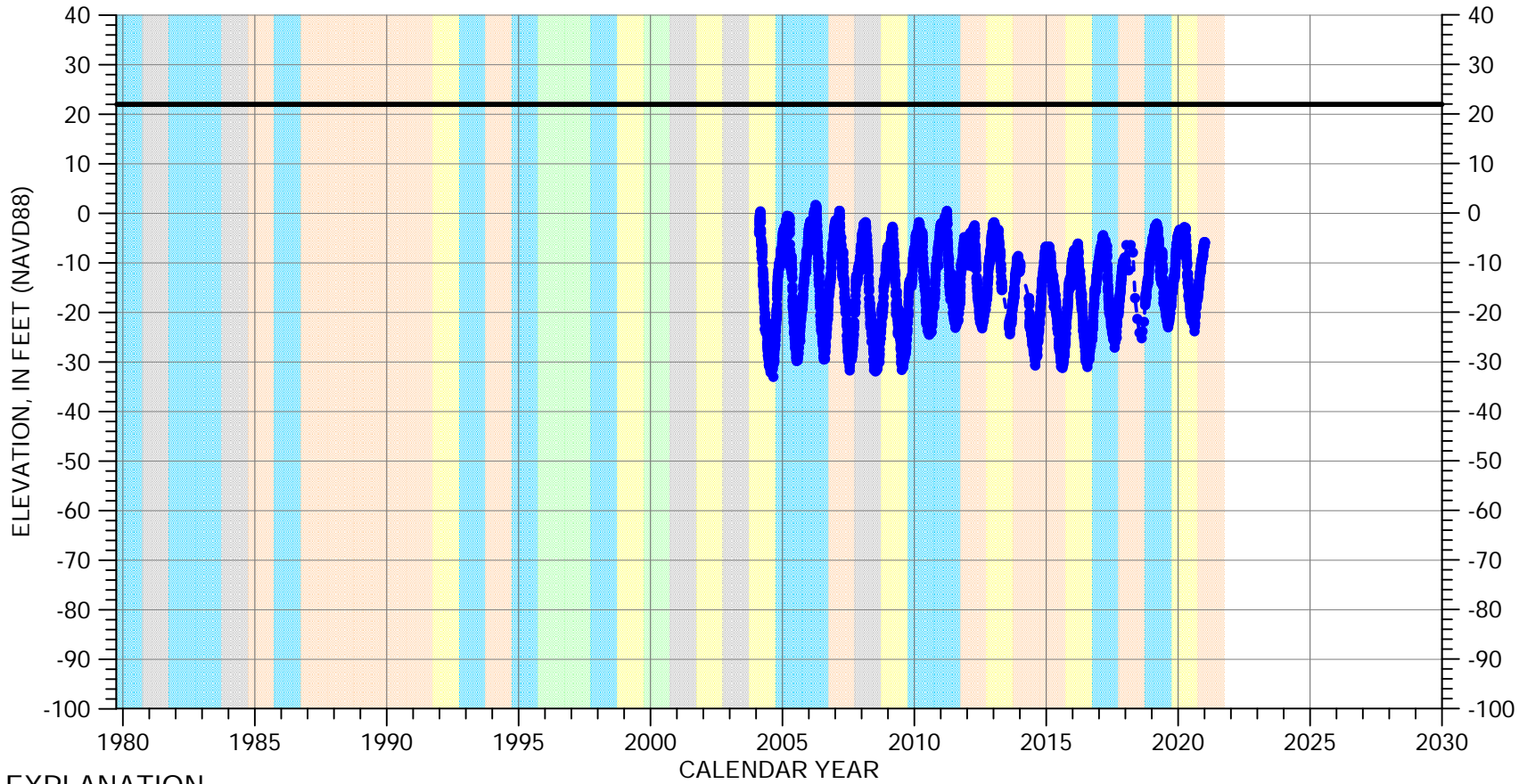
Multiple perforated intervals from -299 to -521 feet msl



Well bottom -530 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-27A01

180/400-Foot Aquifer Subbasin

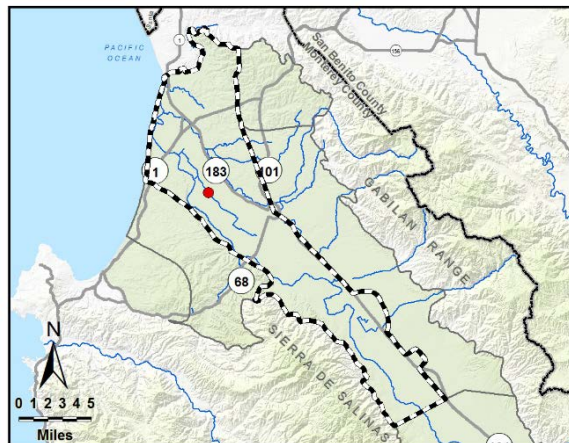


EXPLANATION

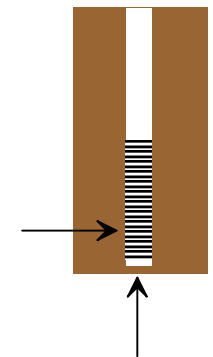
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



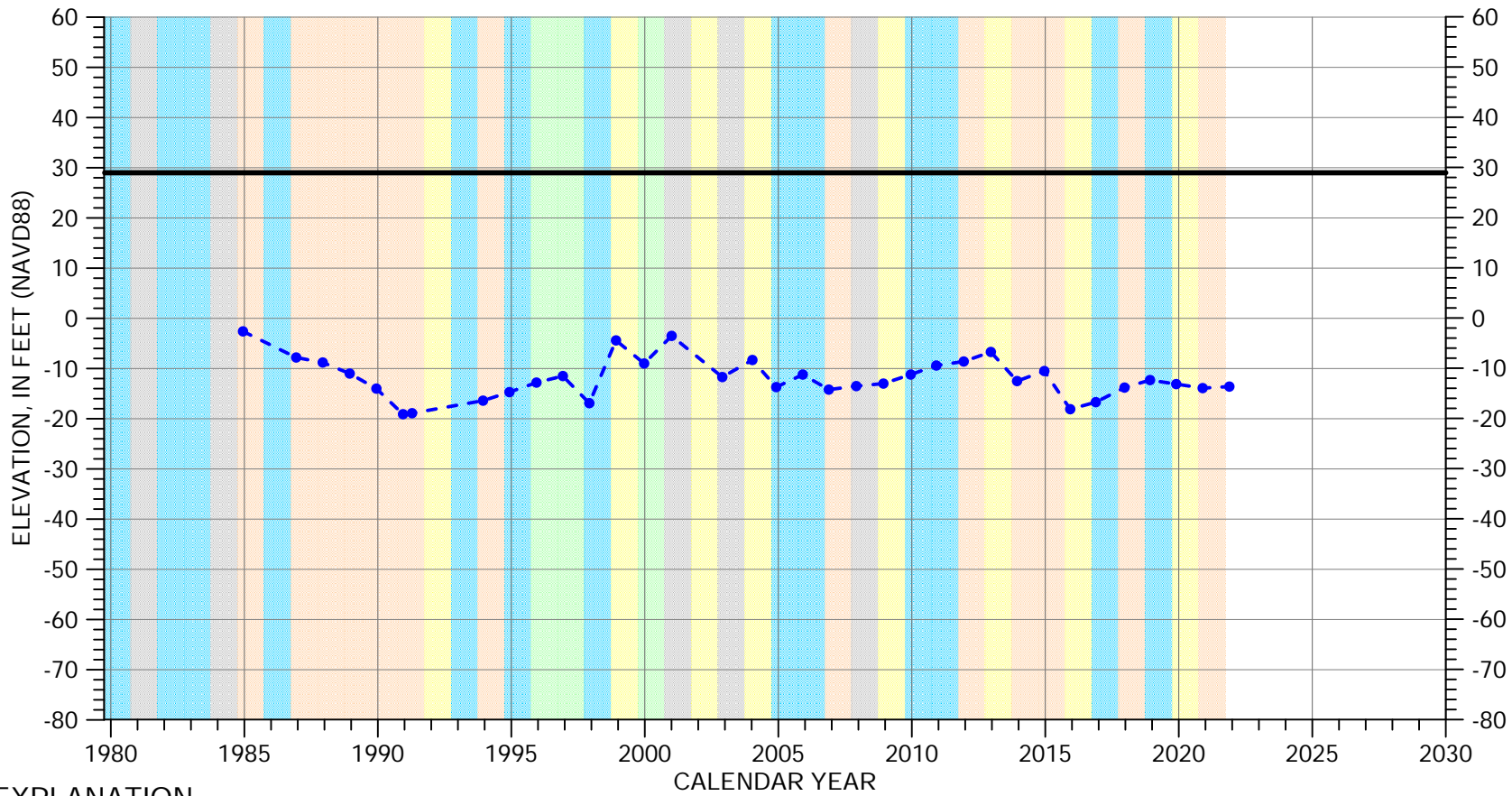
Perforated from
-218 to -268 feet msl



Well bottom
-271 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-27G03

180/400-Foot Aquifer Subbasin

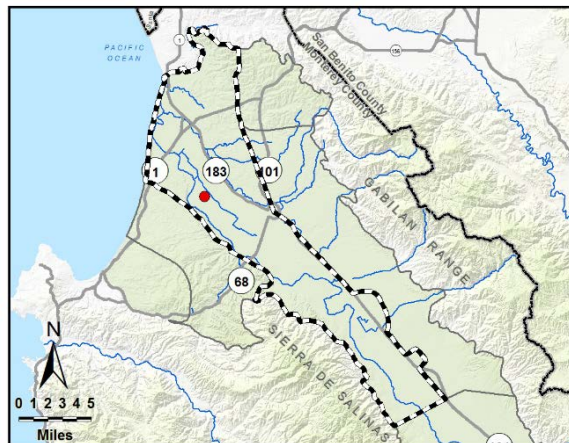


EXPLANATION

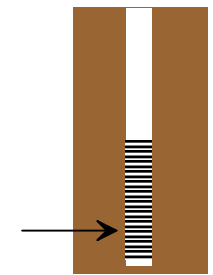
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



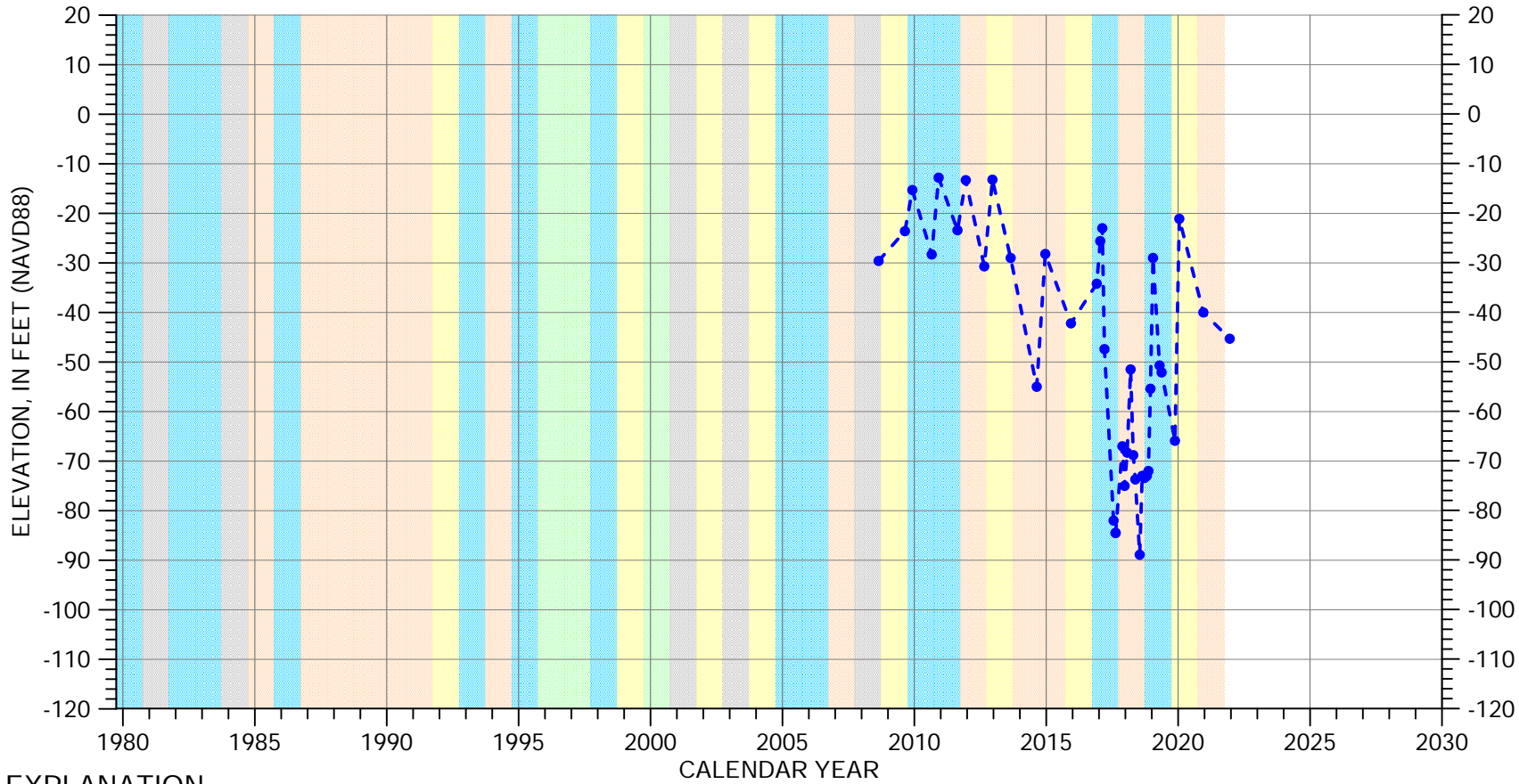
Multiple perforated intervals from -250 to -342 feet msl



Well bottom -469 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-28C02

180/400-Foot Aquifer Subbasin

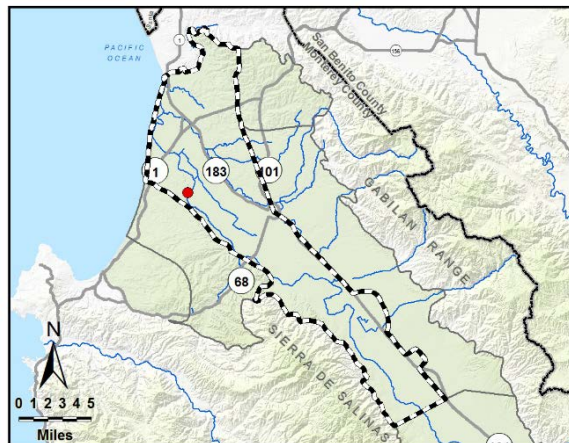


EXPLANATION

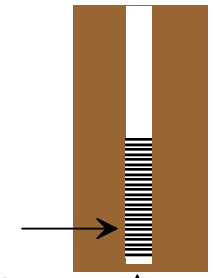
- Groundwater Elevation
- Suspect Measurement
- Land Surface (45 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------|--------------|
| Orange | DRY | Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Blue | WET |
| Grey | NORMAL | | |



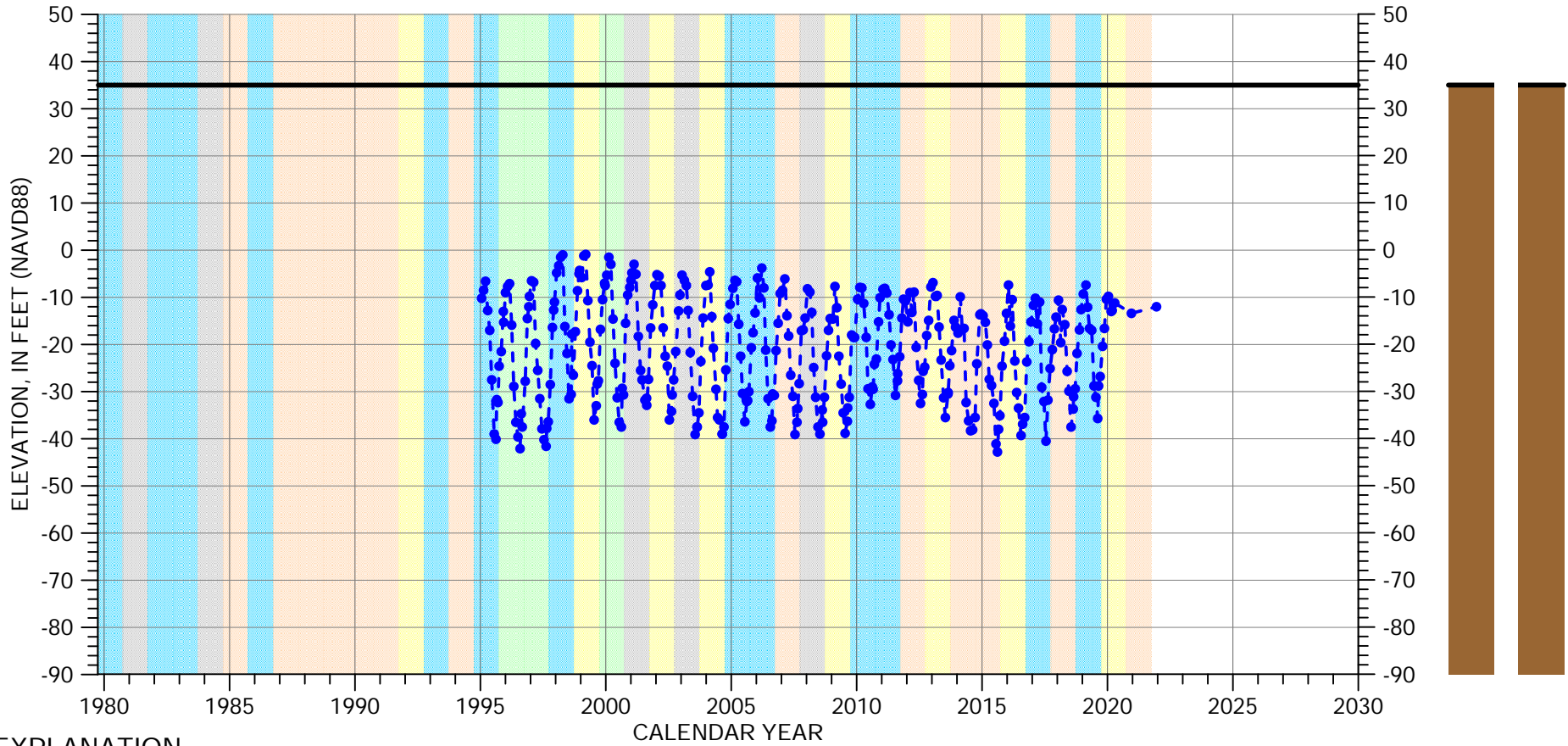
Multiple perforated intervals from -675 to -1095 feet msl



Well bottom -1115 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-34A03

180/400-Foot Aquifer Subbasin

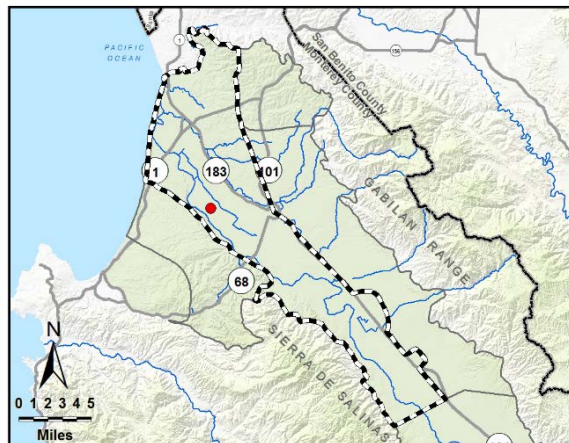


EXPLANATION

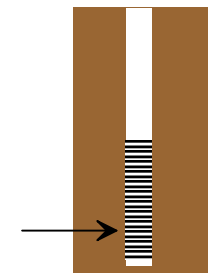
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



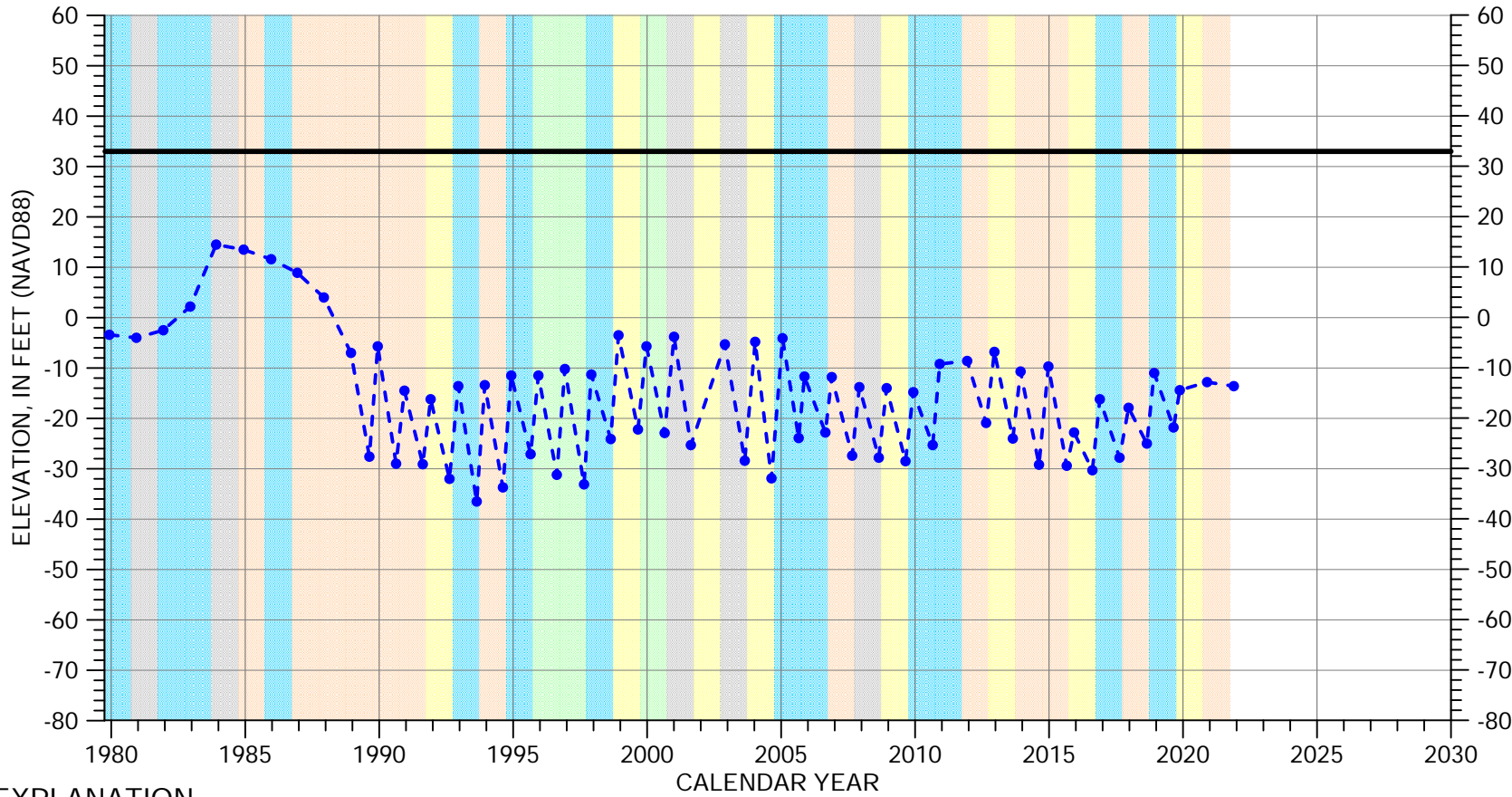
Multiple perforated intervals from -457 to -587 feet msl



Well bottom -637 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-34B03

180/400-Foot Aquifer Subbasin

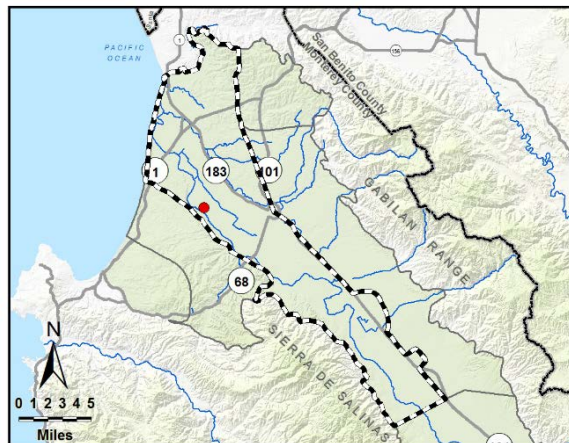


EXPLANATION

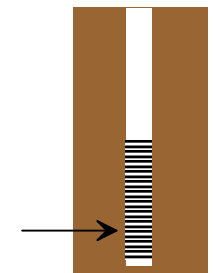
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



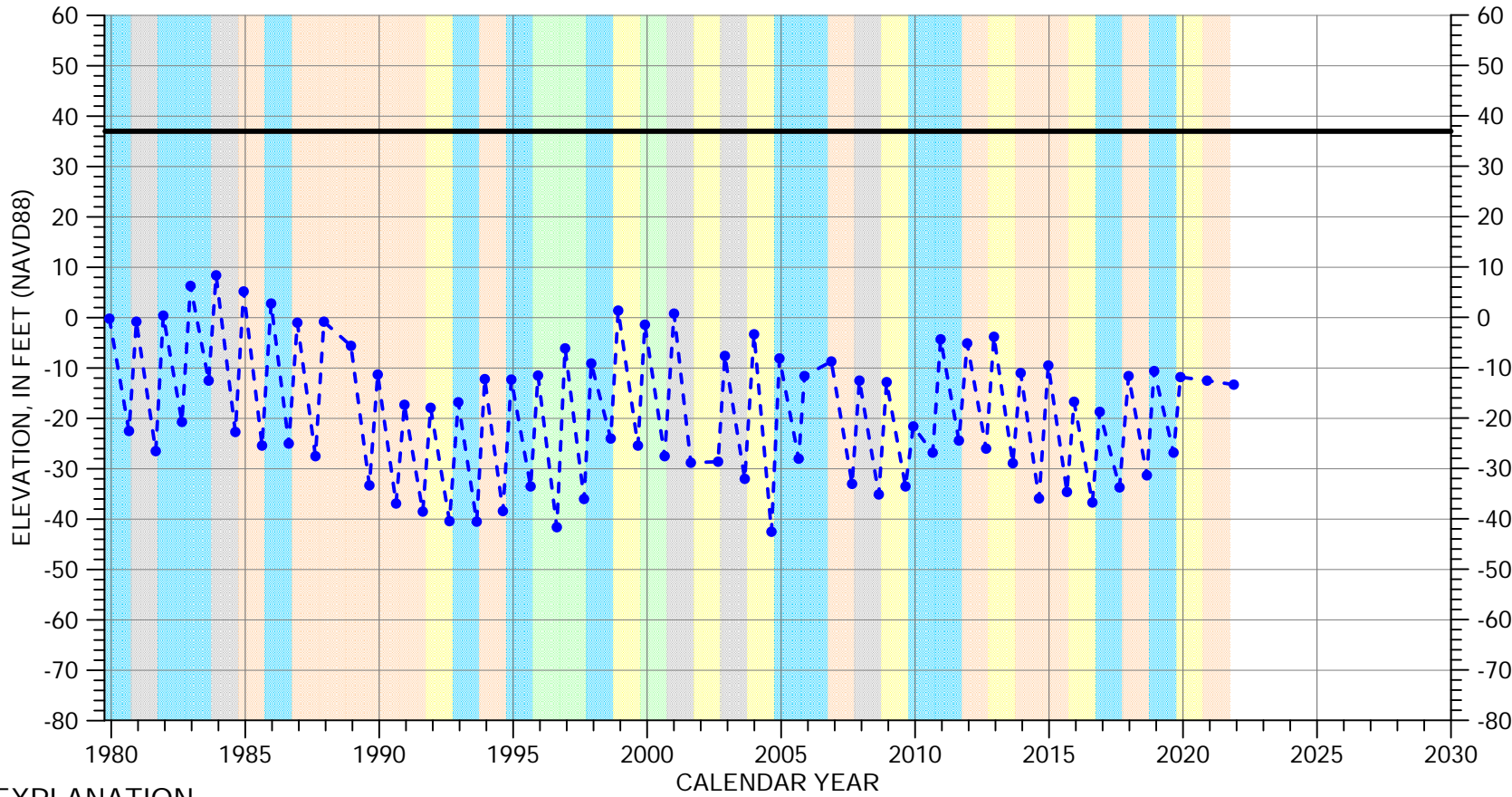
Multiple perforated intervals from -275 to -313 feet msl



Well bottom -315 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-36E01

180/400-Foot Aquifer Subbasin

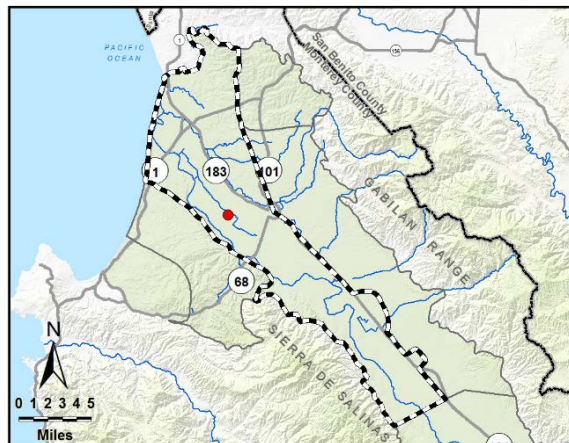


EXPLANATION

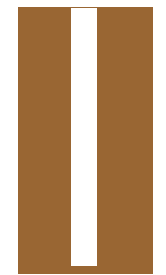
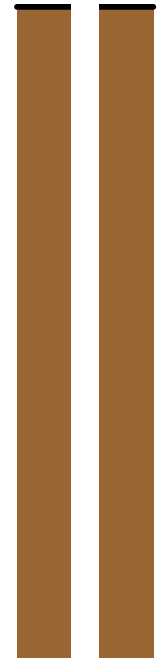
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



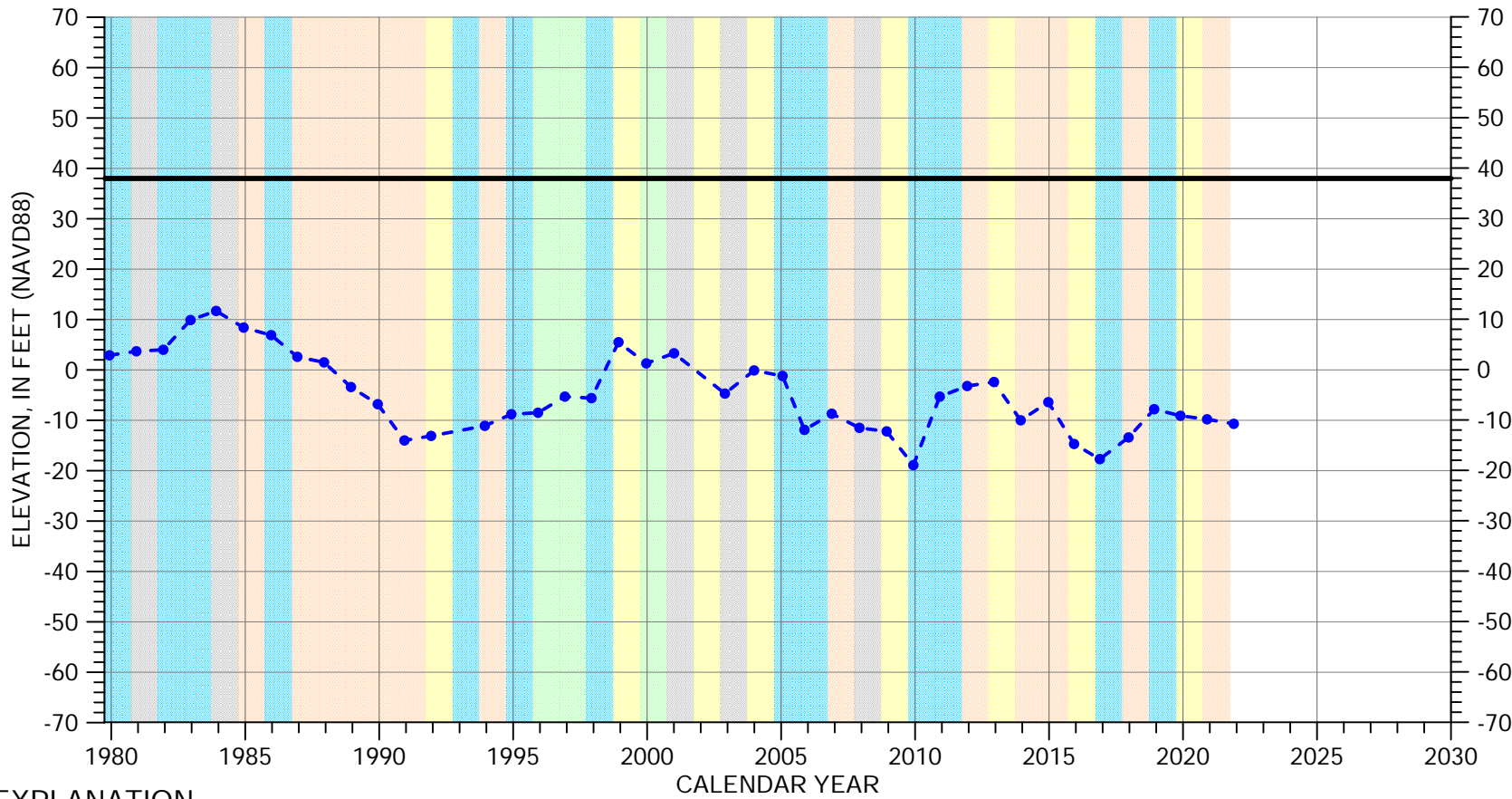
Perforated interval
unknown



Well bottom
-165 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-36G01

180/400-Foot Aquifer Subbasin

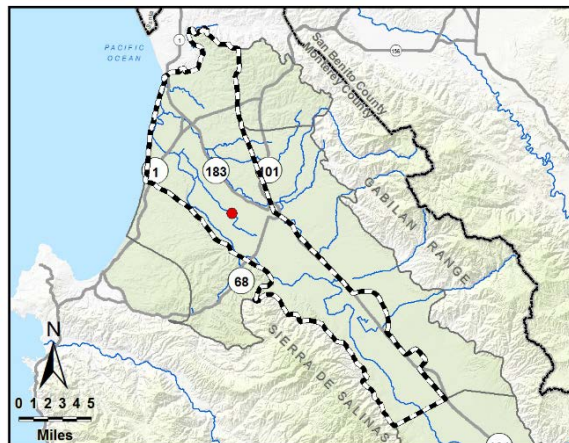


EXPLANATION

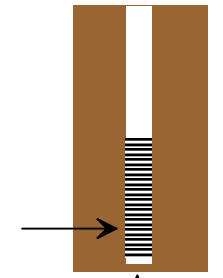
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



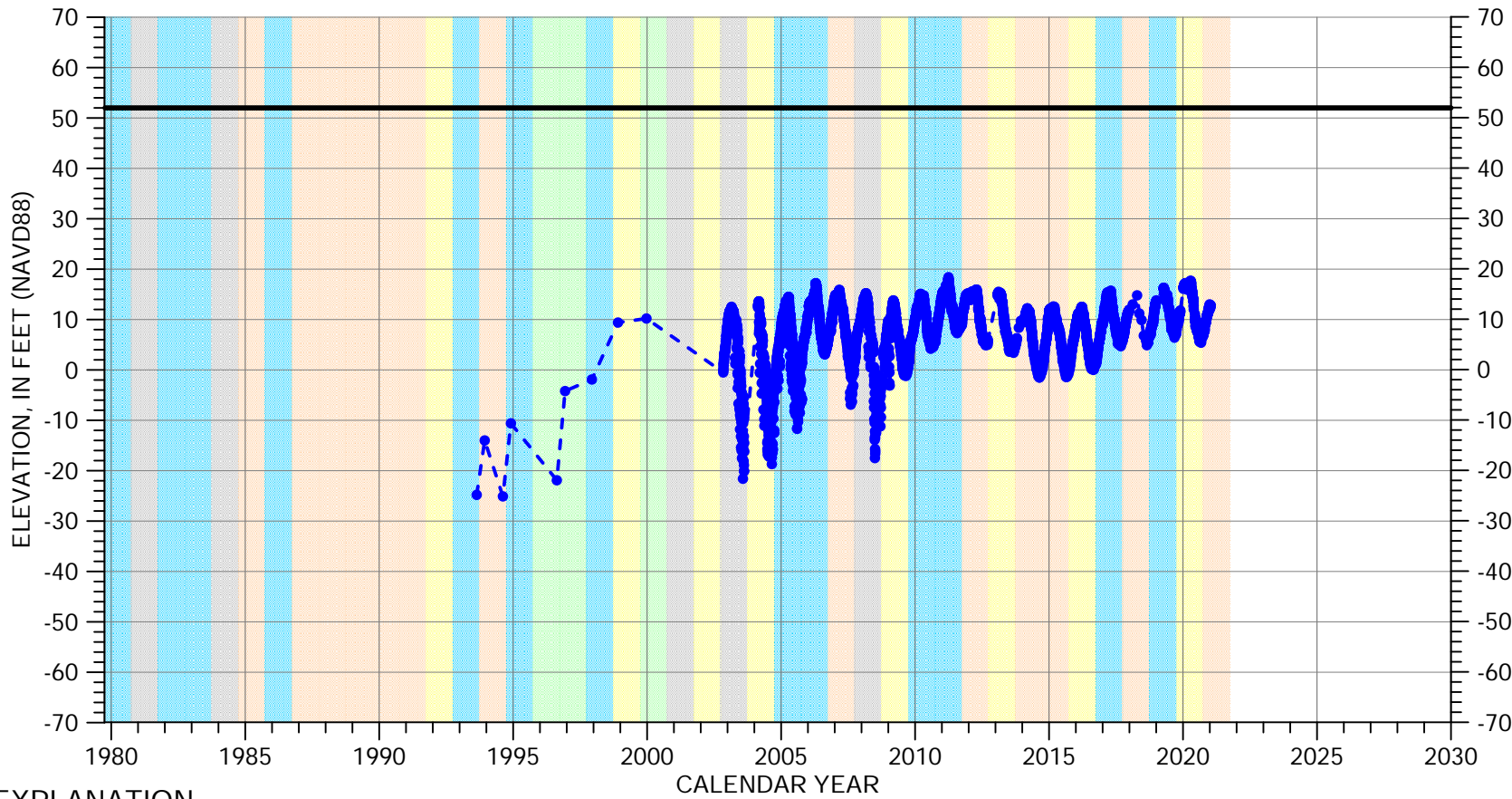
Multiple perforated intervals from -301 to -375 feet msl



Well bottom -381 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-18C01

180/400-Foot Aquifer Subbasin

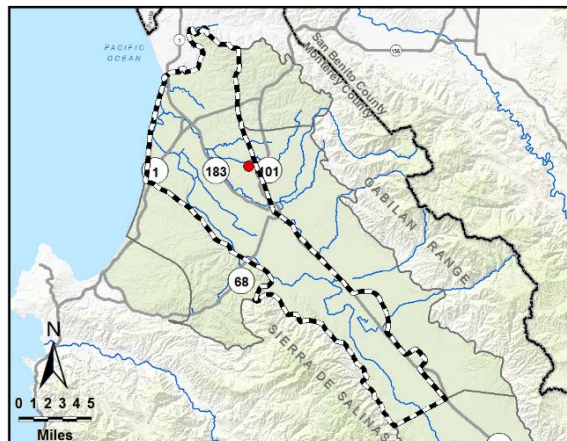


EXPLANATION

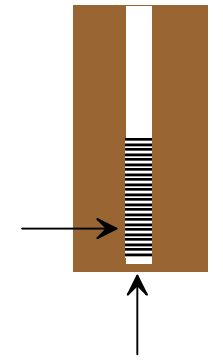
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



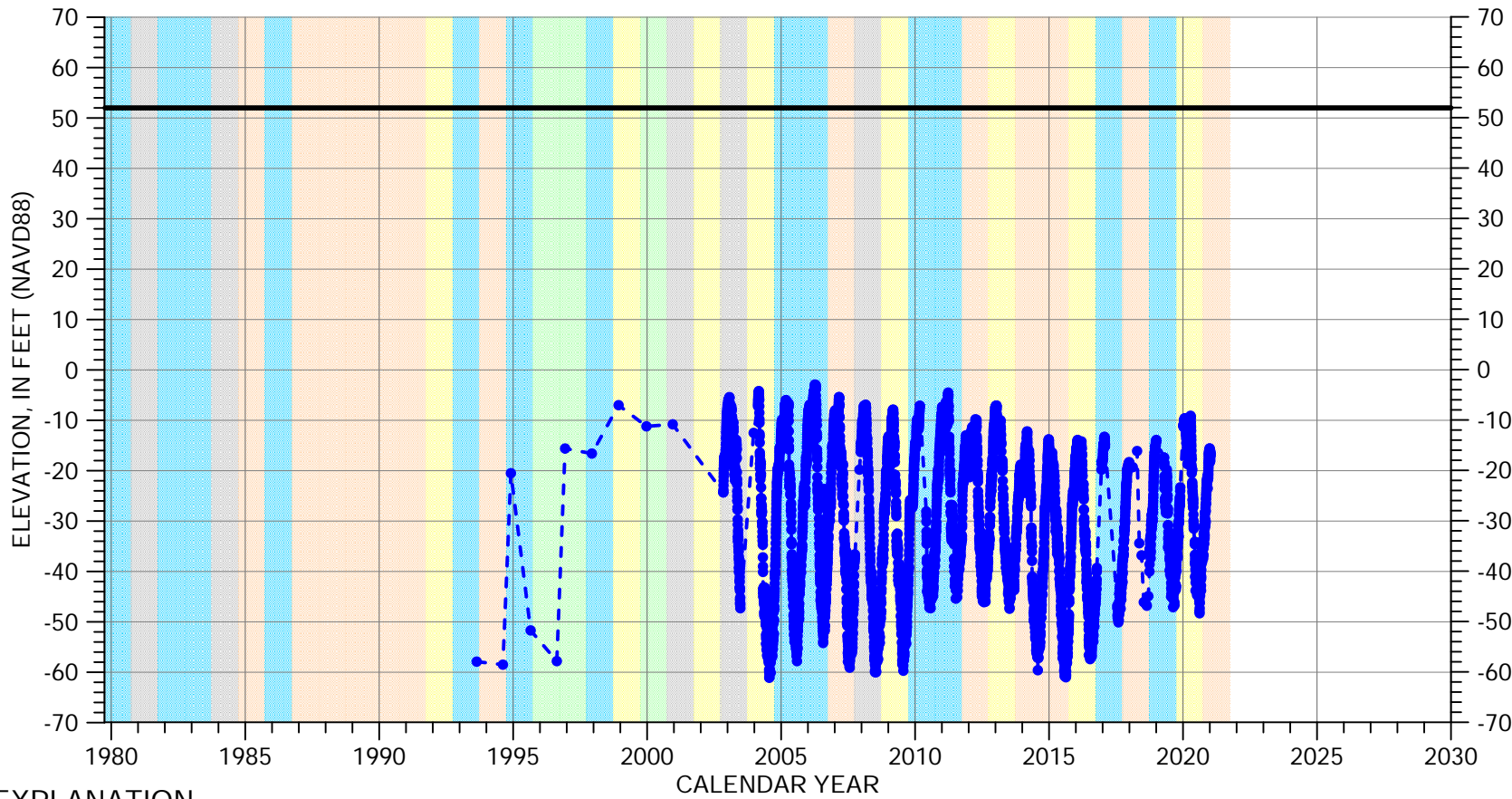
Perforated from
-113 to -163 feet msl



Well bottom
-173 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-18C02

180/400-Foot Aquifer Subbasin

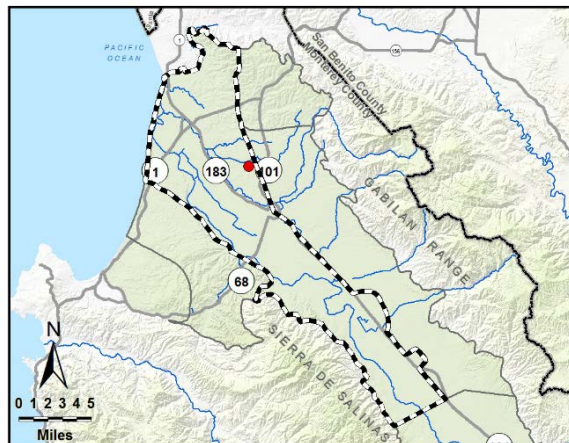


EXPLANATION

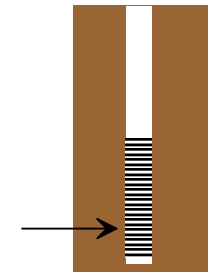
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



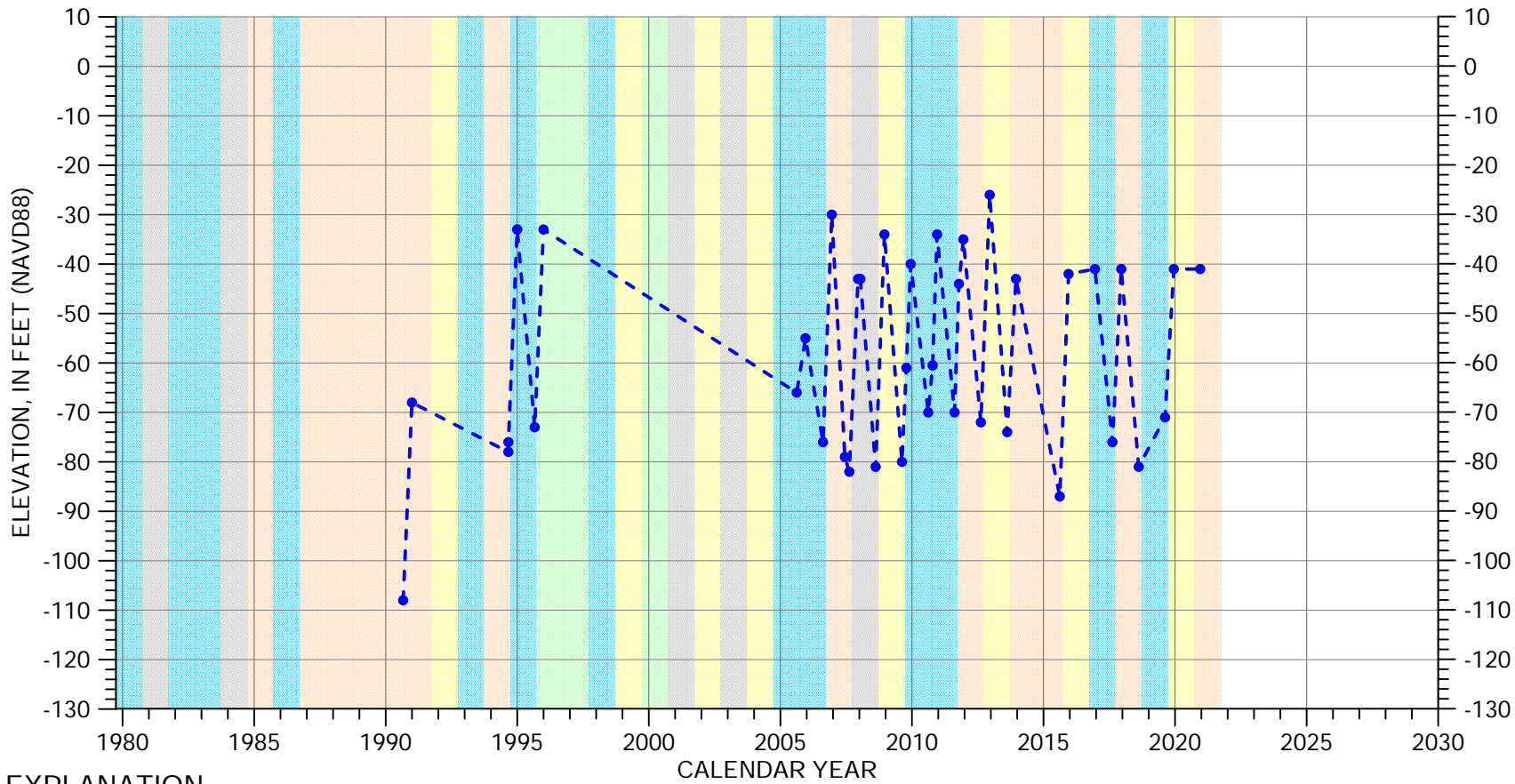
Perforated from
-218 to -333 feet msl



Well bottom
-343 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-20C01

180/400-Foot Aquifer Subbasin

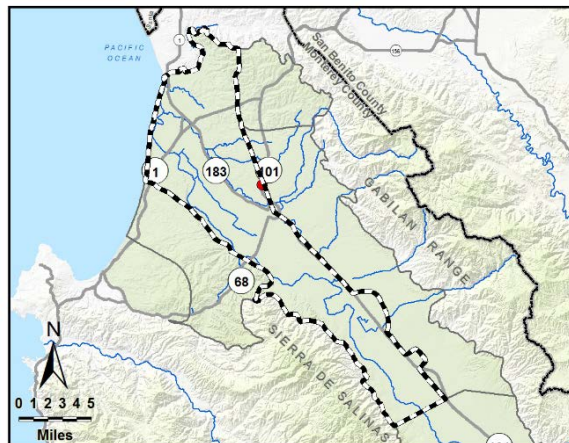


EXPLANATION

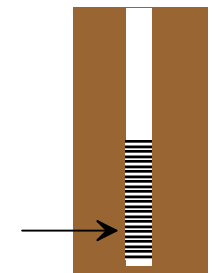
- Groundwater Elevation
- Suspect Measurement
- Land Surface (63 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



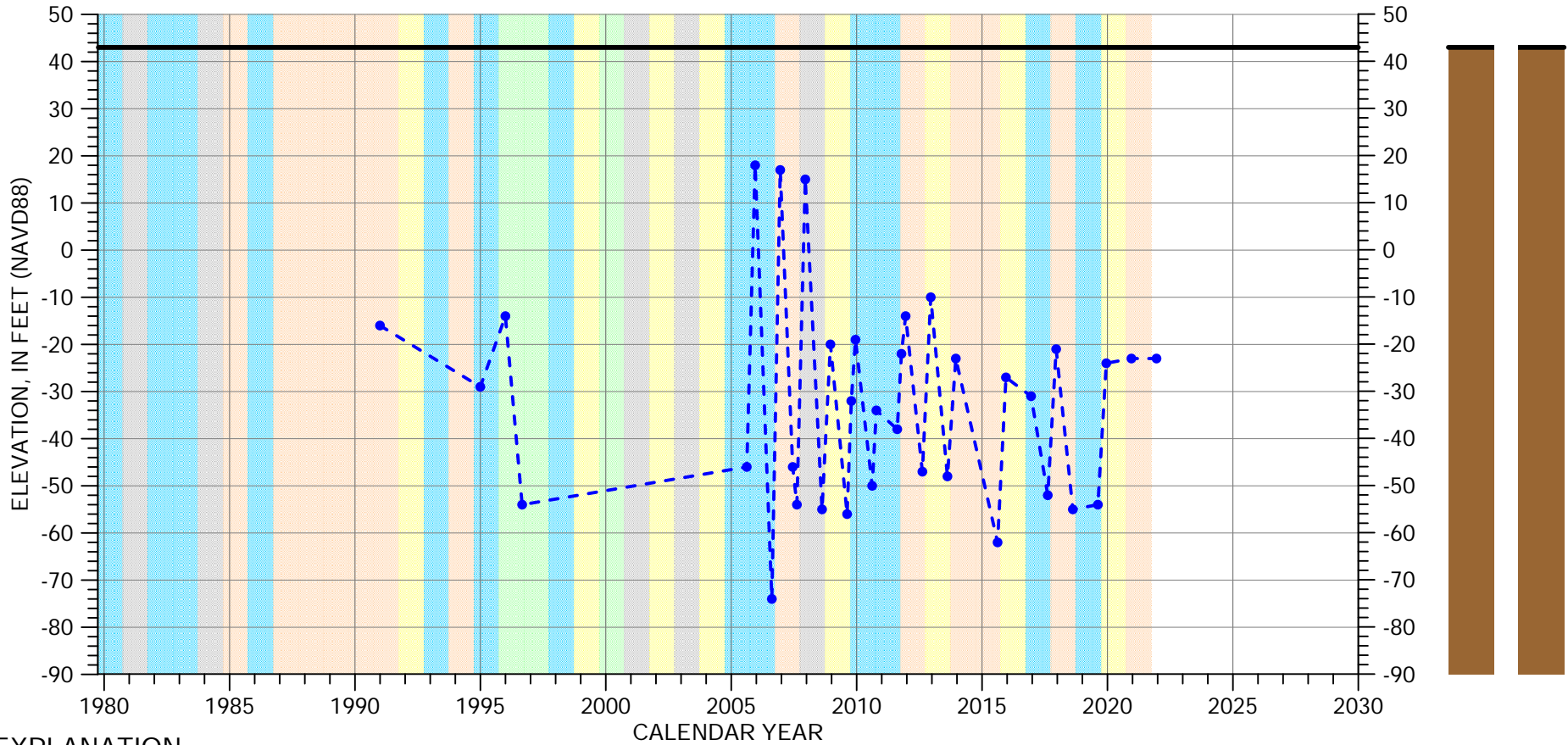
Multiple perforated intervals from -400 to -548 feet msl



Well bottom -639 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-29F03

180/400-Foot Aquifer Subbasin

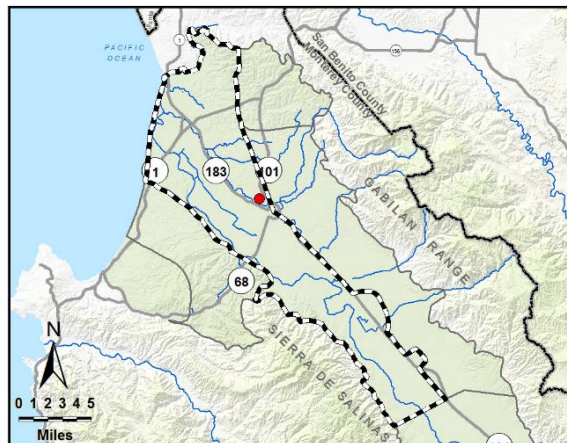


EXPLANATION

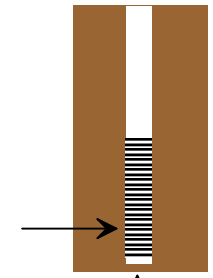
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



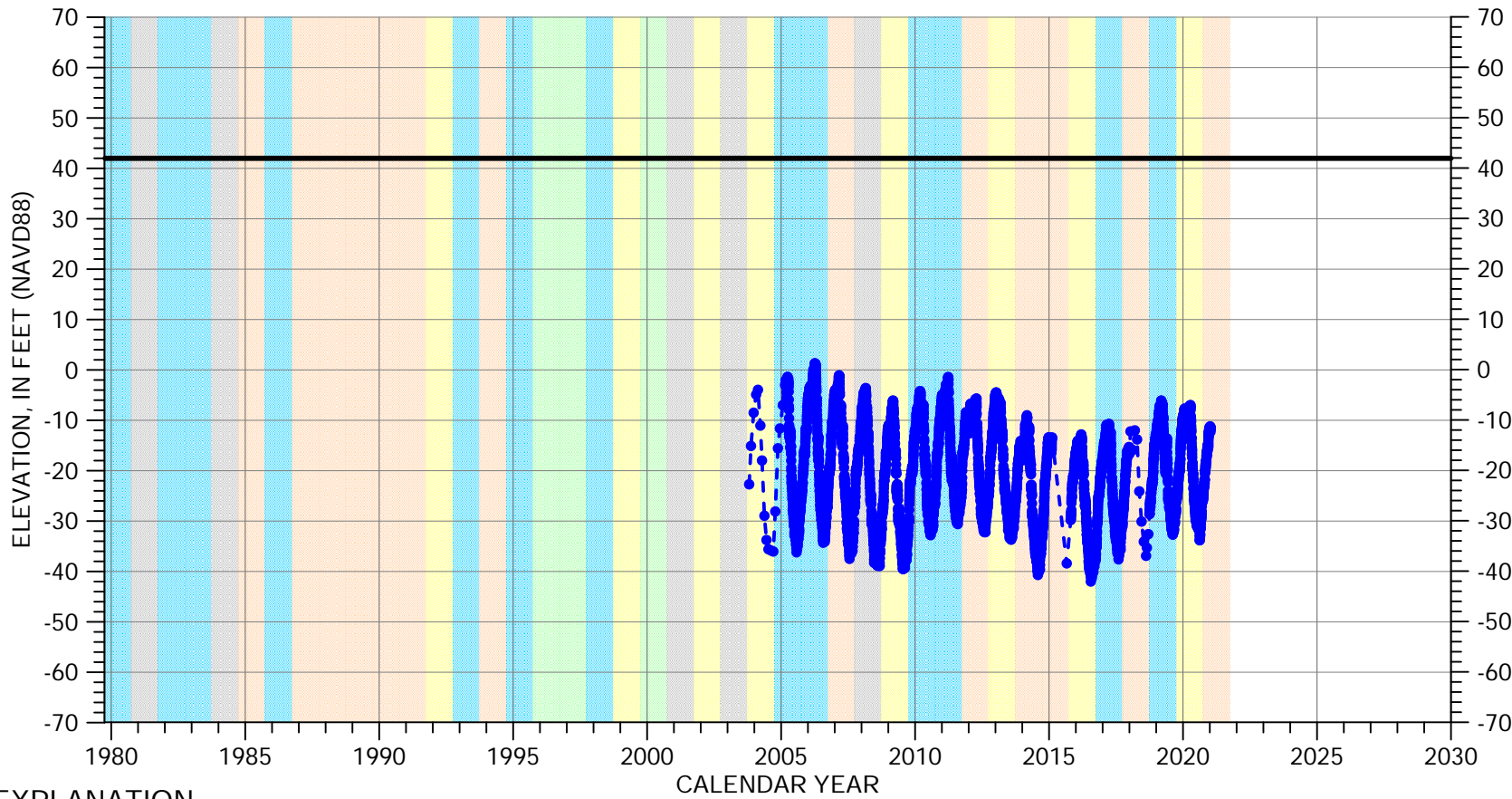
Multiple perforated intervals from -438 to -588 feet msl



Well bottom -598 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-30G08

180/400-Foot Aquifer Subbasin

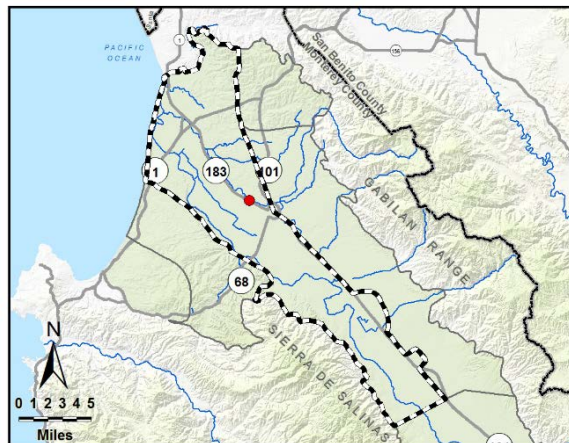


EXPLANATION

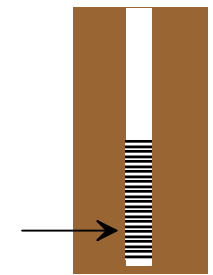
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



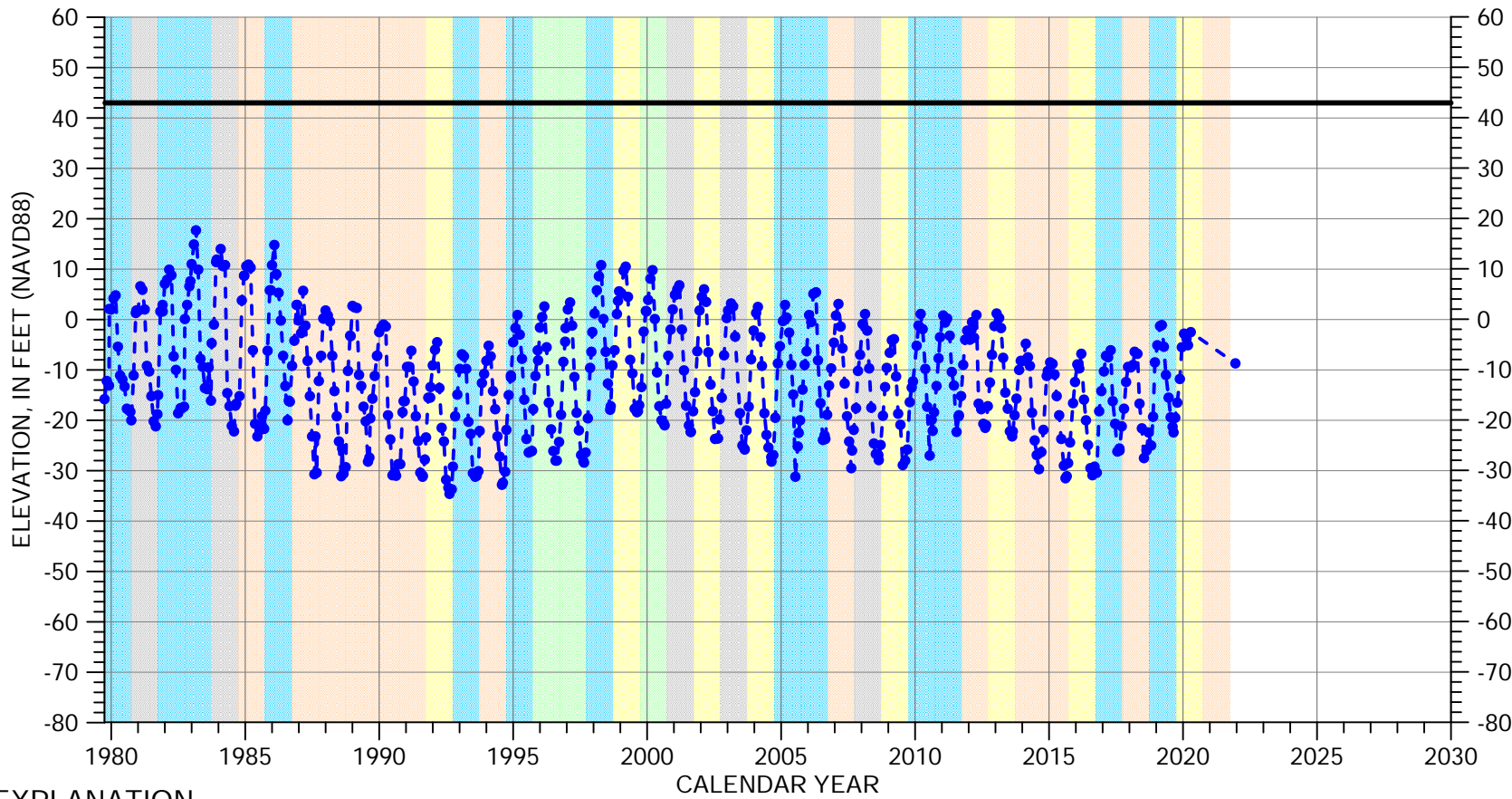
Perforated from
-198 to -248 feet msl



Well bottom
-251 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-31F01

180/400-Foot Aquifer Subbasin

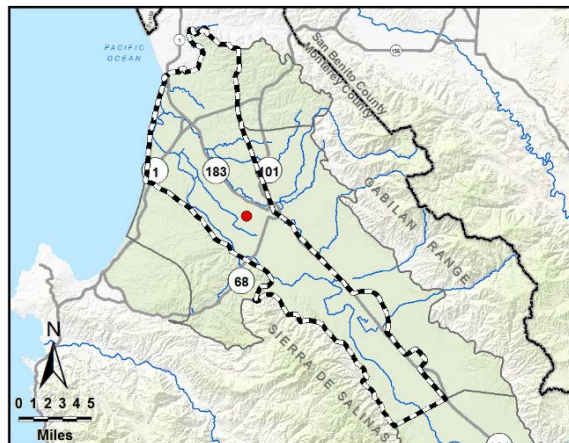


EXPLANATION

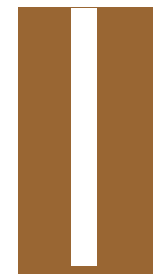
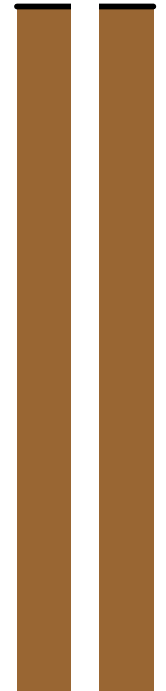
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



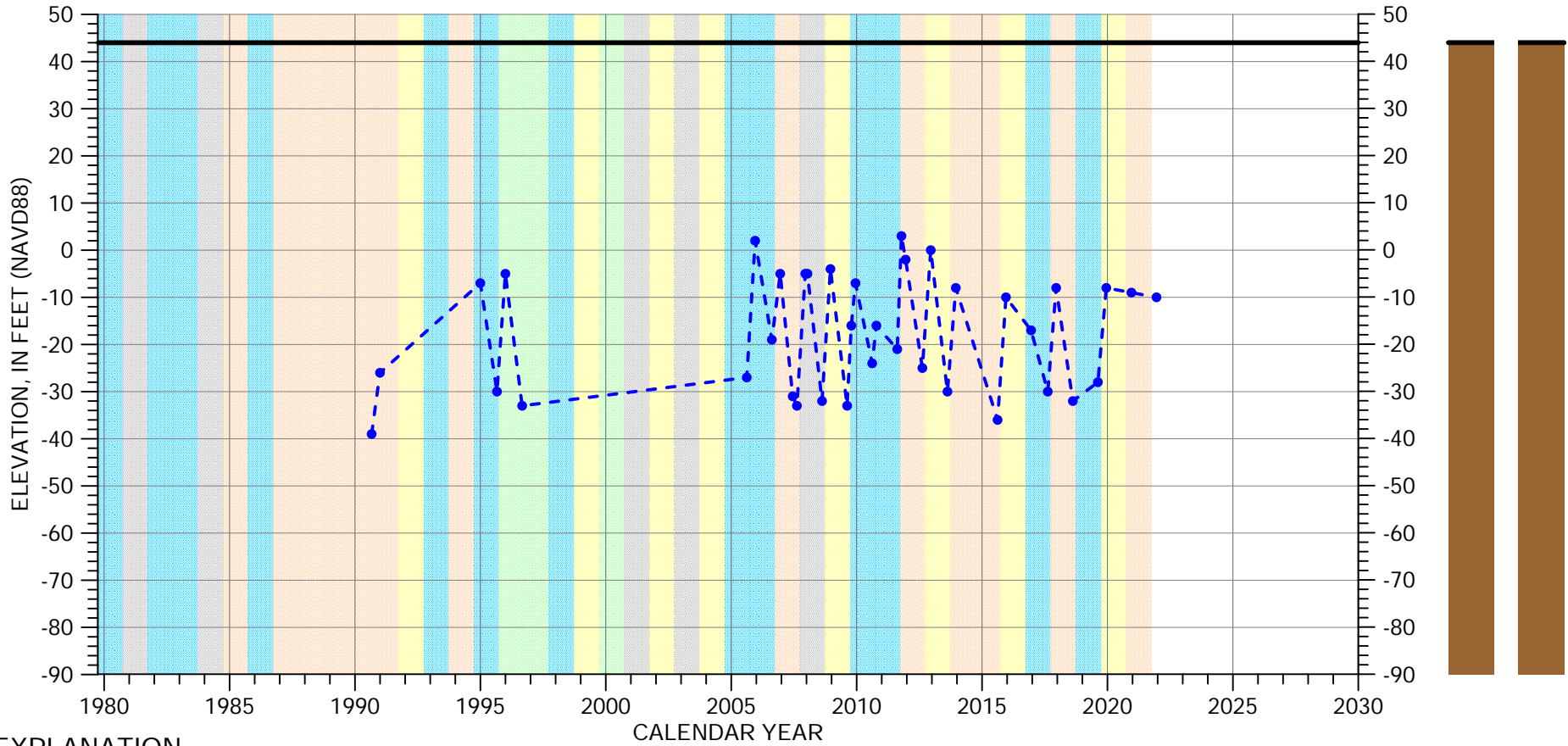
Perforated interval
unknown



Well bottom
-163 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-31L01

180/400-Foot Aquifer Subbasin

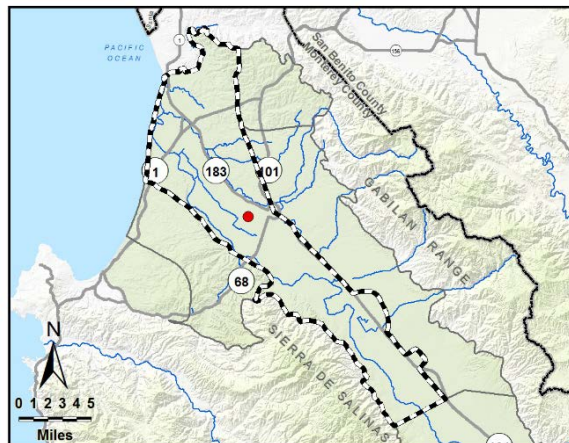


EXPLANATION

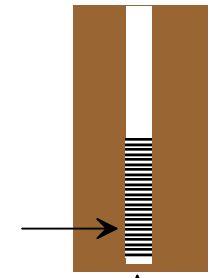
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



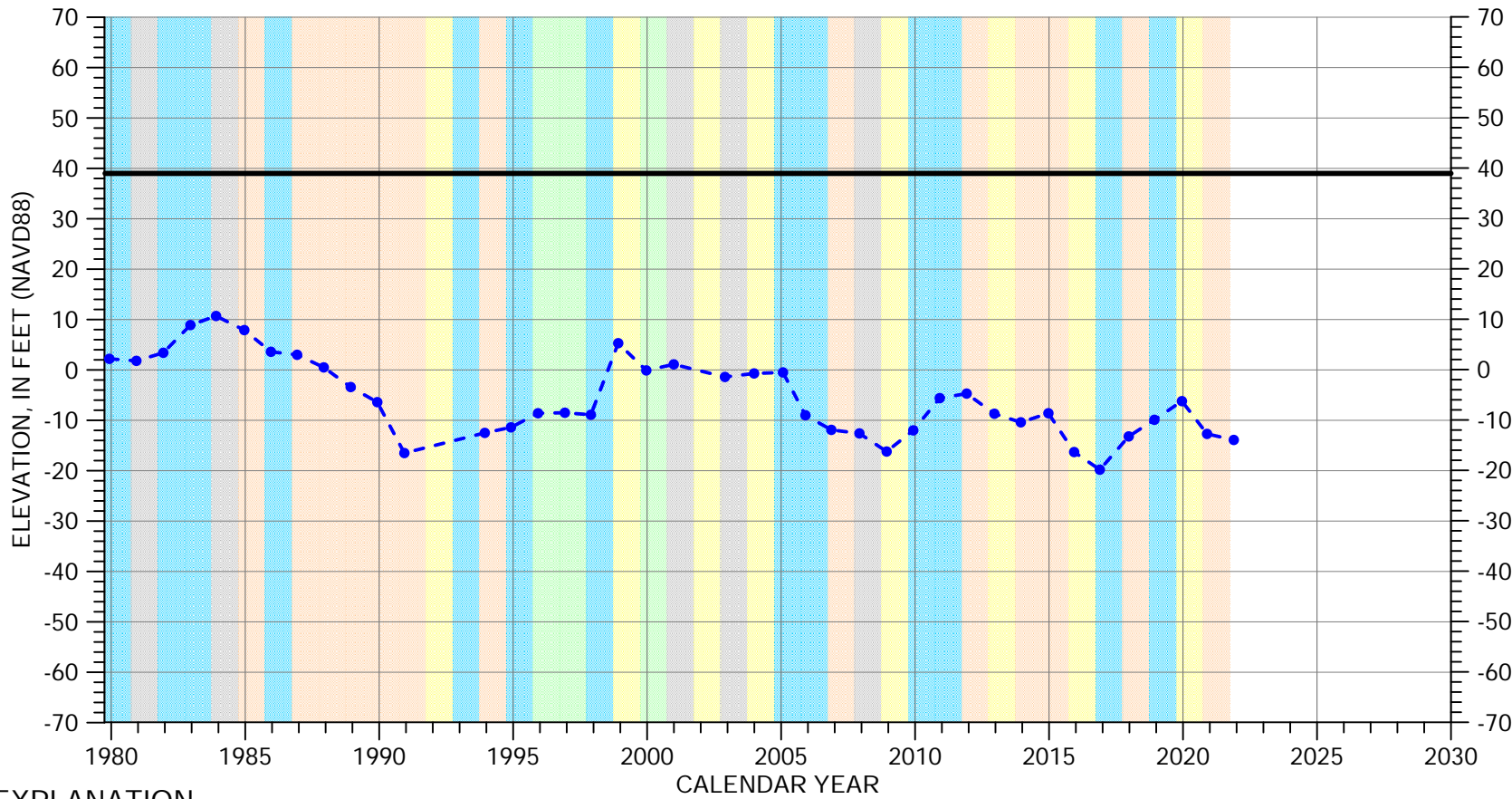
Multiple perforated intervals from -286 to -586 feet msl



Well bottom -596 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/02E-01A03

180/400-Foot Aquifer Subbasin

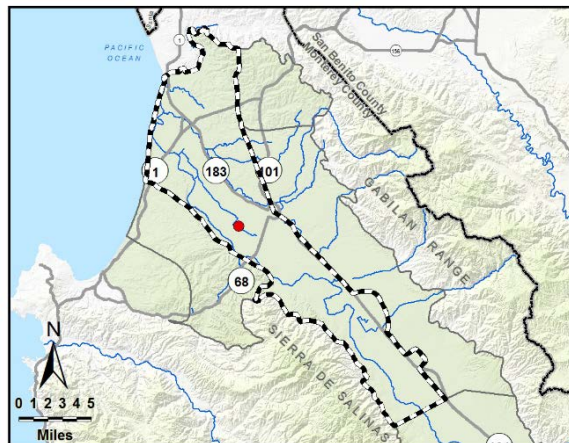


EXPLANATION

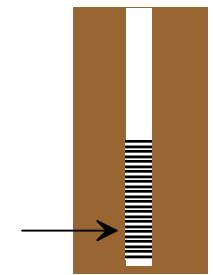
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



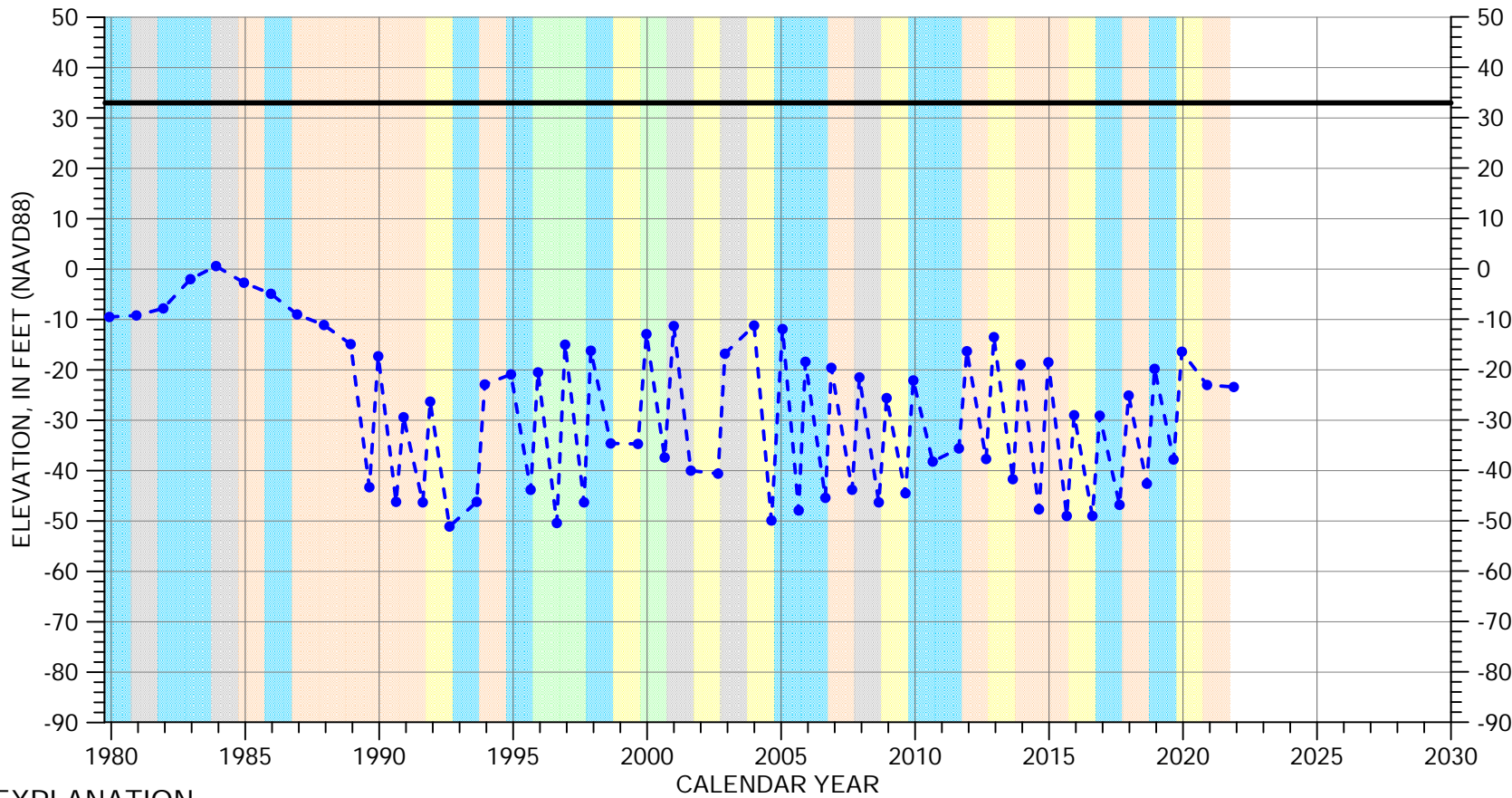
Multiple perforated intervals from -300 to -439 feet msl



Well bottom -444 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/02E-02G01

180/400-Foot Aquifer Subbasin

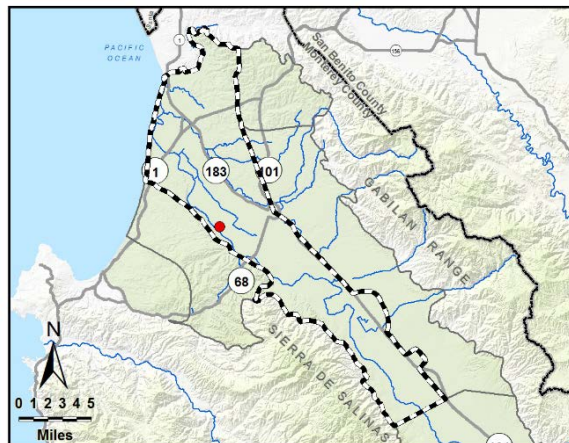


EXPLANATION

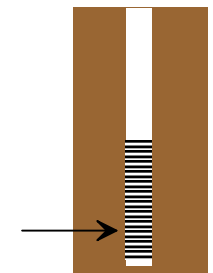
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



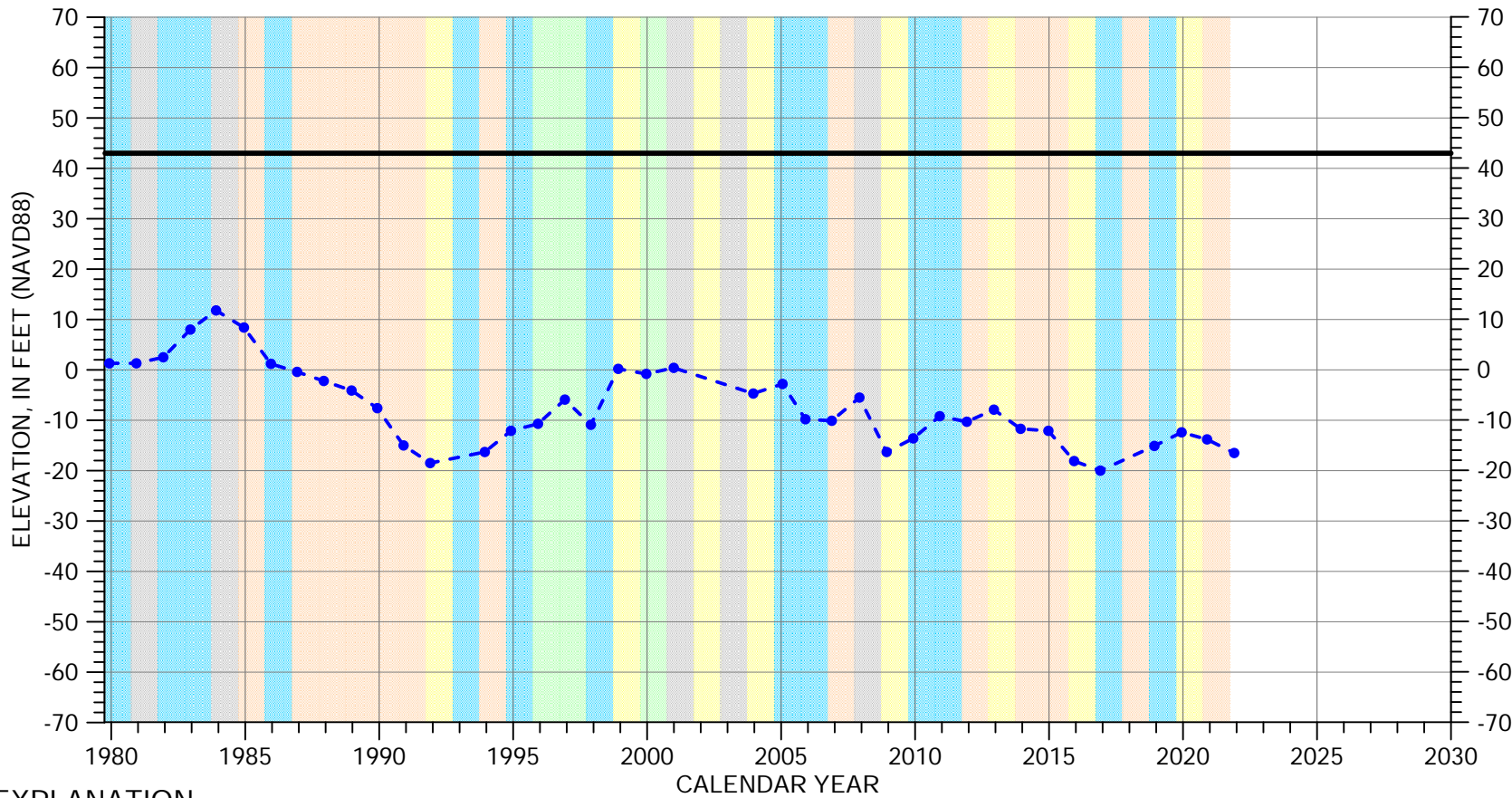
Multiple perforated intervals from -270 to -370 feet msl



Well bottom -374 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/02E-12A01

180/400-Foot Aquifer Subbasin

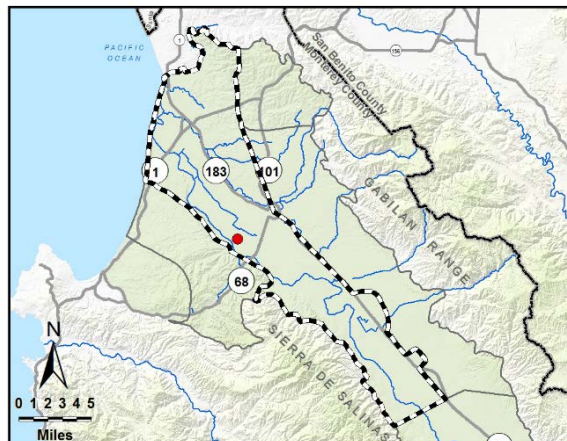


EXPLANATION

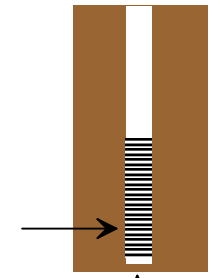
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



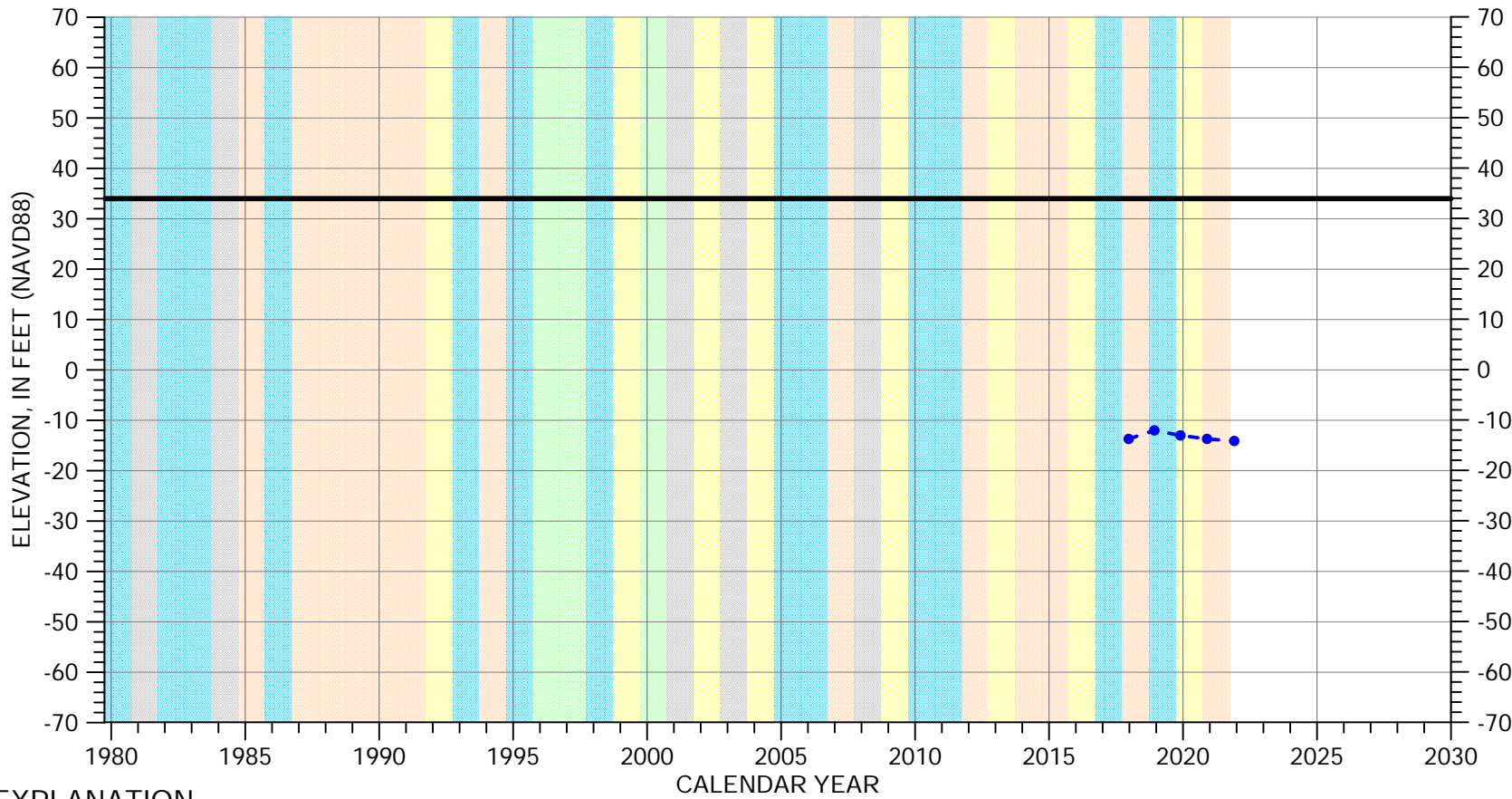
Multiple perforated intervals from -383 to -464 feet msl



Well bottom -506 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/02E-12C01

180/400-Foot Aquifer Subbasin

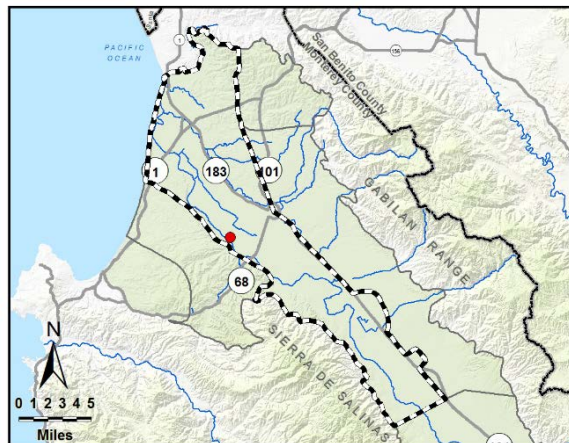


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



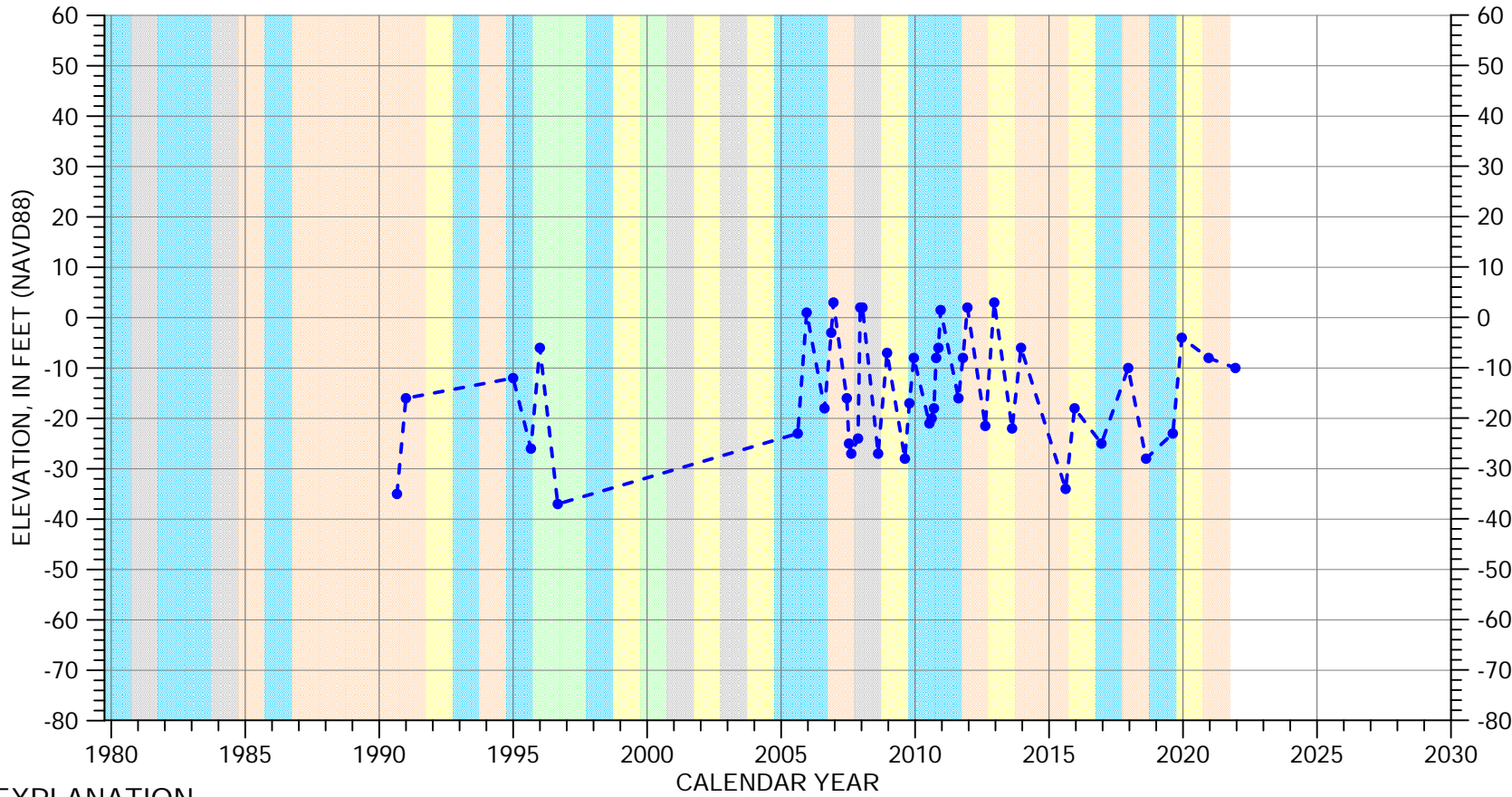
Perforated interval
unknown



Well bottom
-144 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-03R02

180/400-Foot Aquifer Subbasin

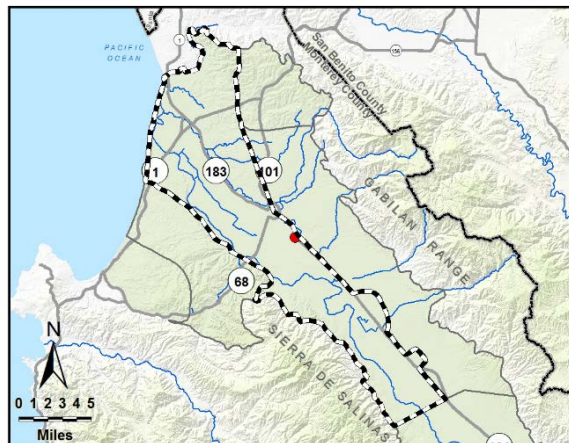


EXPLANATION

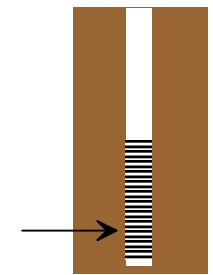
- Groundwater Elevation
- Suspect Measurement
- Land Surface (63 FT MSL)

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



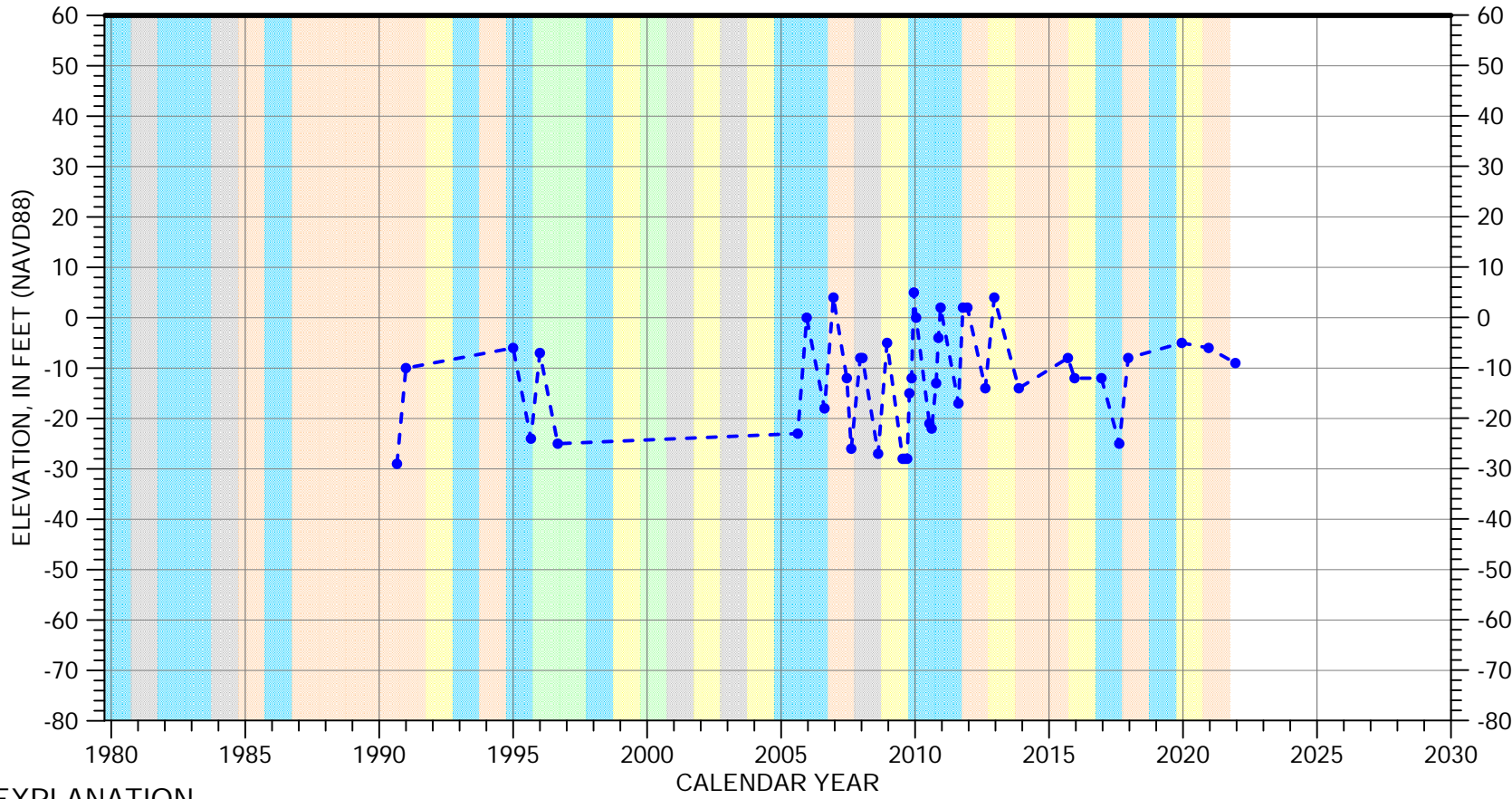
Multiple perforated intervals from -313 to -381 feet msl



Well bottom -573 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-04Q01

180/400-Foot Aquifer Subbasin

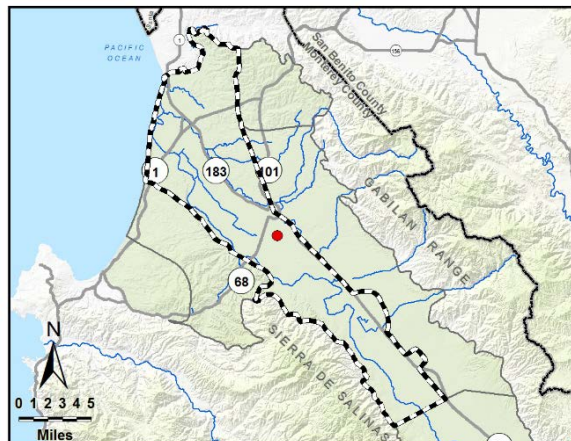


EXPLANATION

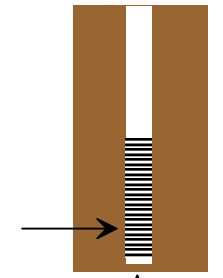
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



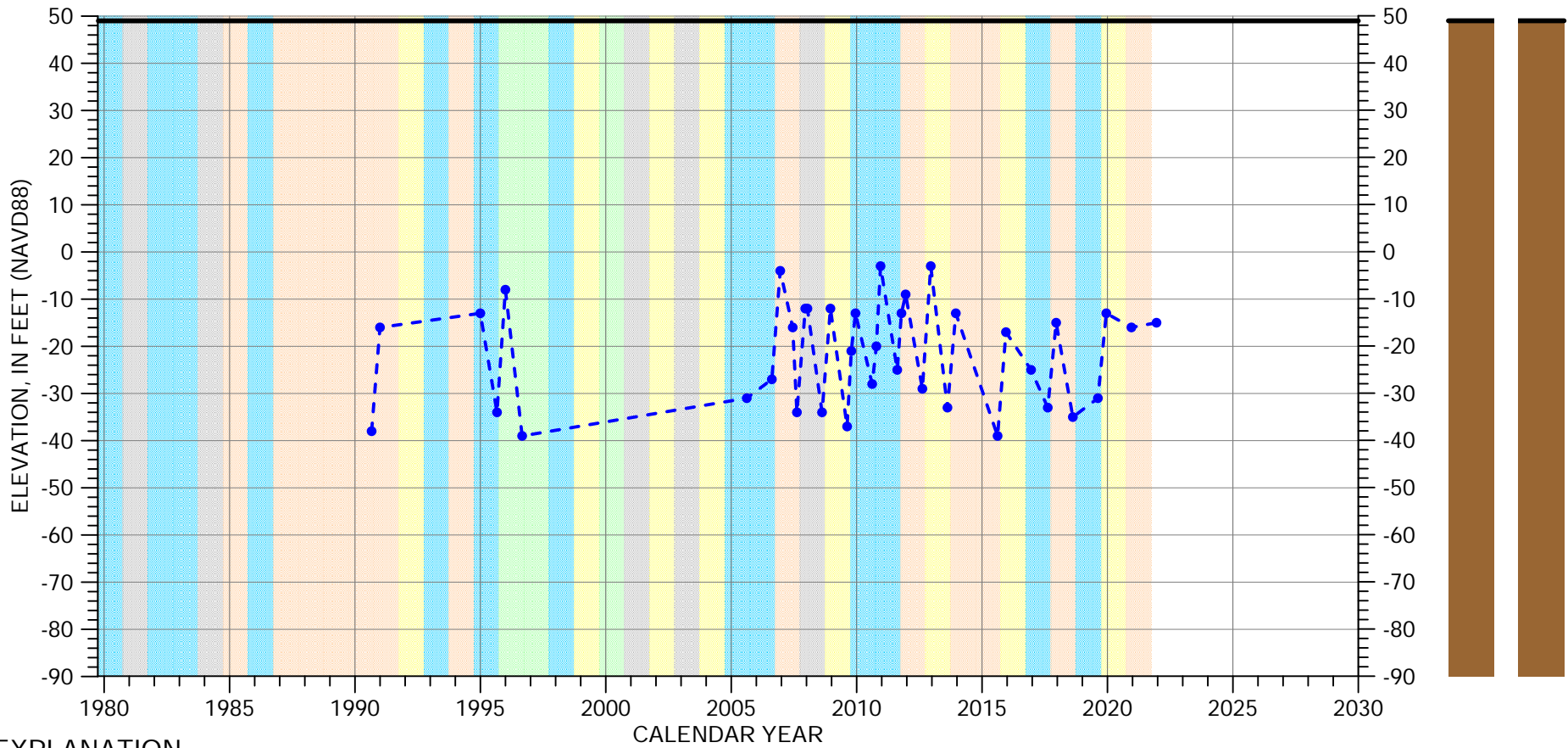
Multiple perforated intervals from -248 to -458 feet msl



Well bottom -478 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-05C02

180/400-Foot Aquifer Subbasin

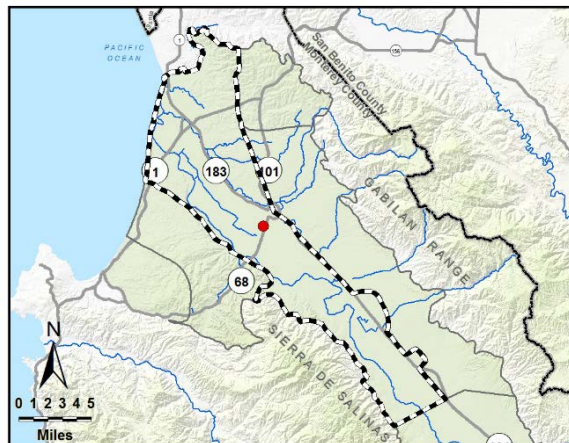


EXPLANATION

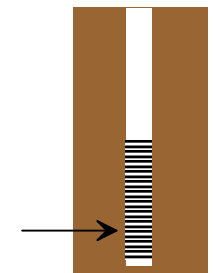
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



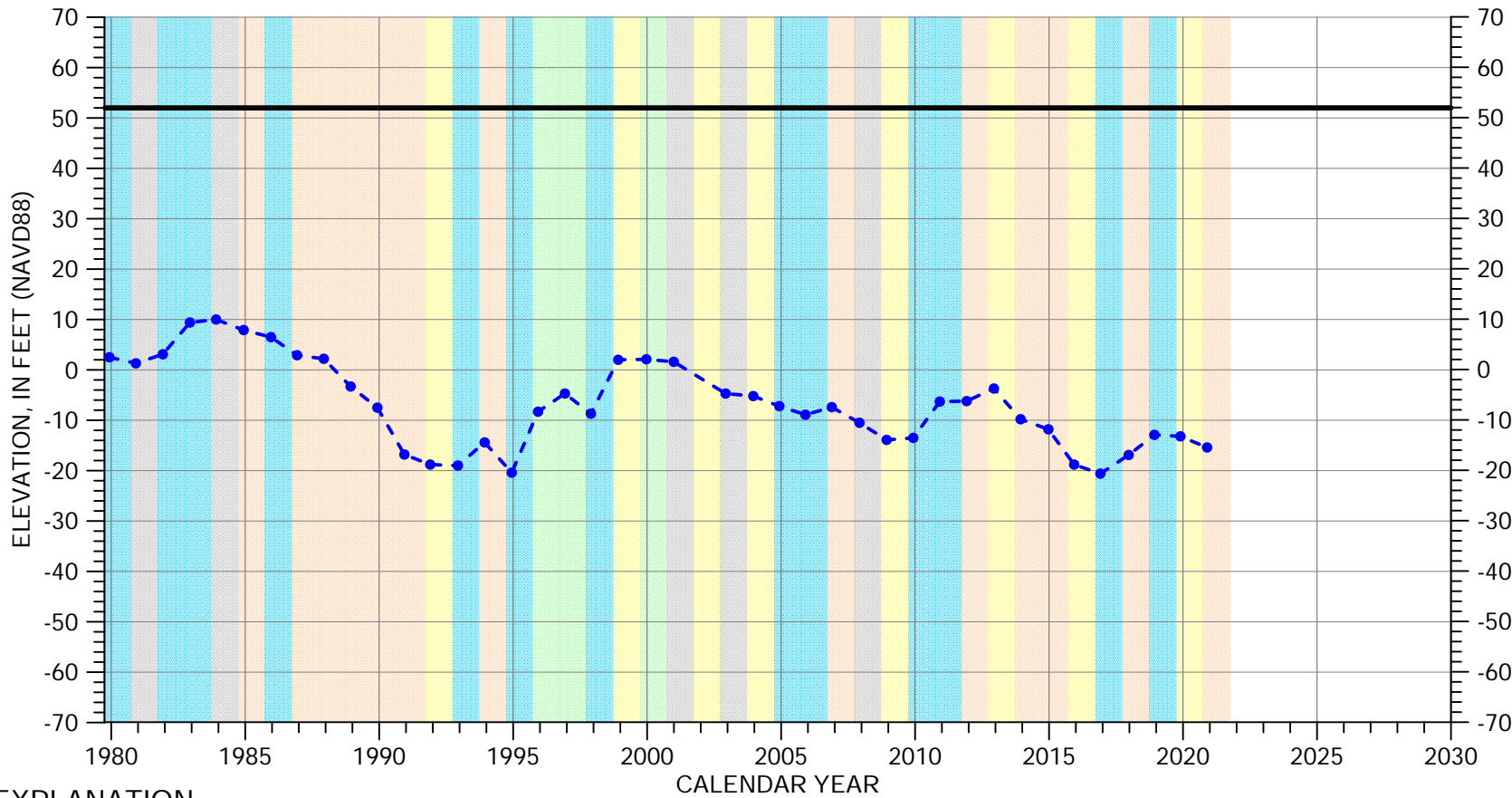
Multiple perforated intervals from -312 to -392 feet msl



Well bottom -569 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-08F01

180/400-Foot Aquifer Subbasin

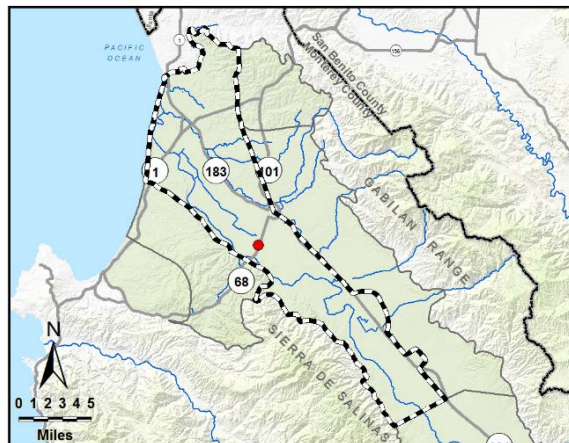


EXPLANATION

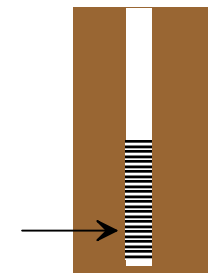
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



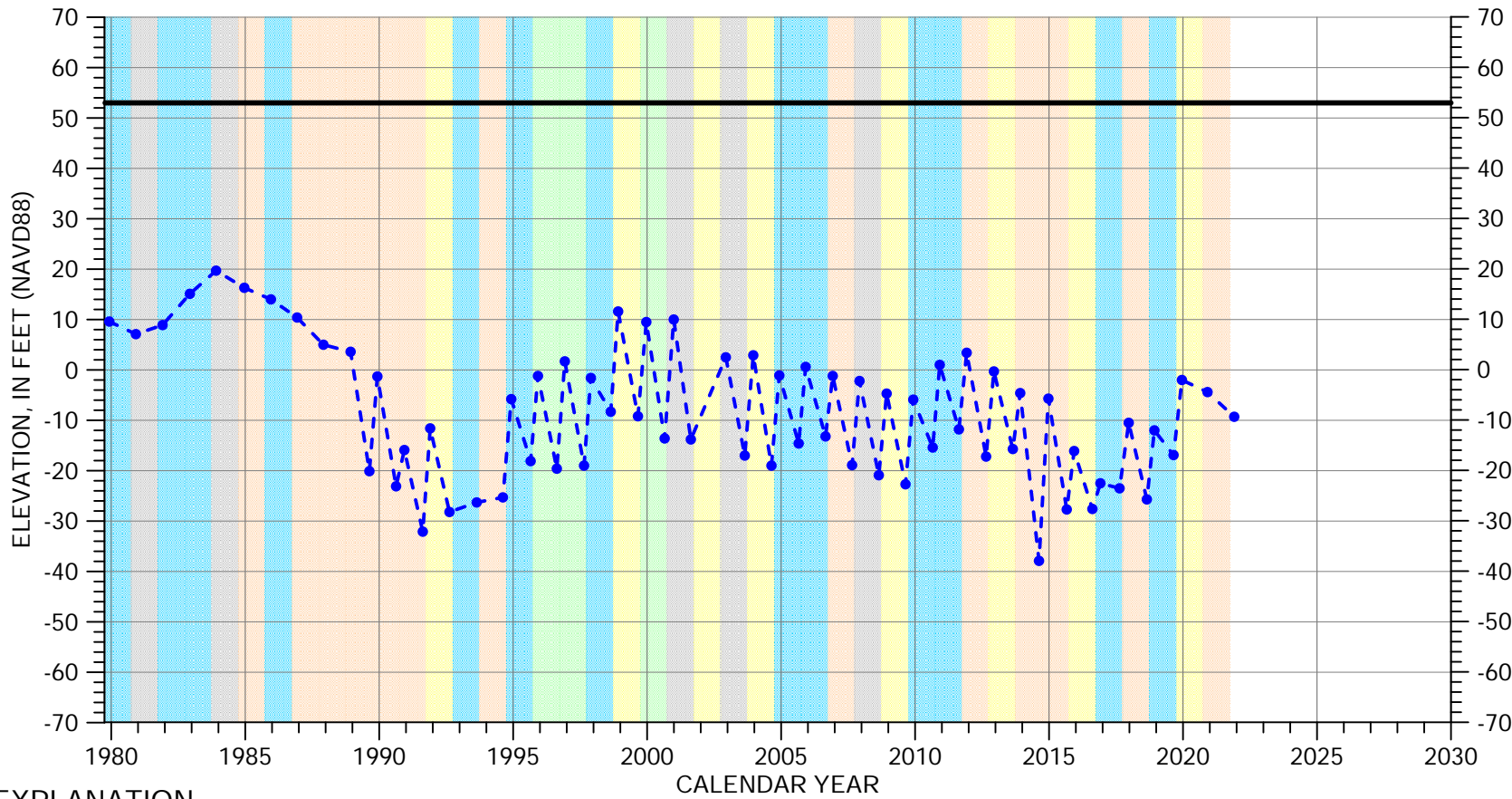
Multiple perforated intervals from -348 to -398 feet msl



Well bottom -400 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-09E03

180/400-Foot Aquifer Subbasin

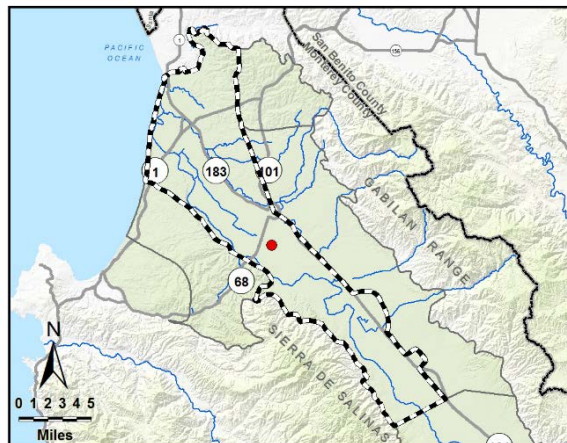


EXPLANATION

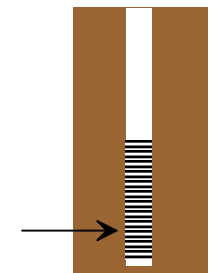
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



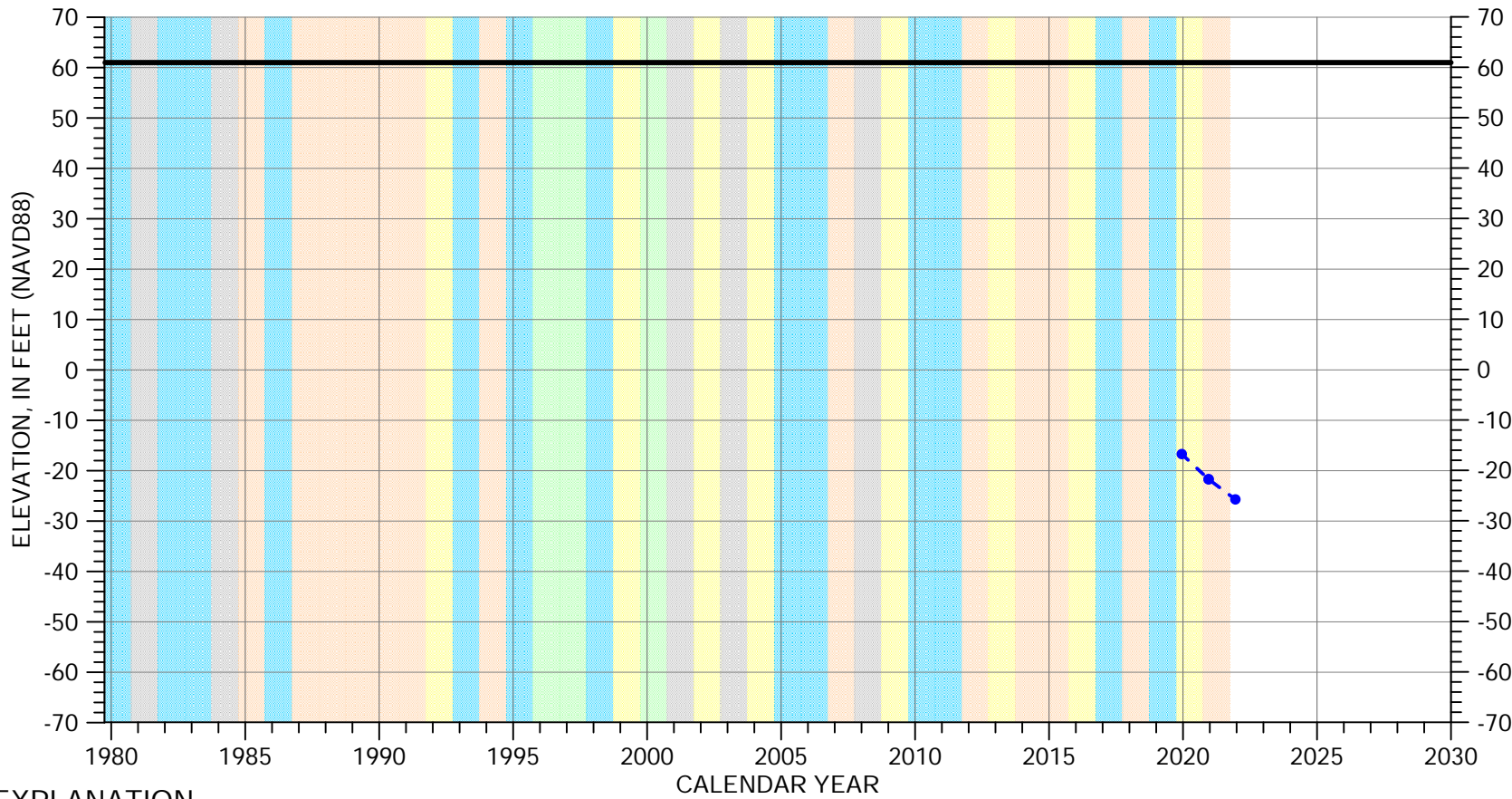
Multiple perforated intervals from -131 to -192 feet msl



Well bottom -195 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-10D04

180/400-Foot Aquifer Subbasin

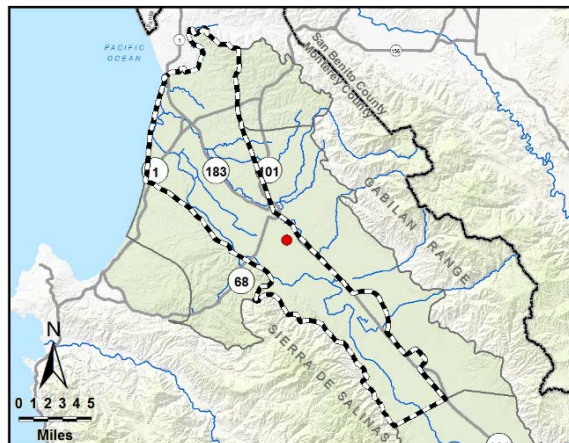


EXPLANATION

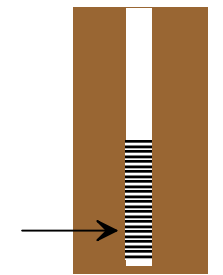
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



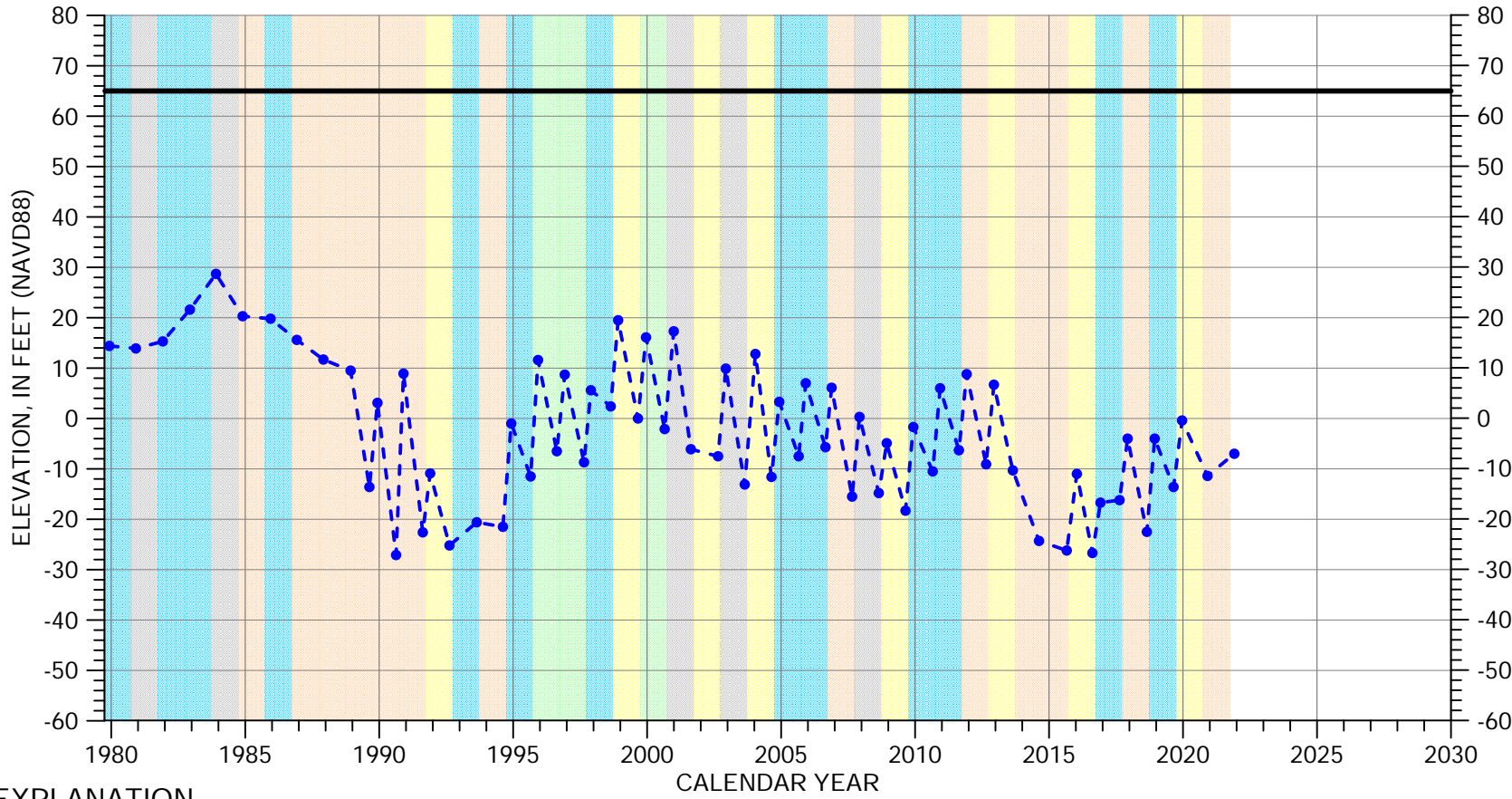
Perforated from
-539 to -889 feet msl



Well bottom
-919 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-13N01

180/400-Foot Aquifer Subbasin

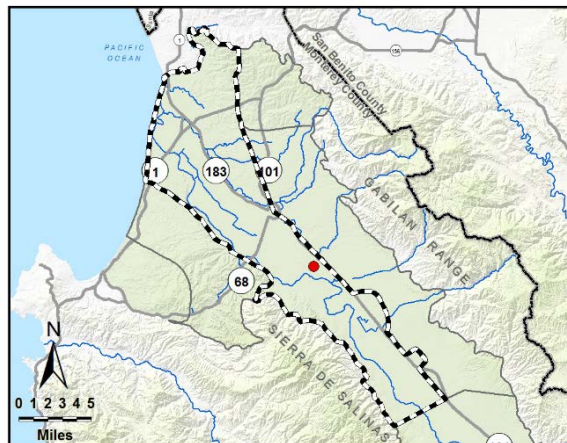


EXPLANATION

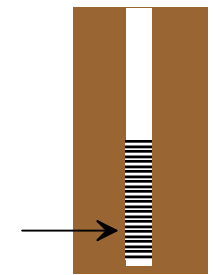
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



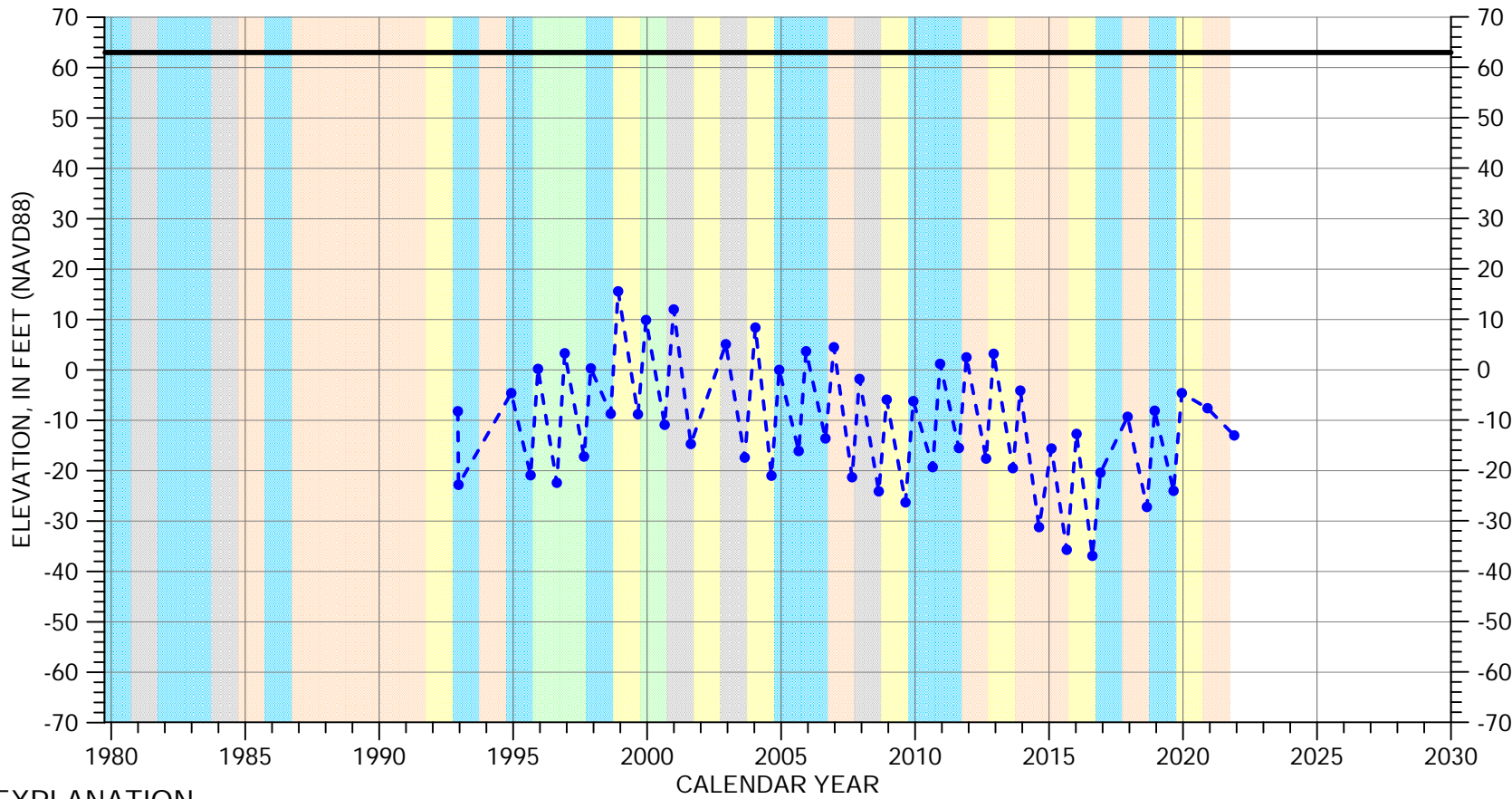
Multiple perforated intervals from -149 to -205 feet msl



Well bottom -208 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-14P02

180/400-Foot Aquifer Subbasin

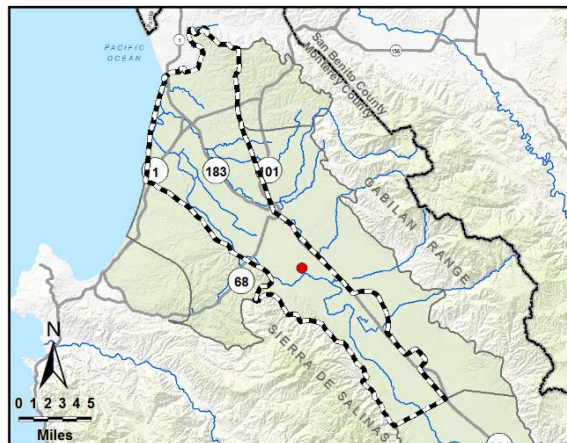


EXPLANATION

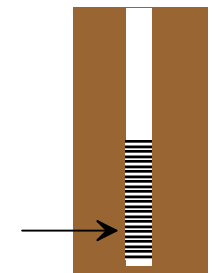
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | | | |
|--|--------------|--|--------------|
| | DRY | | WET - NORMAL |
| | DRY - NORMAL | | WET |
| | NORMAL | | |



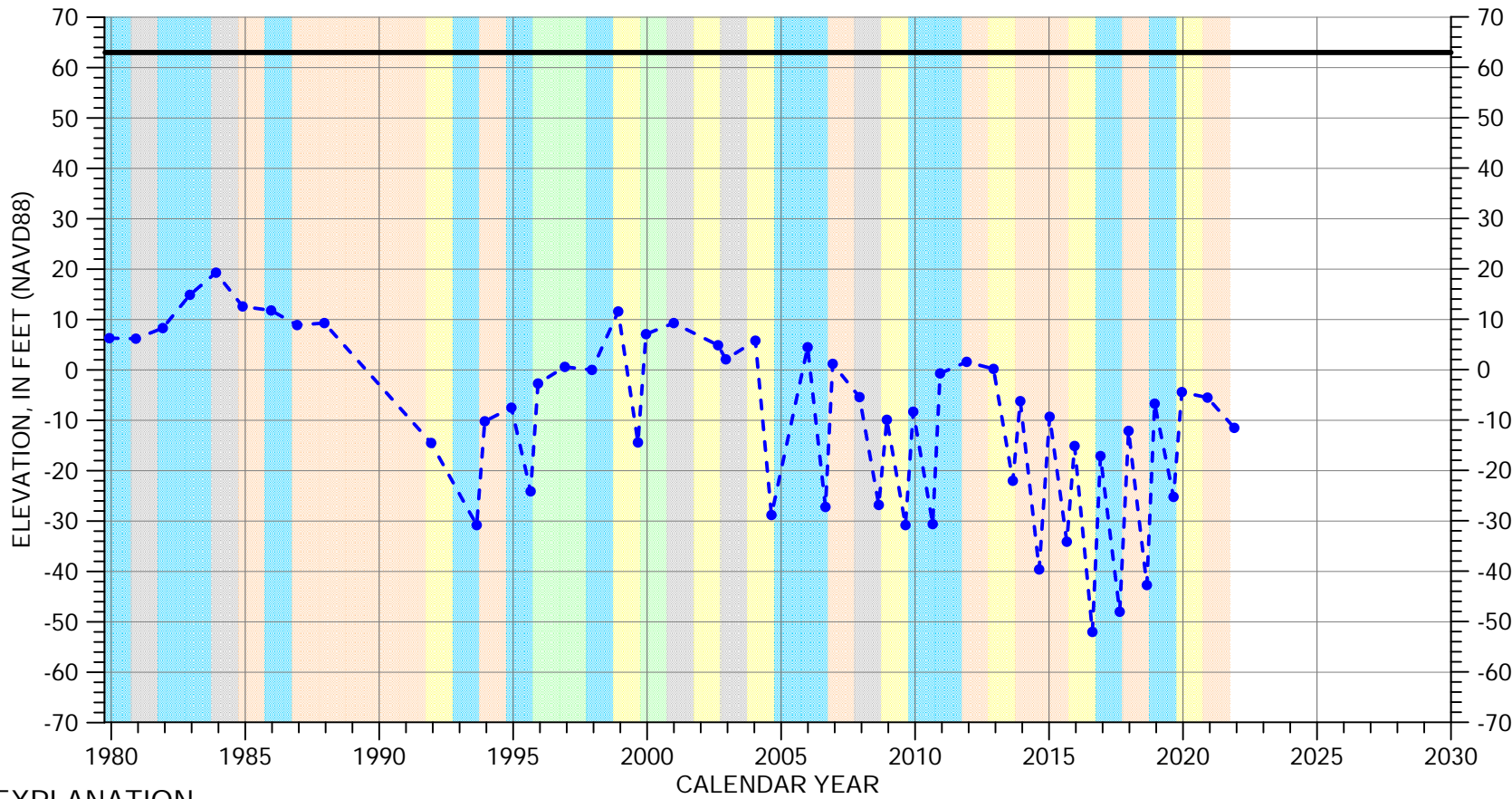
Multiple perforated intervals from -352 to -500 feet msl



Well bottom -543 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-15B01

180/400-Foot Aquifer Subbasin

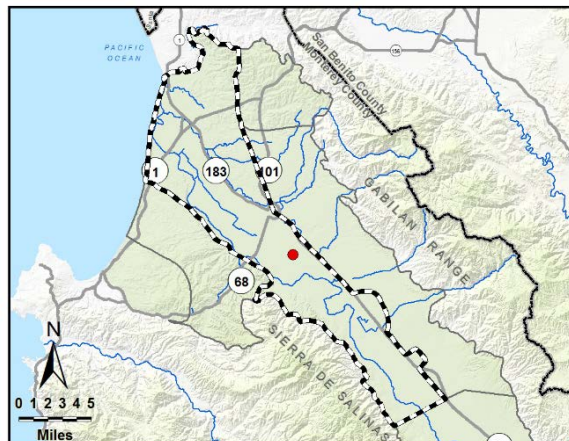


EXPLANATION

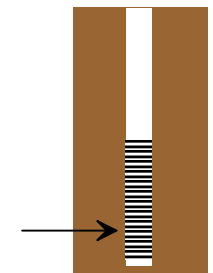
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



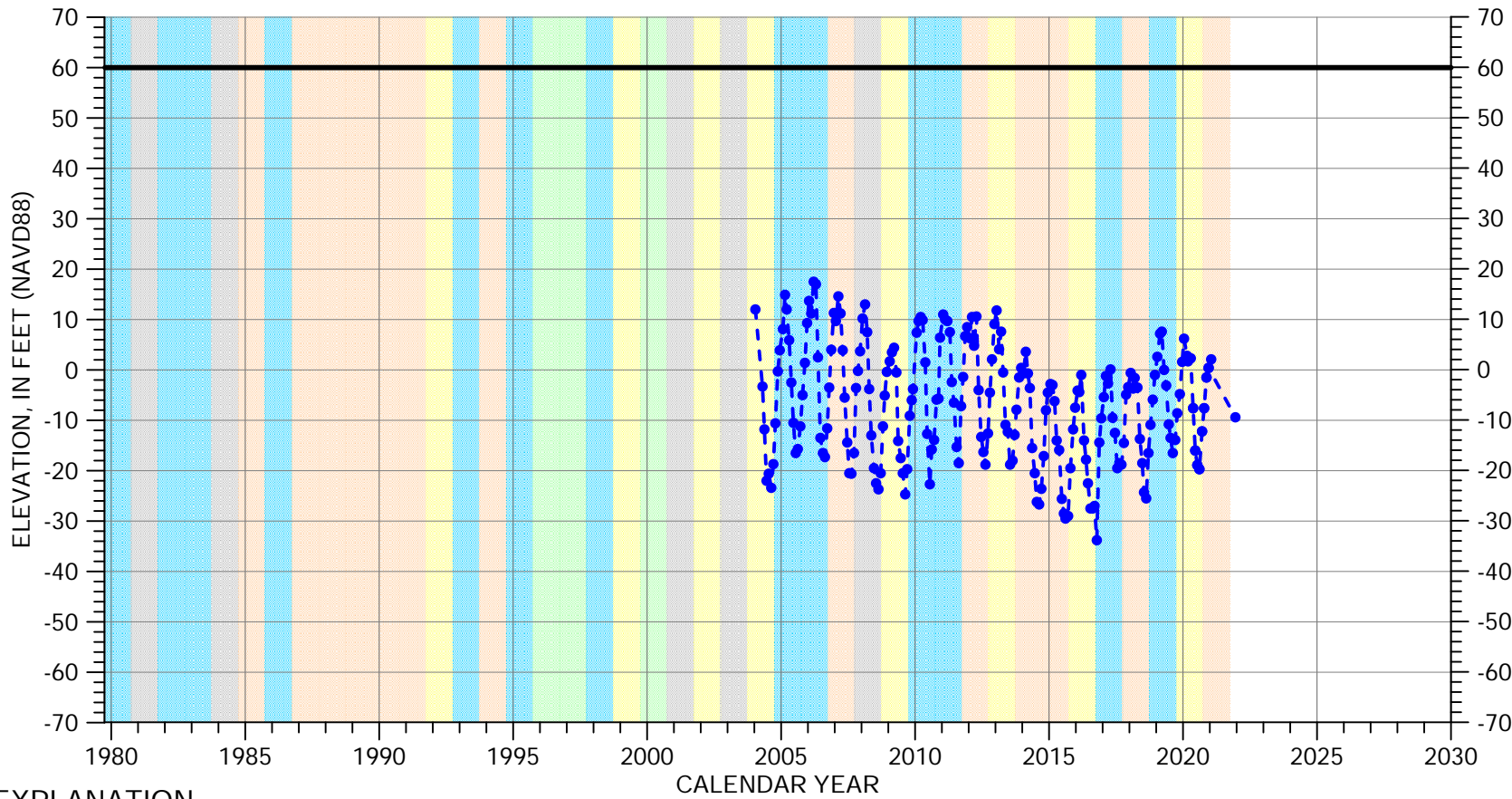
Multiple perforated intervals from -255 to -384 feet msl



Well bottom -389 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-16F02

180/400-Foot Aquifer Subbasin

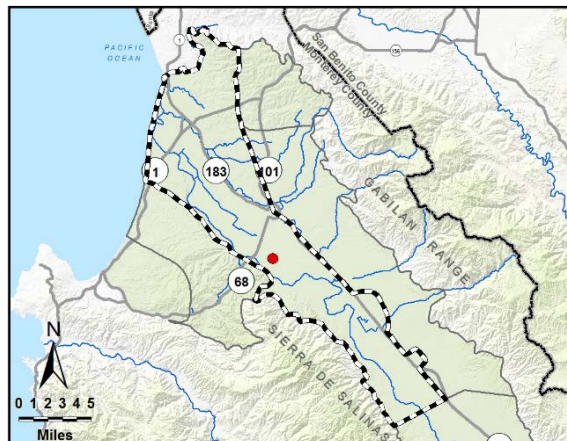


EXPLANATION

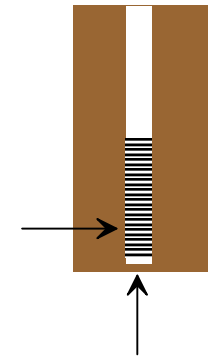
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | | | |
|--|--------------|--|--------------|
| | DRY | | WET - NORMAL |
| | DRY - NORMAL | | WET |
| | NORMAL | | |



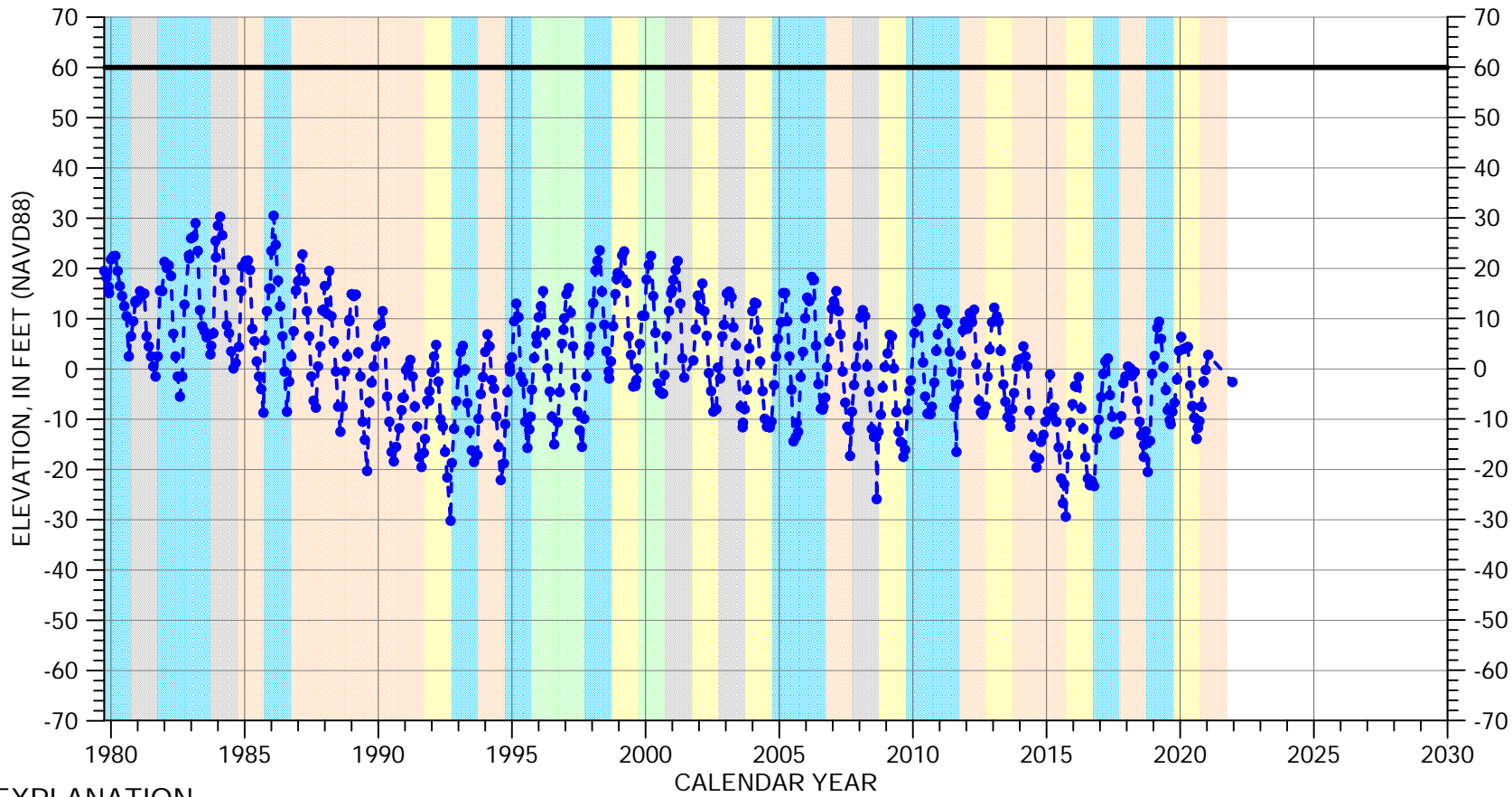
Perforated from
-368 to -511 feet msl



Well bottom
-533 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-16M01

180/400-Foot Aquifer Subbasin

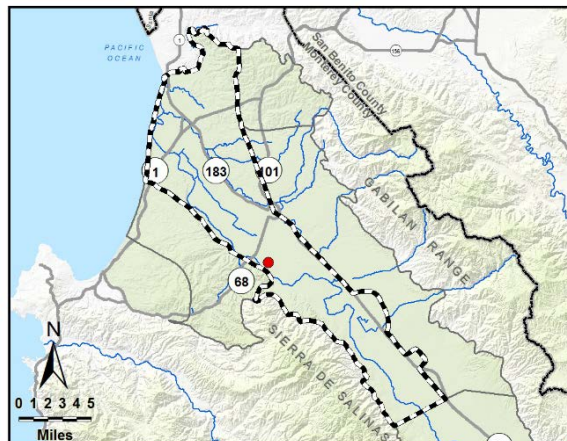


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |

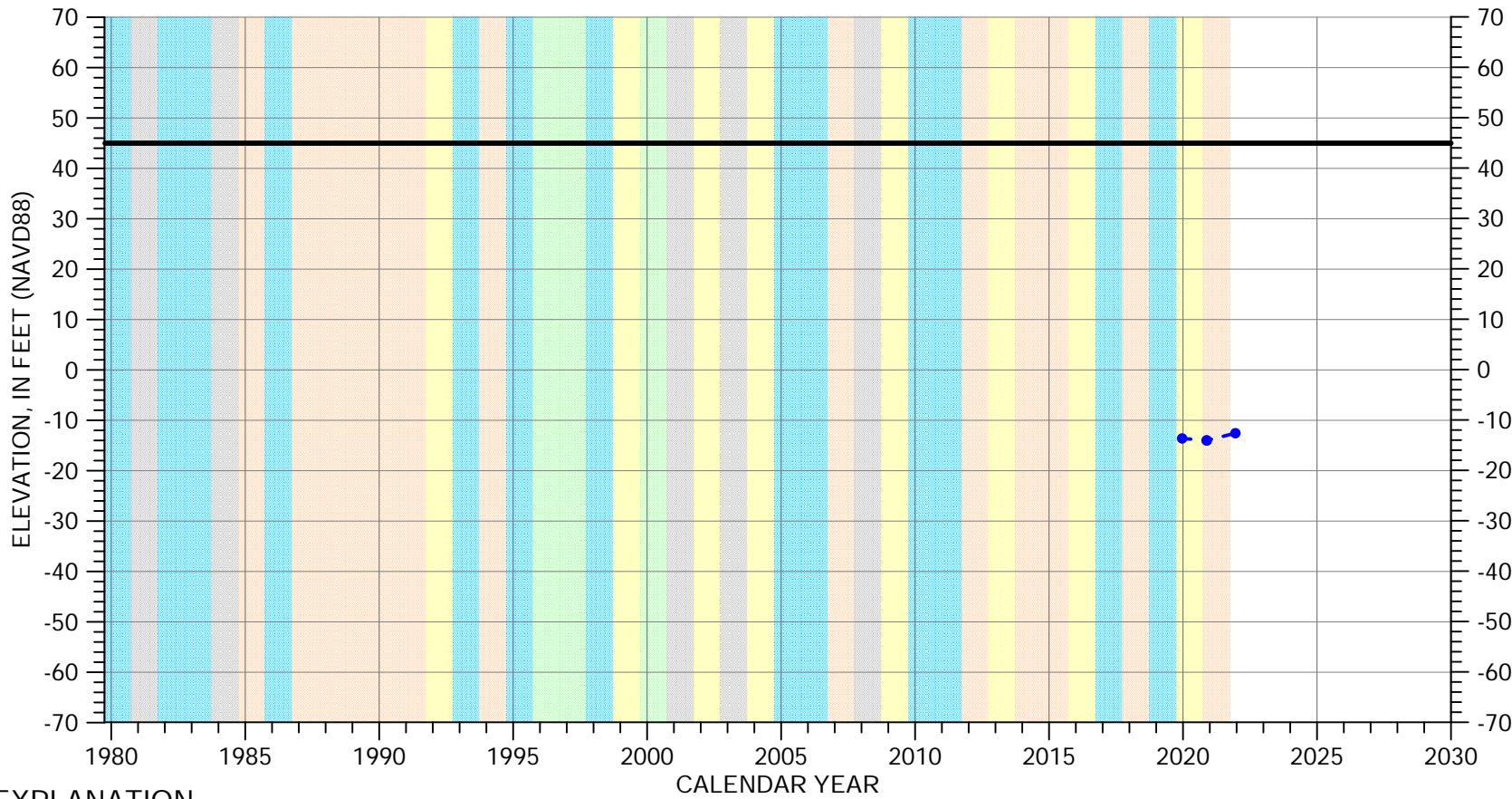


Perforated interval
unknown

Well bottom
elevation unknown

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-17E02

180/400-Foot Aquifer Subbasin

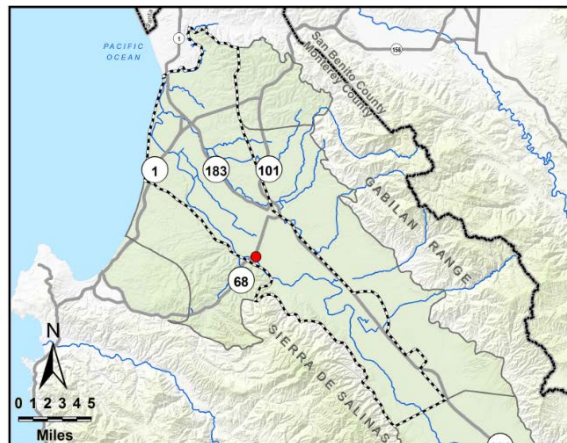


EXPLANATION

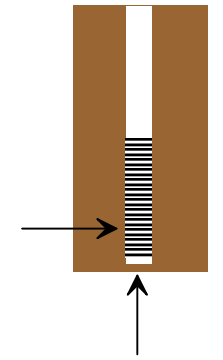
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| <ul style="list-style-type: none"> DRY DRY - NORMAL NORMAL | <ul style="list-style-type: none"> WET - NORMAL WET |
|---|---|



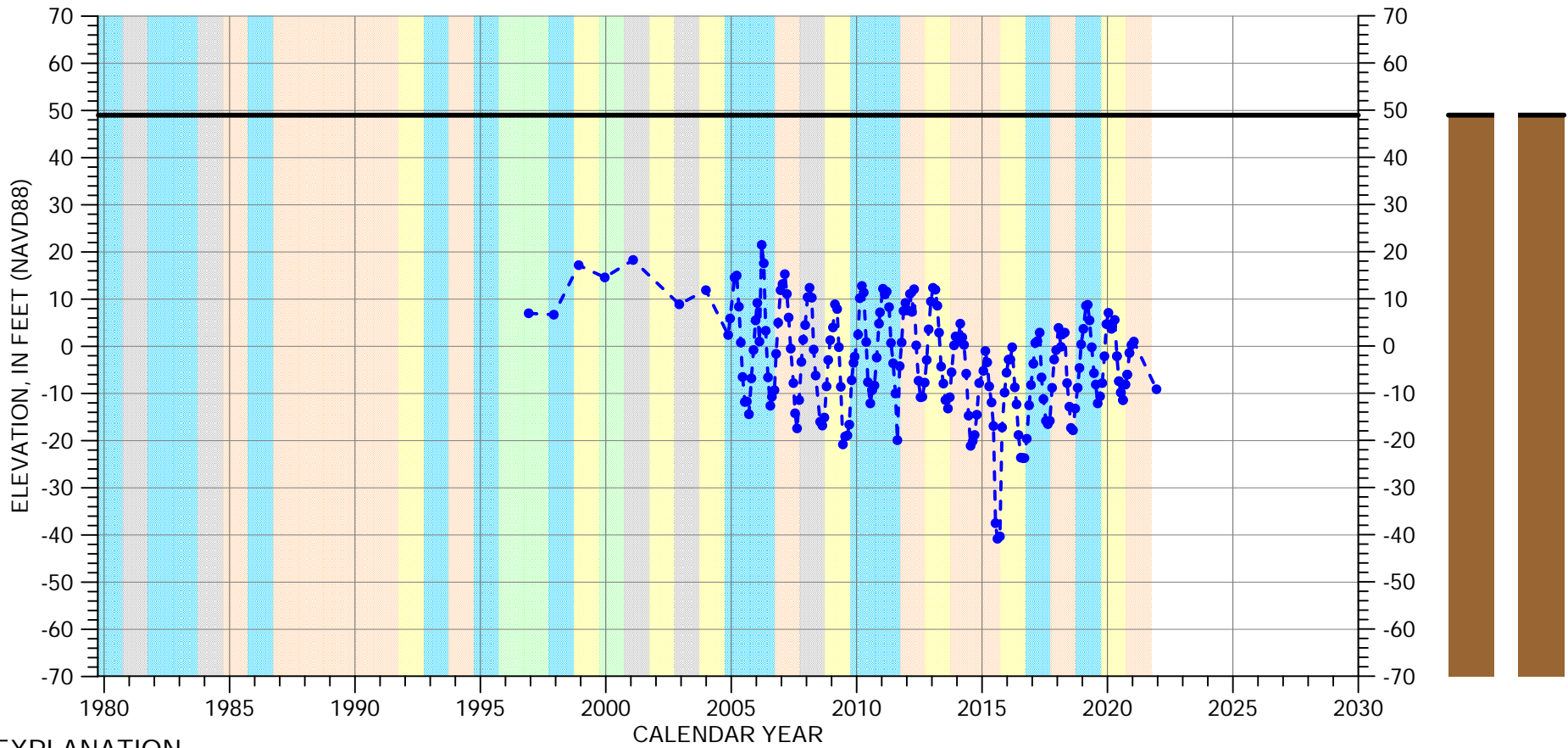
Perforated from
-535 to -635 feet msl



Well bottom
-655 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-17M01

180/400-Foot Aquifer Subbasin

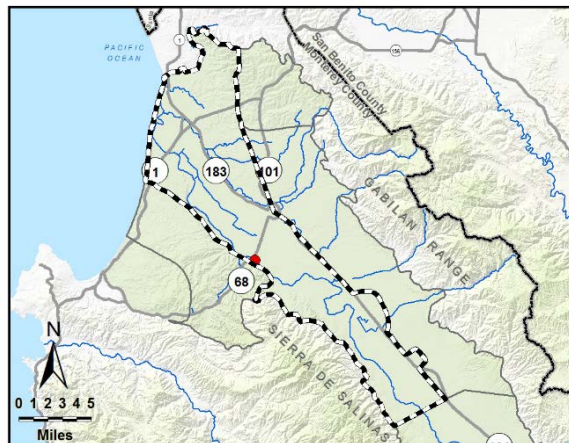


EXPLANATION

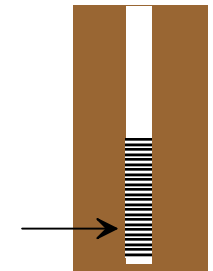
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



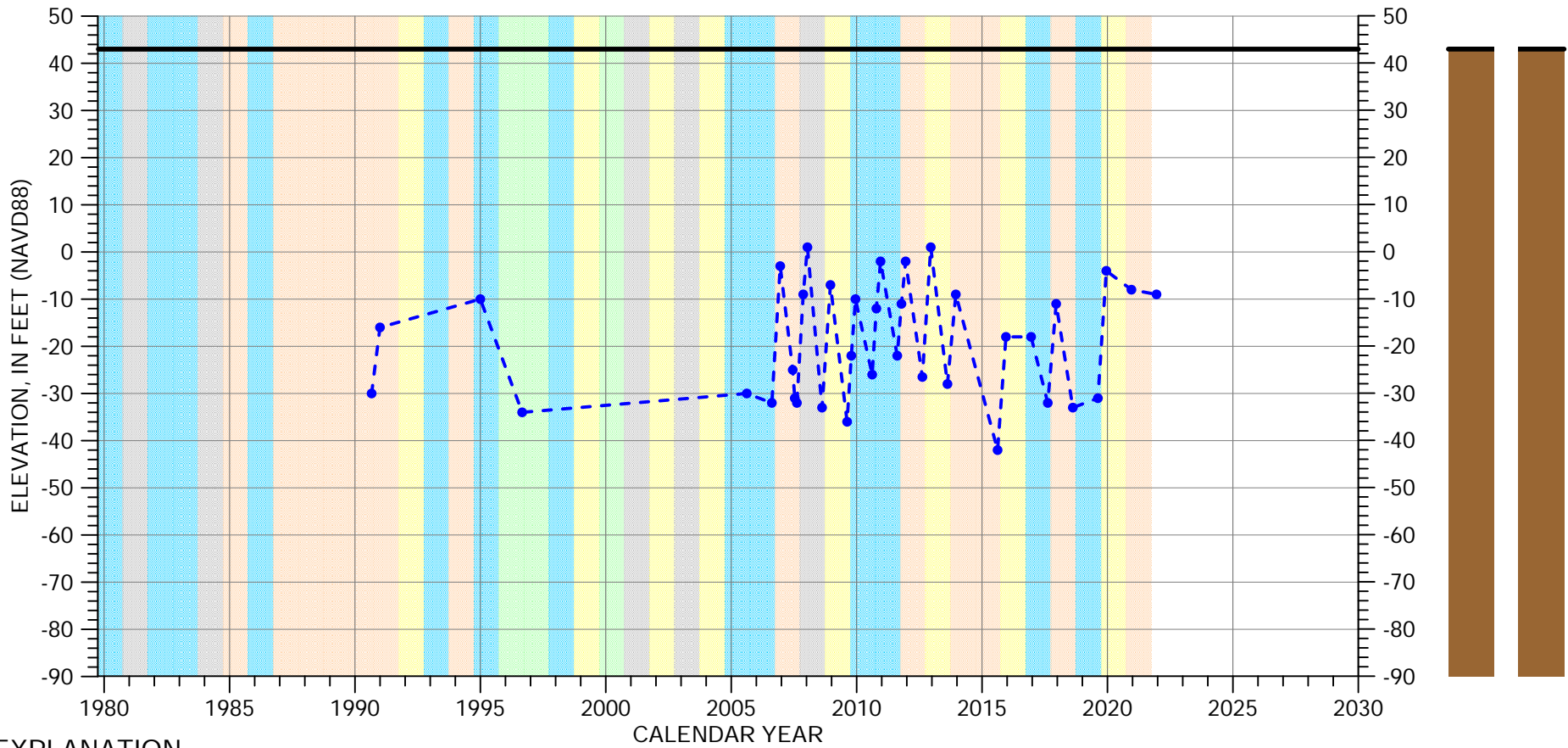
Perforated from
-79 to -131 feet msl



Well bottom
-222 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-17P02

180/400-Foot Aquifer Subbasin

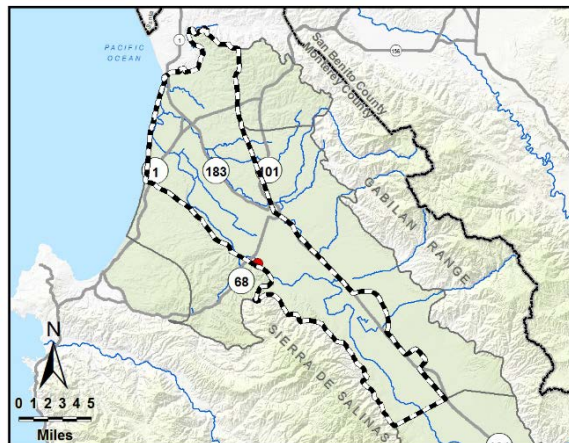


EXPLANATION

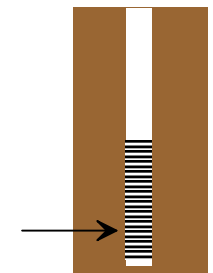
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



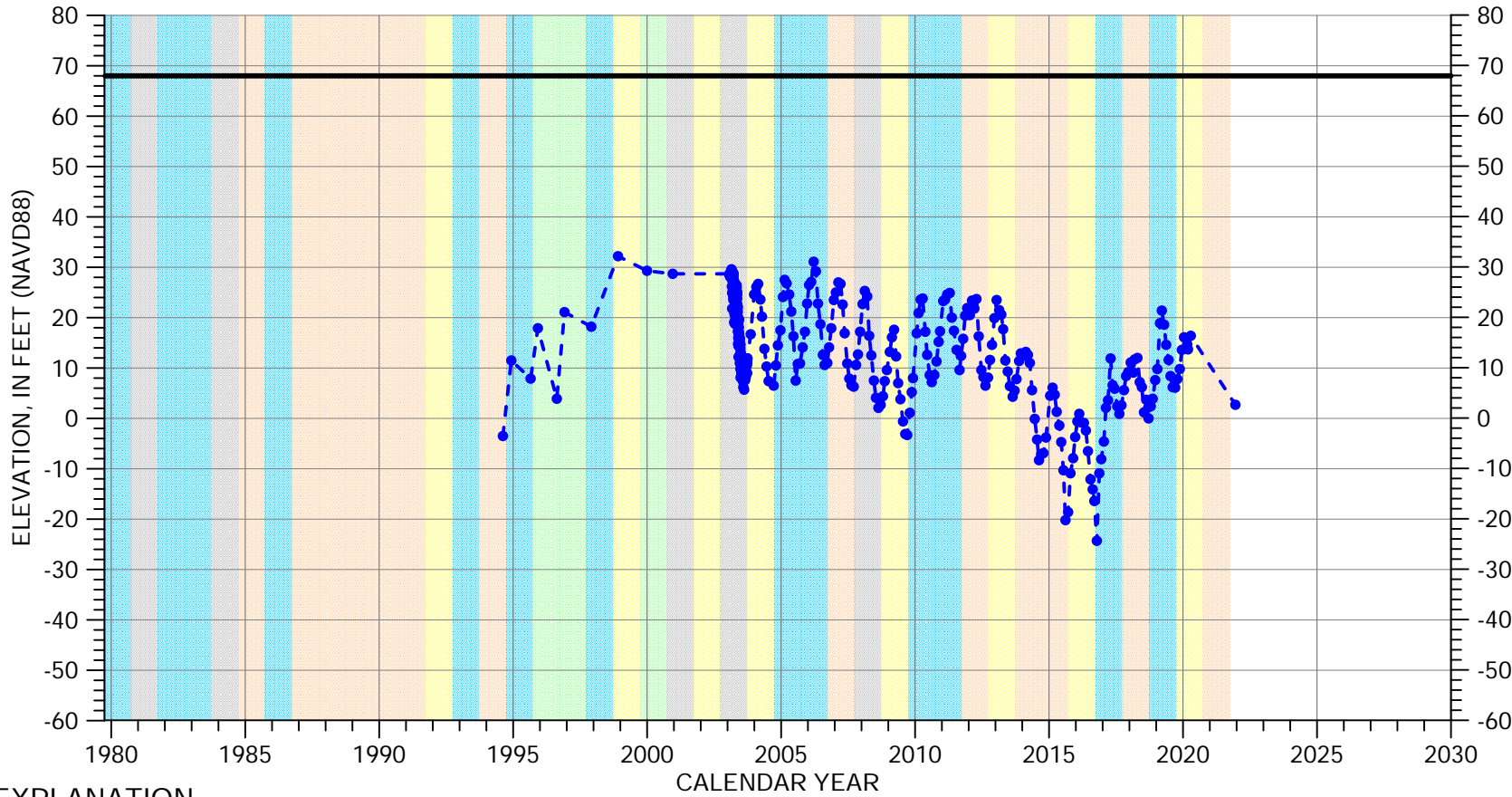
Multiple perforated intervals from -308 to -688 feet msl



Well bottom -708 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-25L01

180/400-Foot Aquifer Subbasin

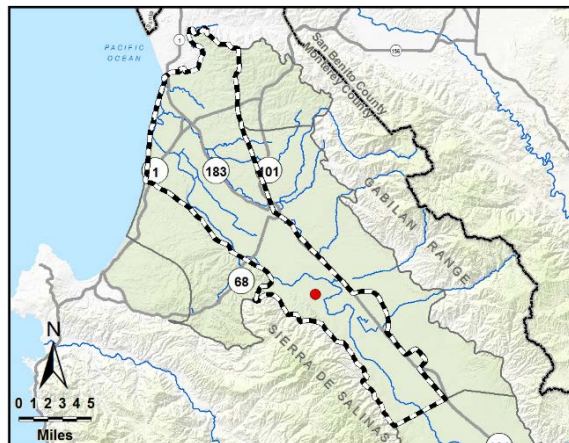


EXPLANATION

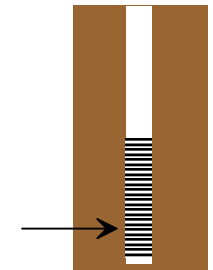
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



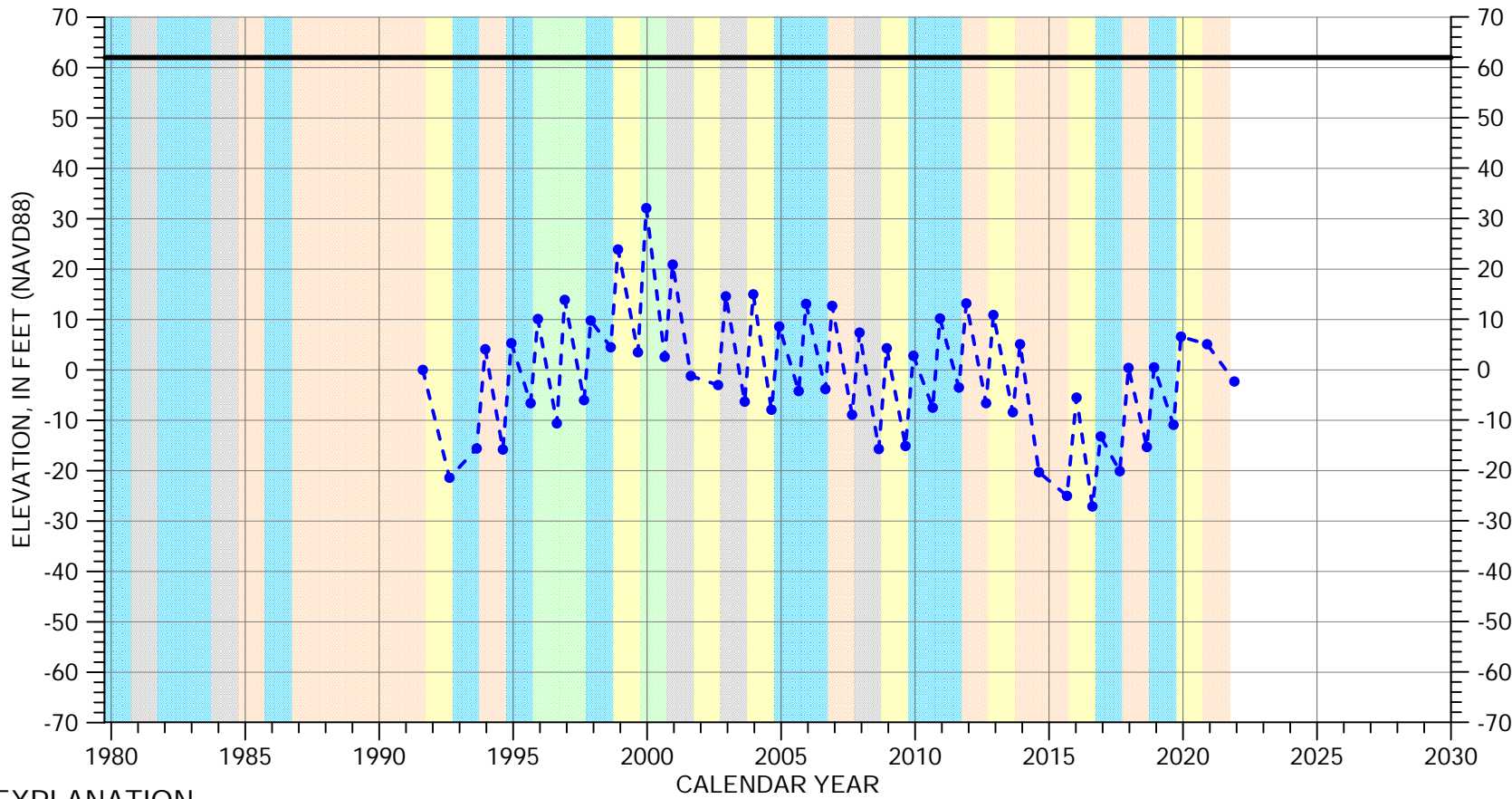
Multiple perforated intervals from -61 to -291 feet msl



Well bottom -320 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-26A01

180/400-Foot Aquifer Subbasin

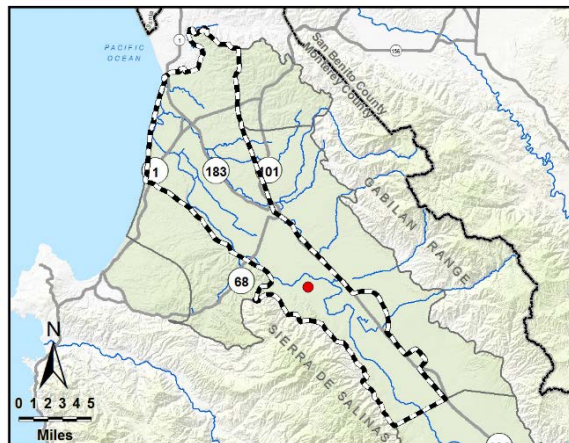


EXPLANATION

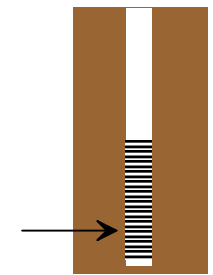
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



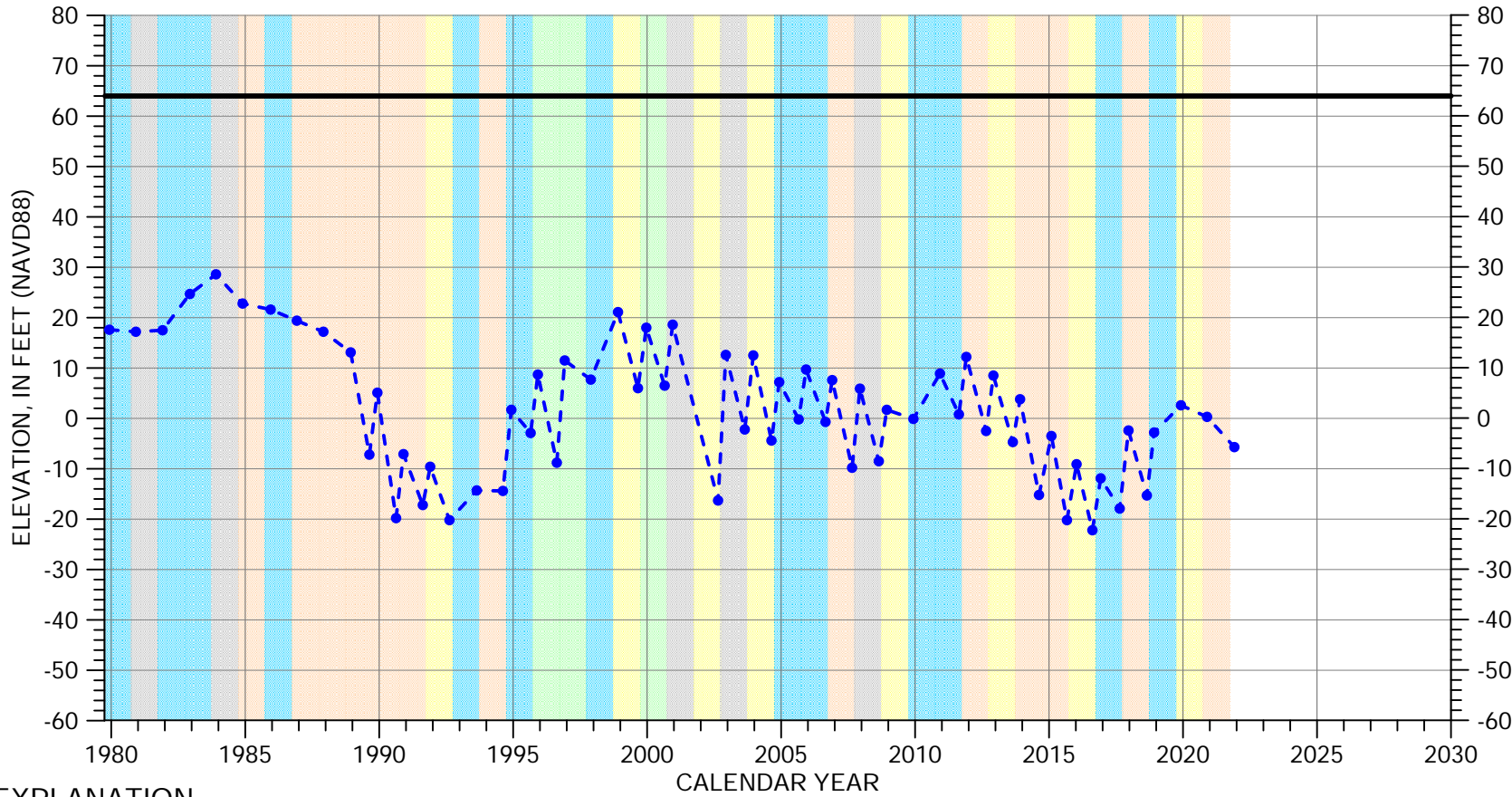
Multiple perforated intervals from -276 to -483 feet msl



Well bottom -513 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-26F01

180/400-Foot Aquifer Subbasin

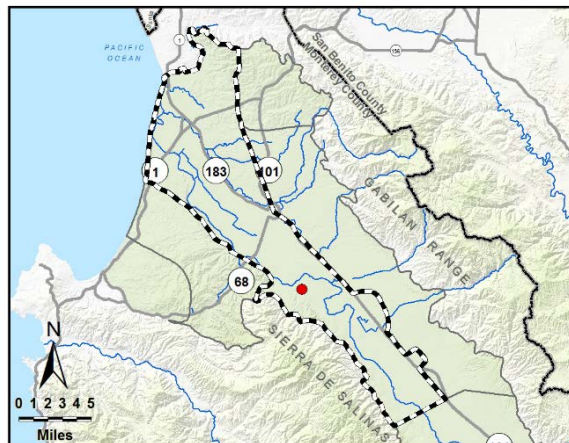


EXPLANATION

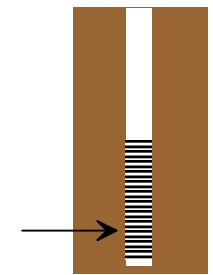
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



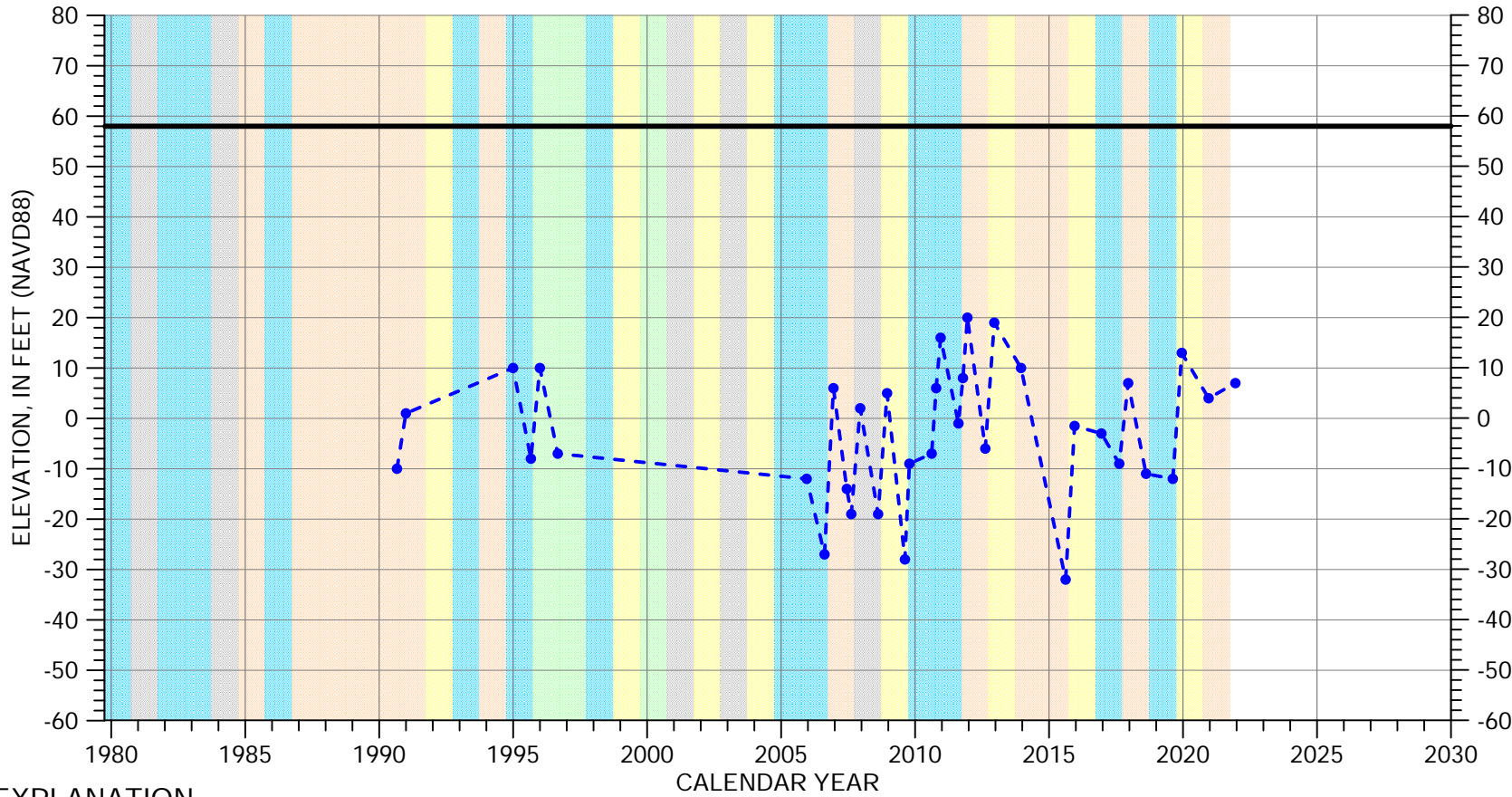
Multiple perforated intervals from -178 to -232 feet msl



Well bottom -254 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-28B02

180/400-Foot Aquifer Subbasin

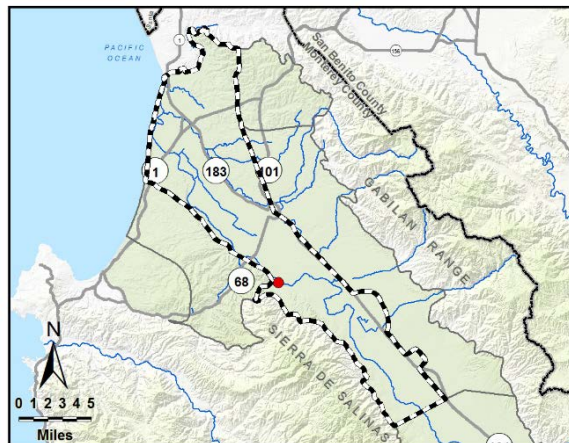


EXPLANATION

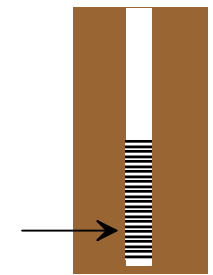
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



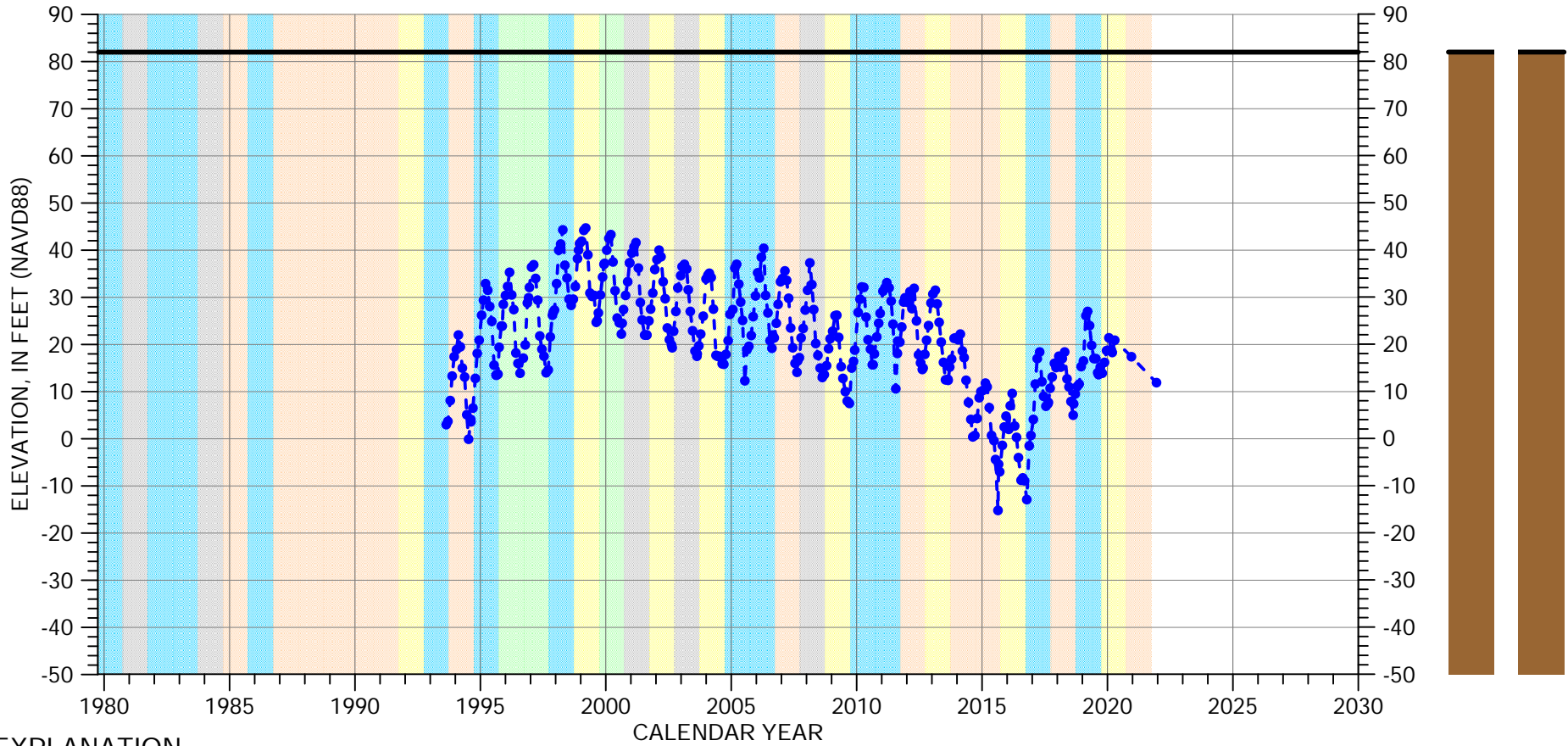
Multiple perforated intervals from -343 to -395 feet msl



Well bottom -420 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/04E-29Q02

180/400-Foot Aquifer Subbasin

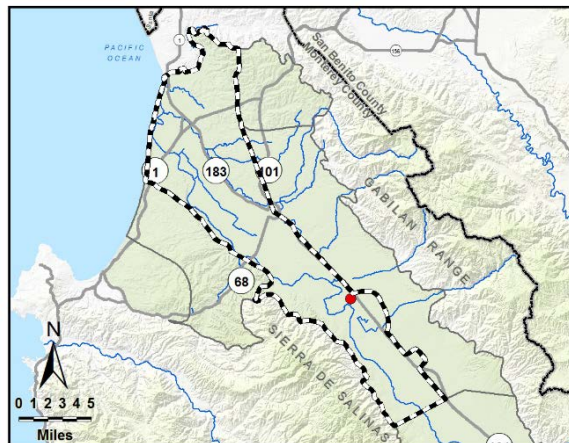


EXPLANATION

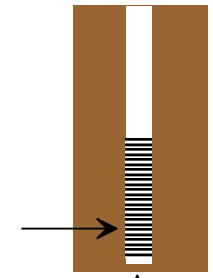
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



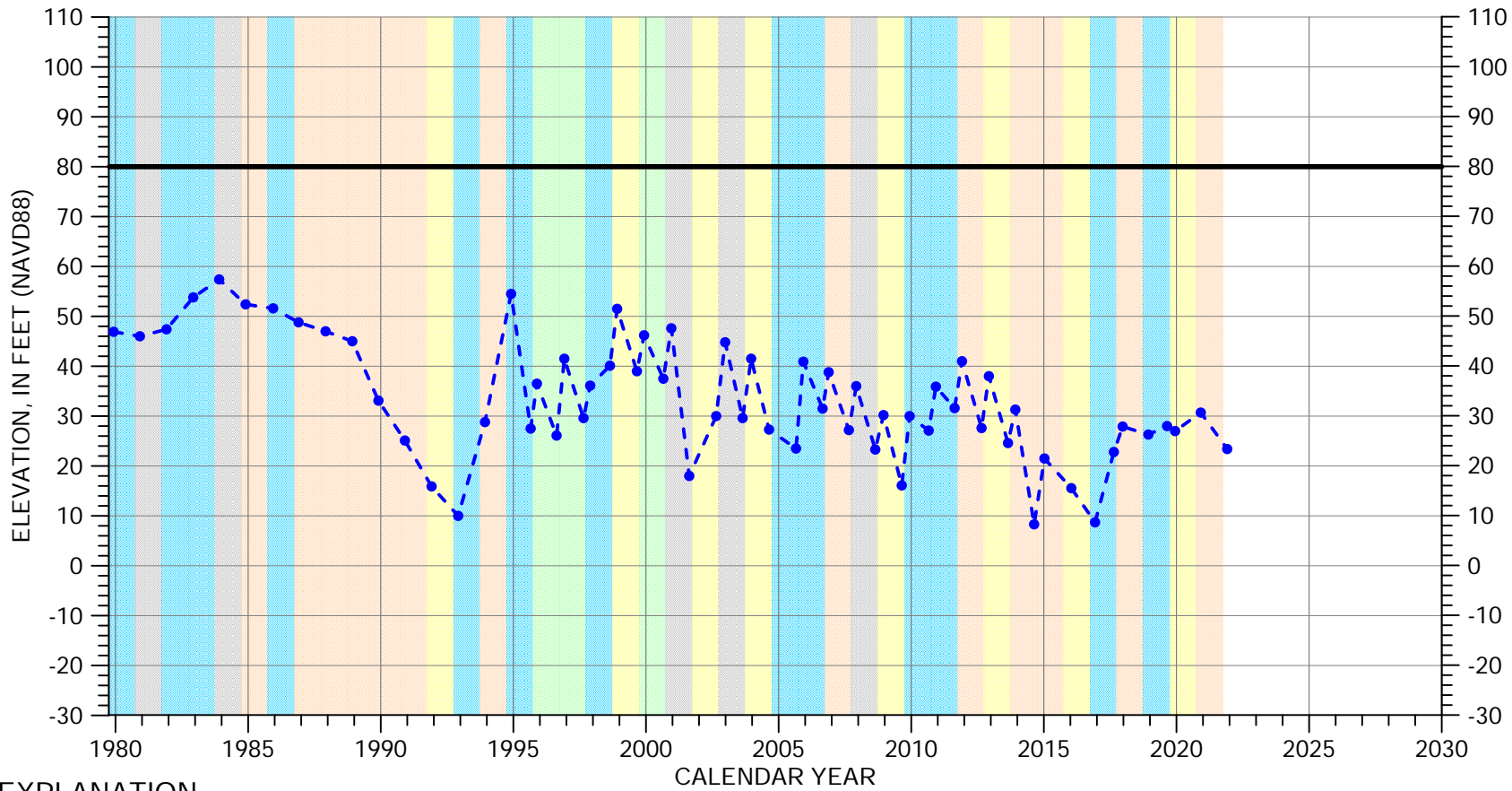
Multiple perforated intervals from -147 to -257 feet msl



Well bottom -473 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/04E-31A02

180/400-Foot Aquifer Subbasin

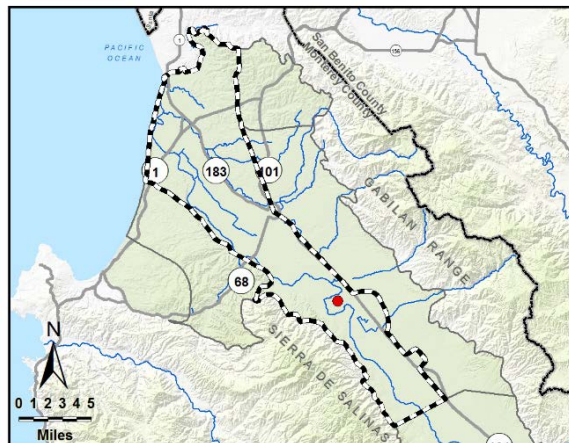


EXPLANATION

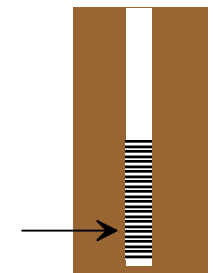
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



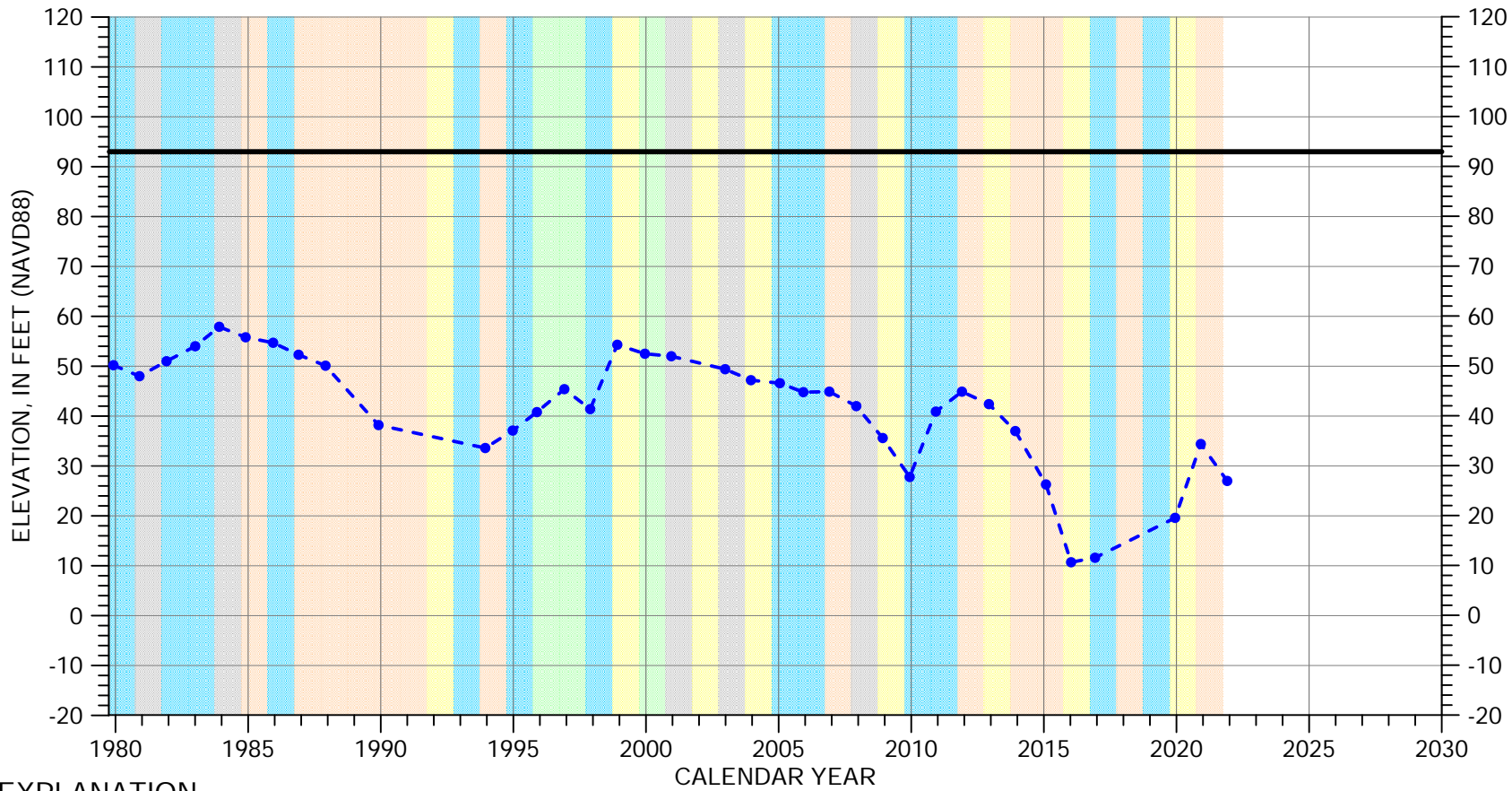
Multiple perforated intervals from -141 to -250 feet msl



Well bottom -258 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-04C01

180/400-Foot Aquifer Subbasin

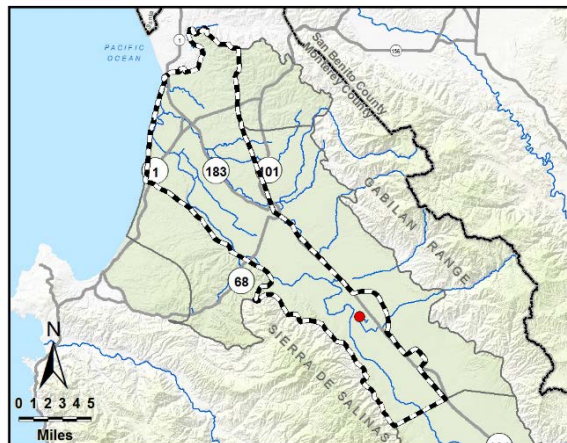


EXPLANATION

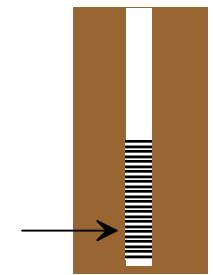
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



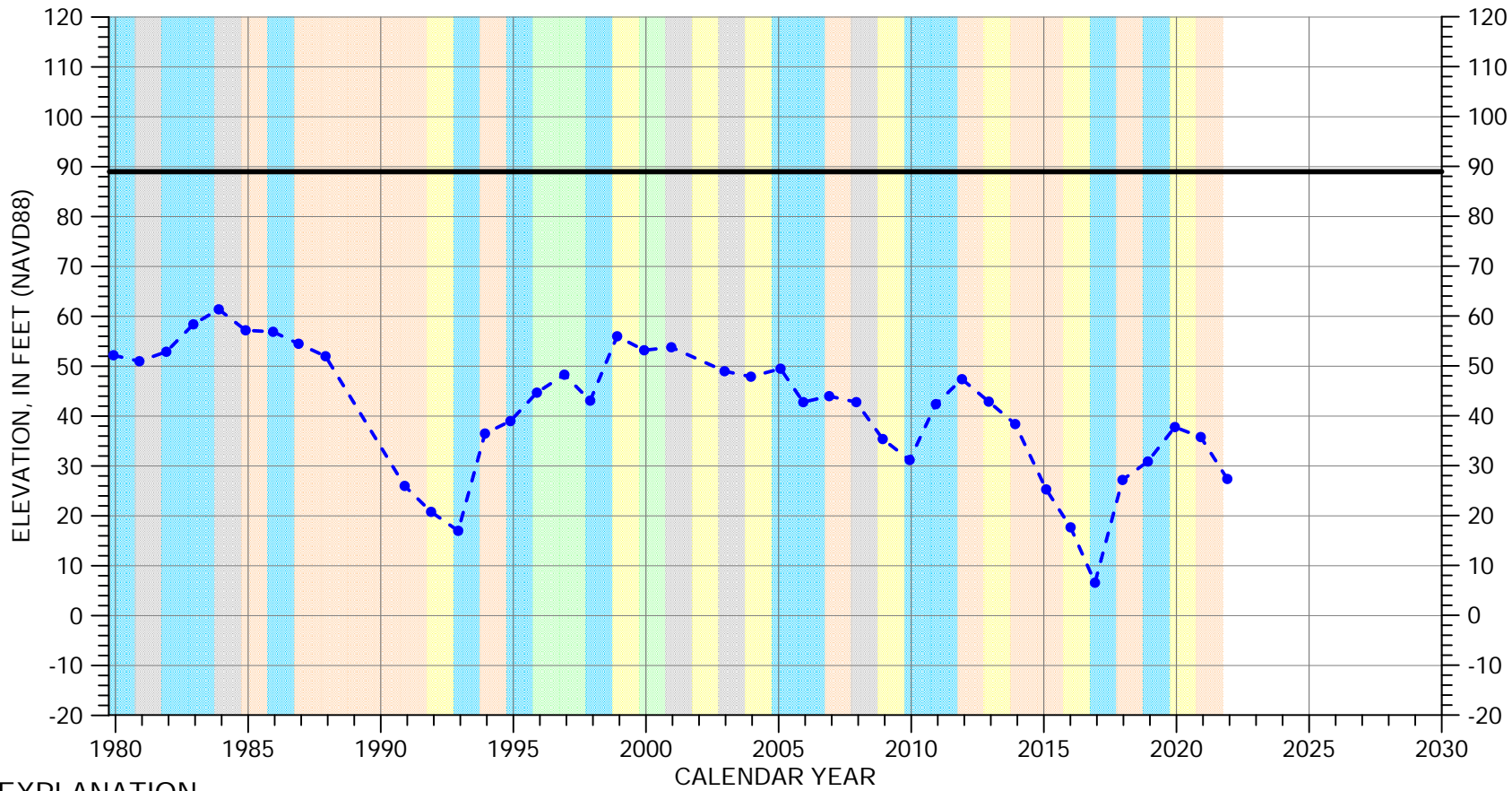
Multiple perforated intervals from -228 to -372 feet msl



Well bottom -379 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-05M02

180/400-Foot Aquifer Subbasin

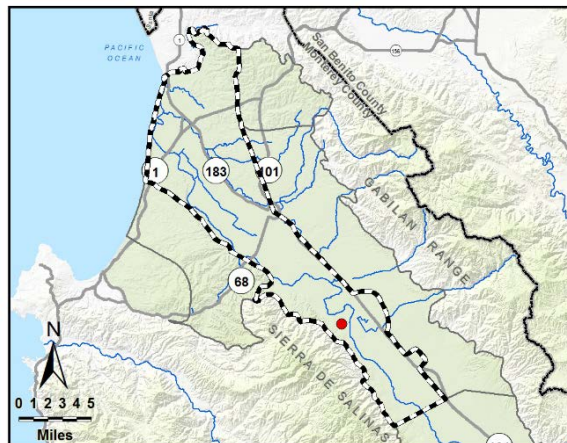


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



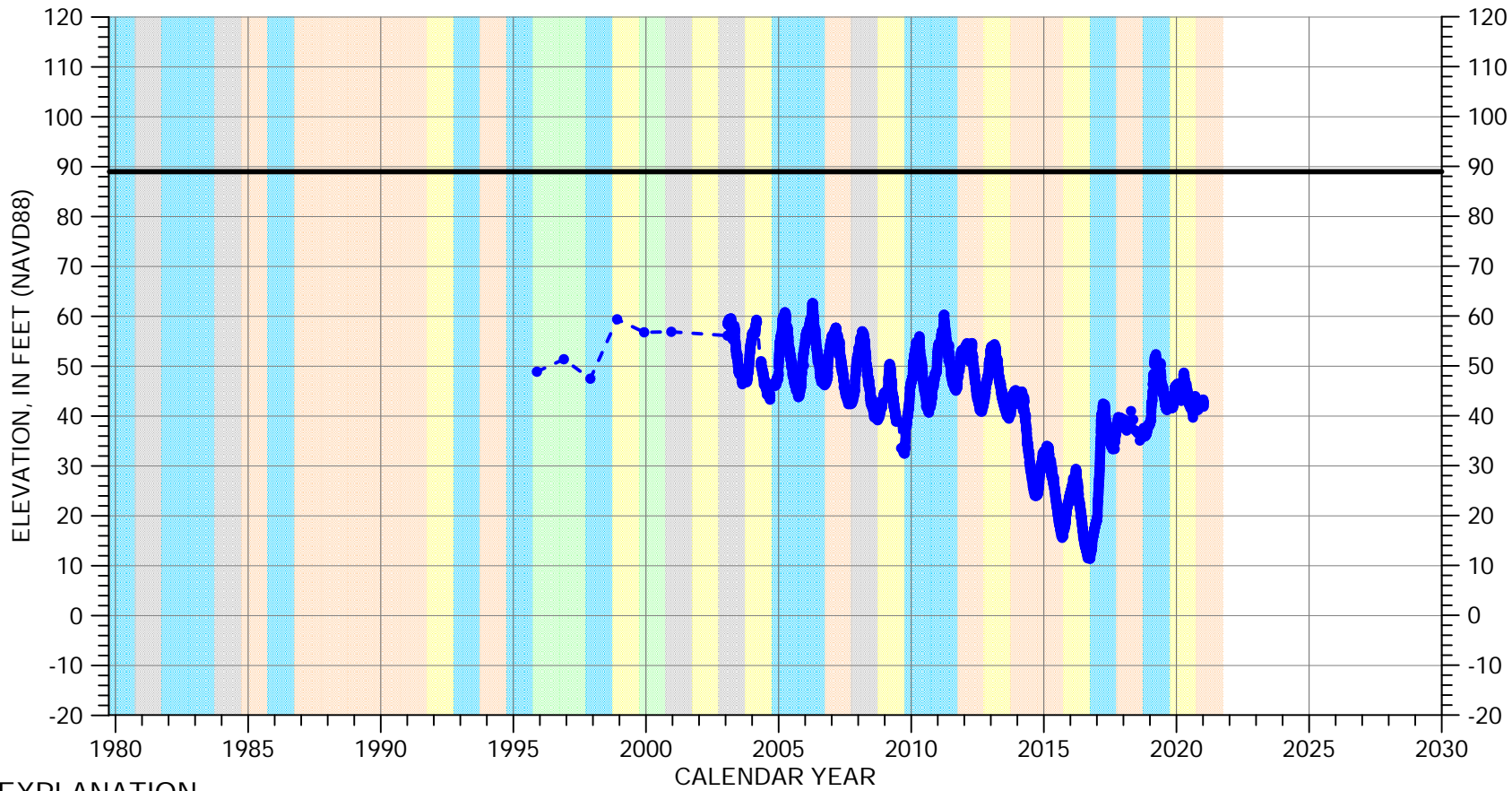
Perforated interval
unknown



Well bottom
-178 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-08H03

180/400-Foot Aquifer Subbasin

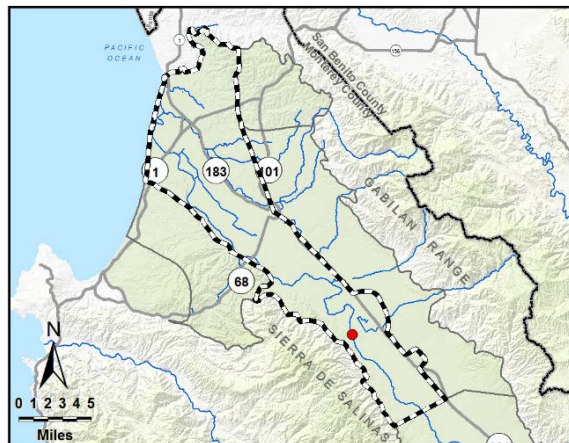


EXPLANATION

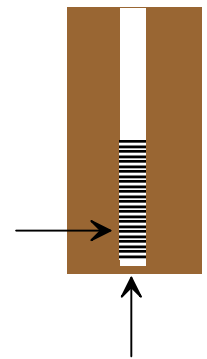
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



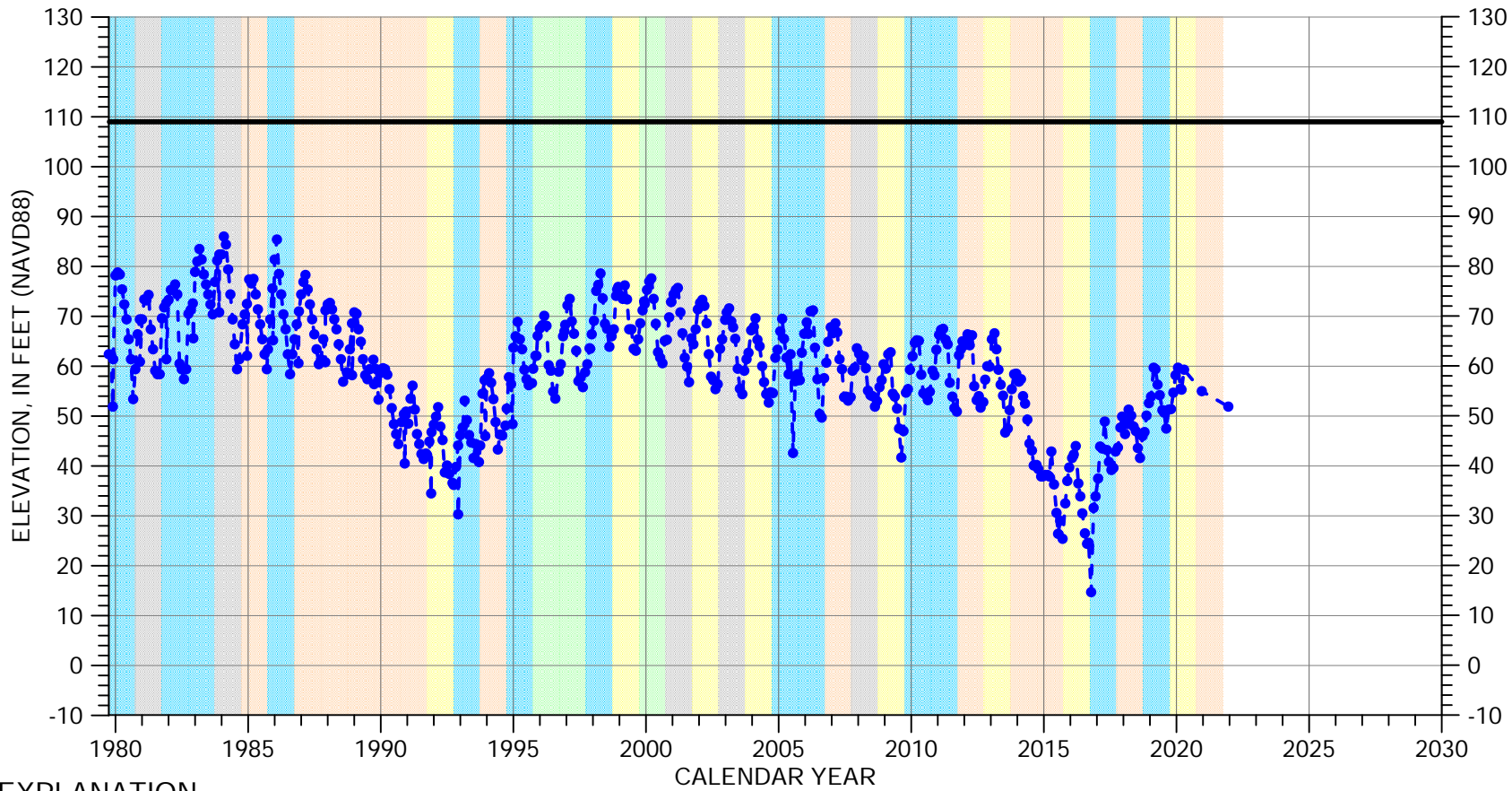
Perforated from
-152 to -202 feet msl



Well bottom
-207 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-10R02

180/400-Foot Aquifer Subbasin

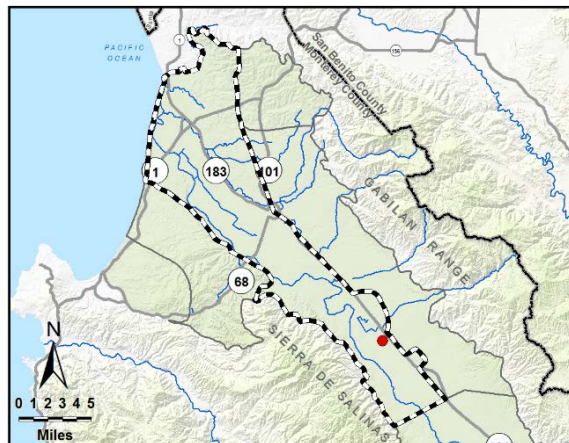


EXPLANATION

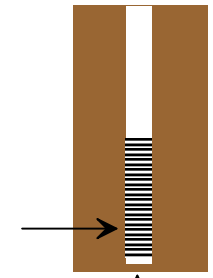
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------|--------------|
| Orange | DRY | Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Cyan | WET |
| Grey | NORMAL | | |



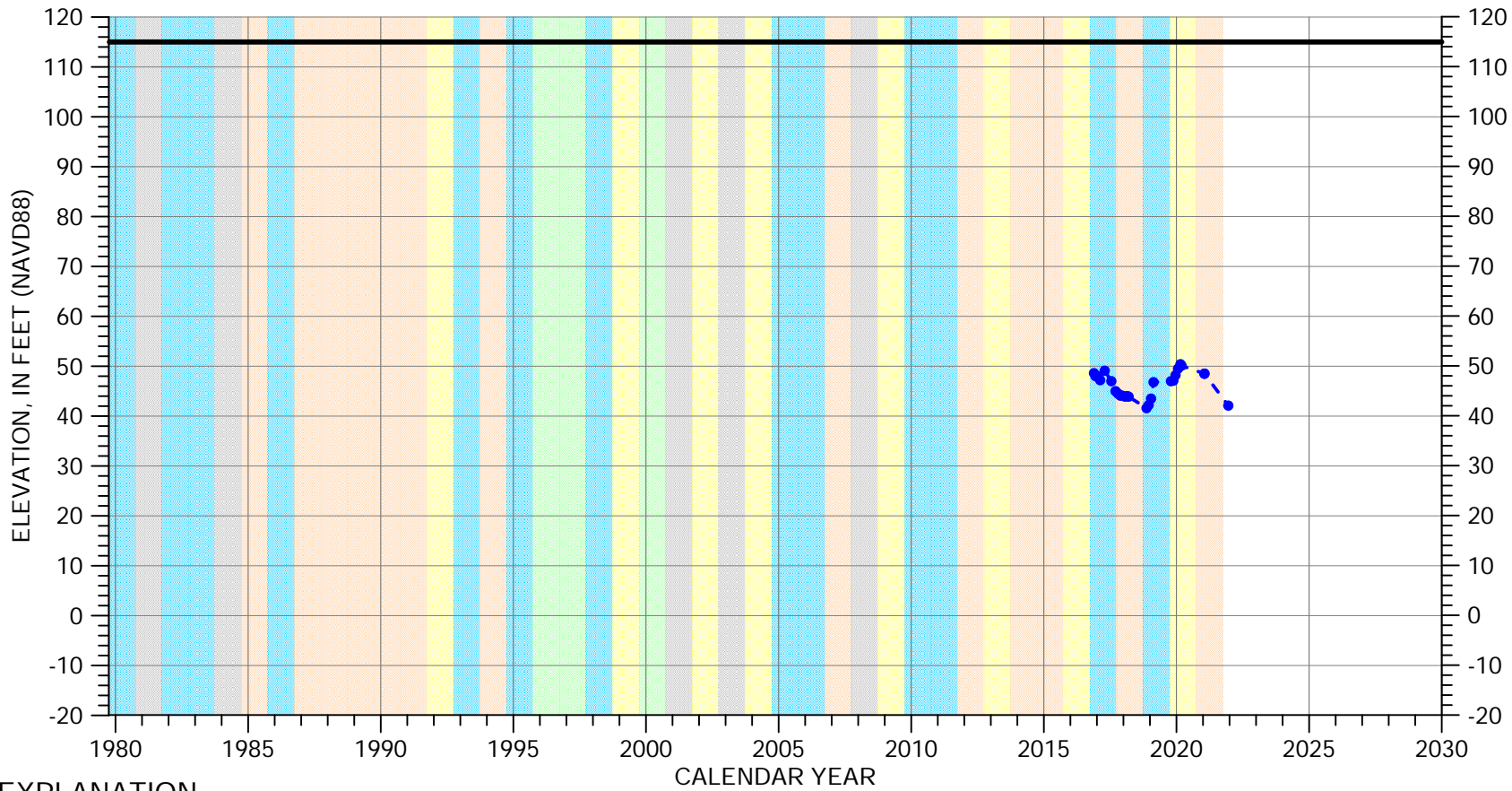
Multiple perforated intervals from -103 to -368 feet msl



Well bottom -375 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-11D51

180/400-Foot Aquifer Subbasin

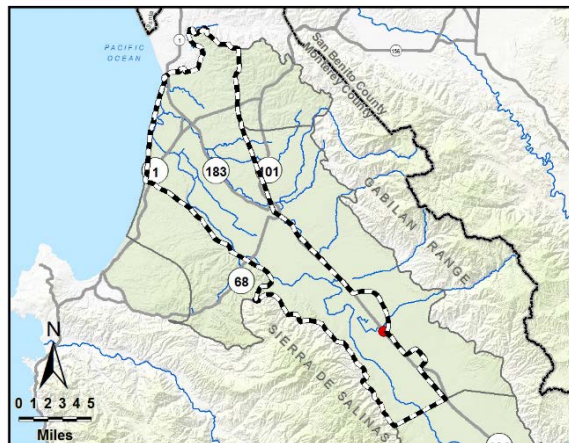


EXPLANATION

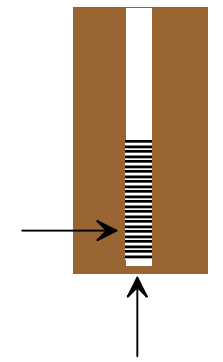
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| <ul style="list-style-type: none"> DRY DRY - NORMAL NORMAL | <ul style="list-style-type: none"> WET - NORMAL WET |
|---|---|



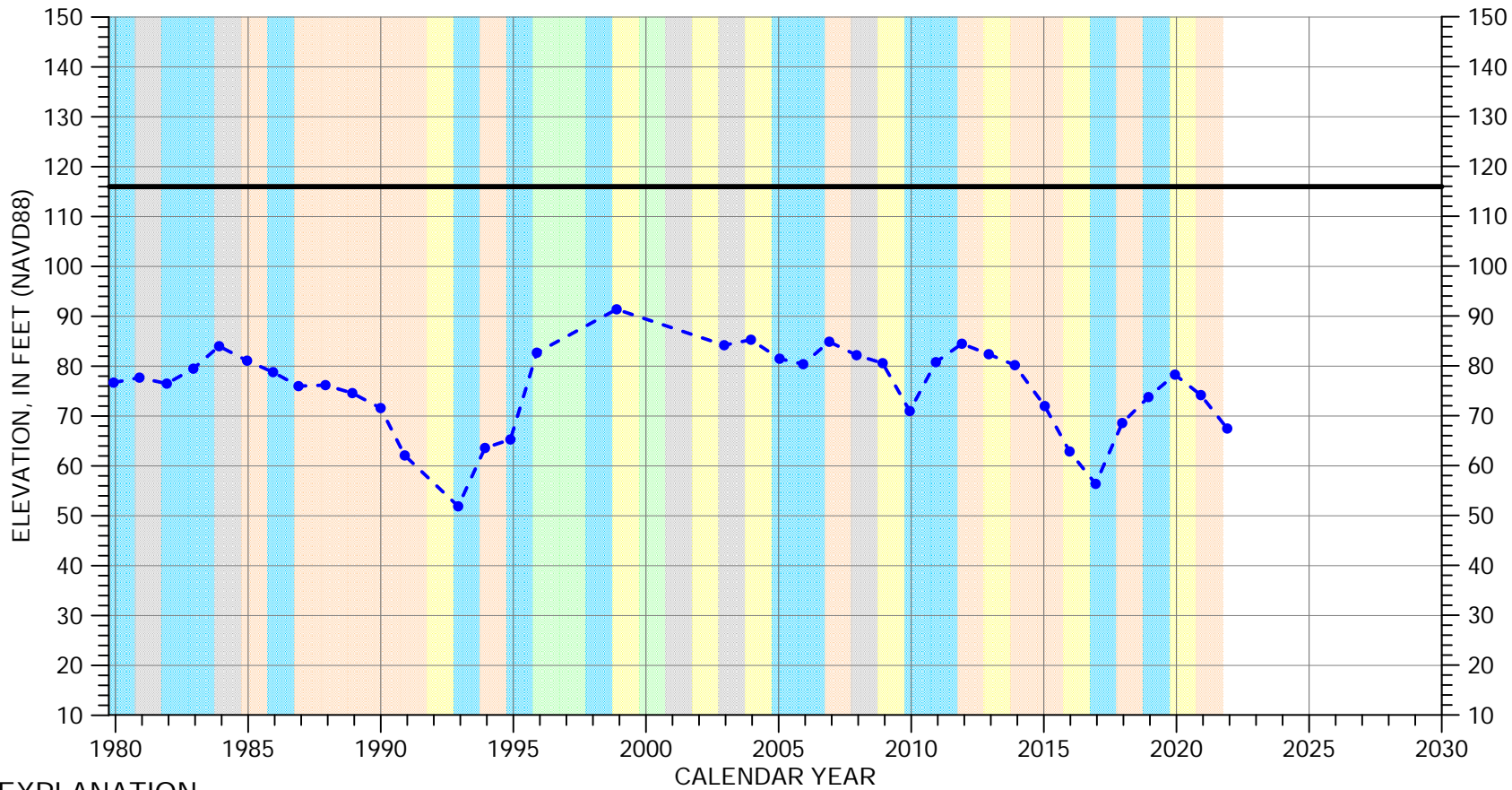
Perforated from
-425 to -875 feet msl



Well bottom
-885 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-13R02

180/400-Foot Aquifer Subbasin

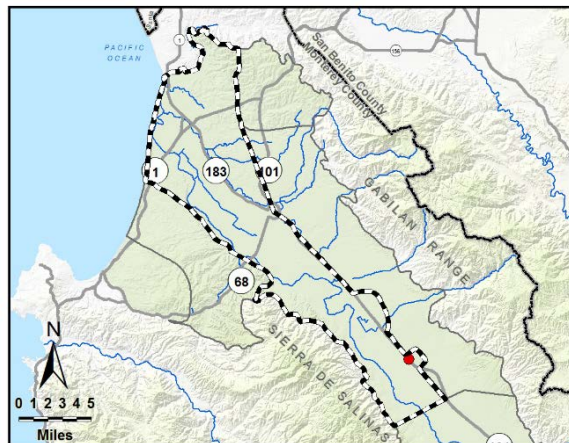


EXPLANATION

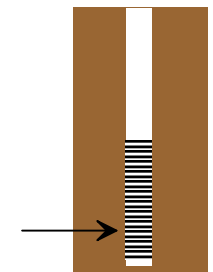
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



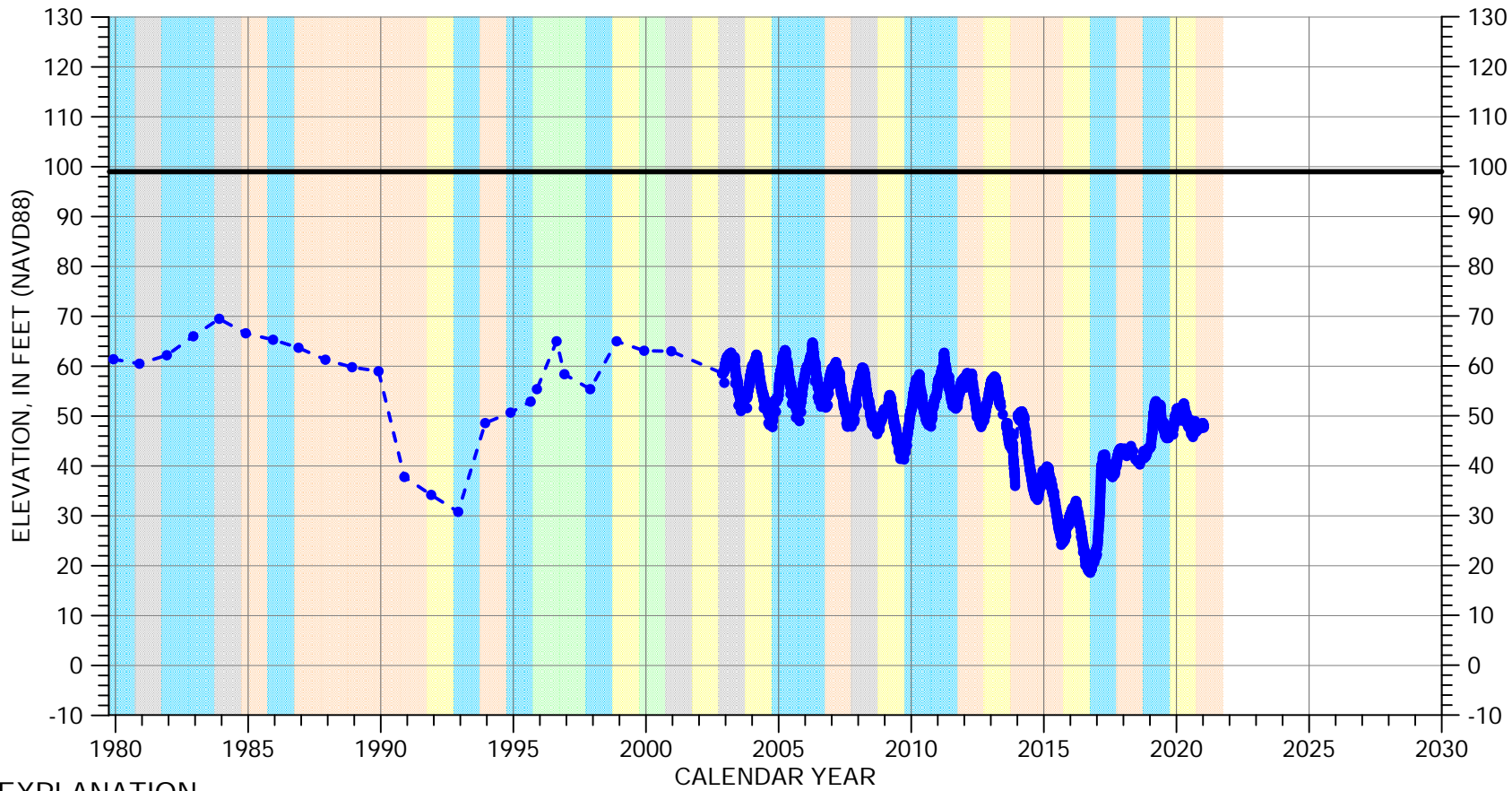
Multiple perforated intervals from -17 to -160 feet msl



Well bottom -161 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-15D01

180/400-Foot Aquifer Subbasin

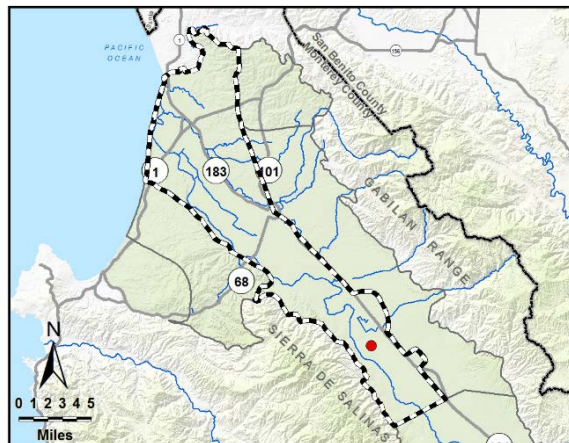


EXPLANATION

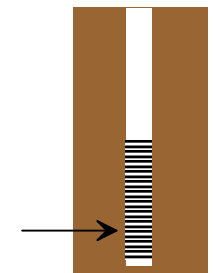
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



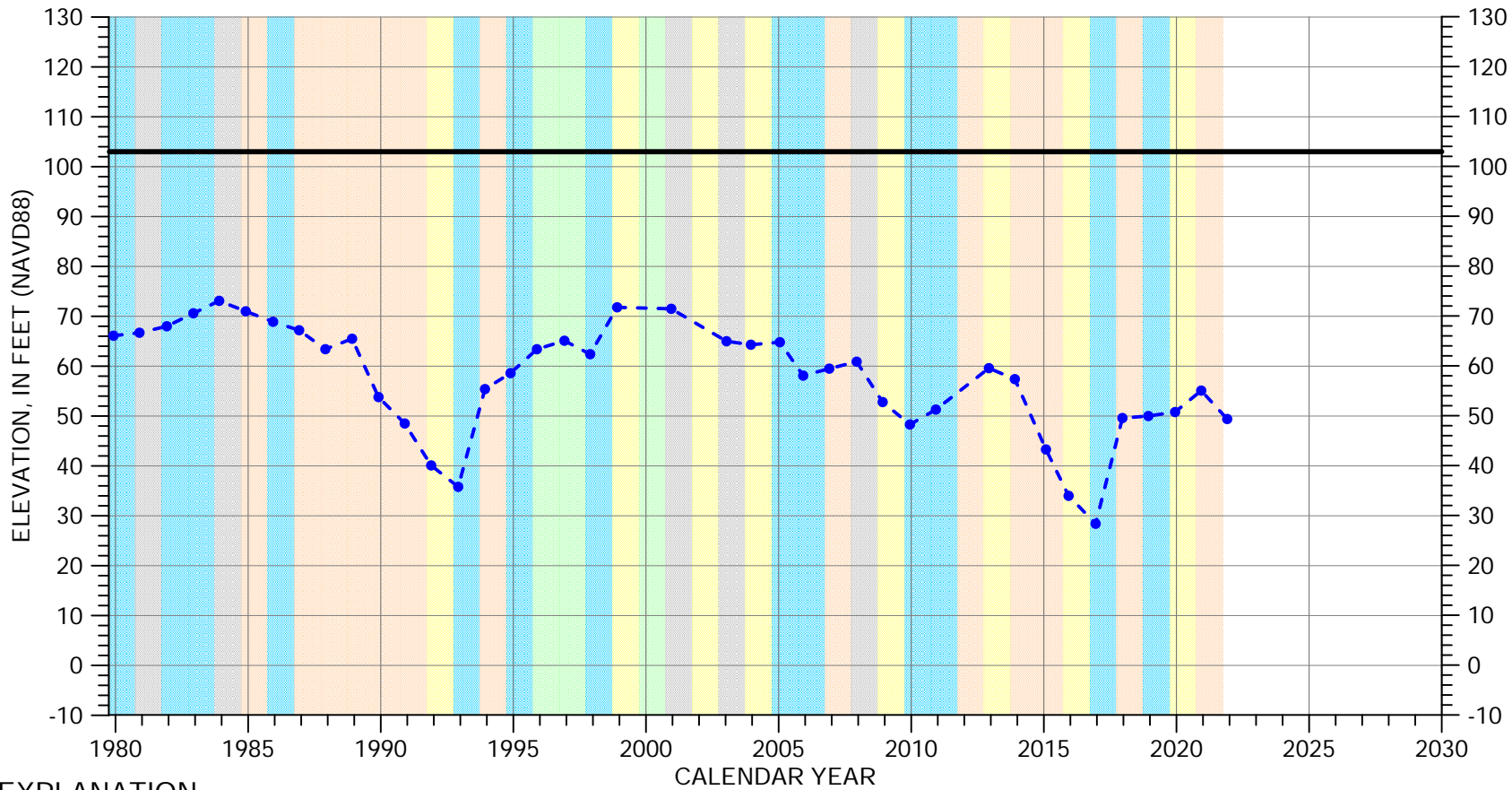
Perforated from
-71 to -259 feet msl



Well bottom
-285 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-15R02

180/400-Foot Aquifer Subbasin

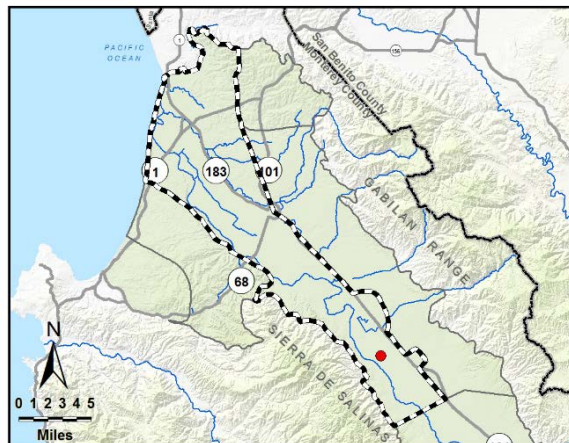


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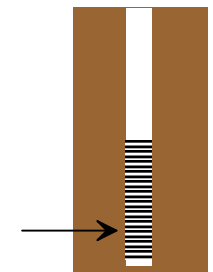
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



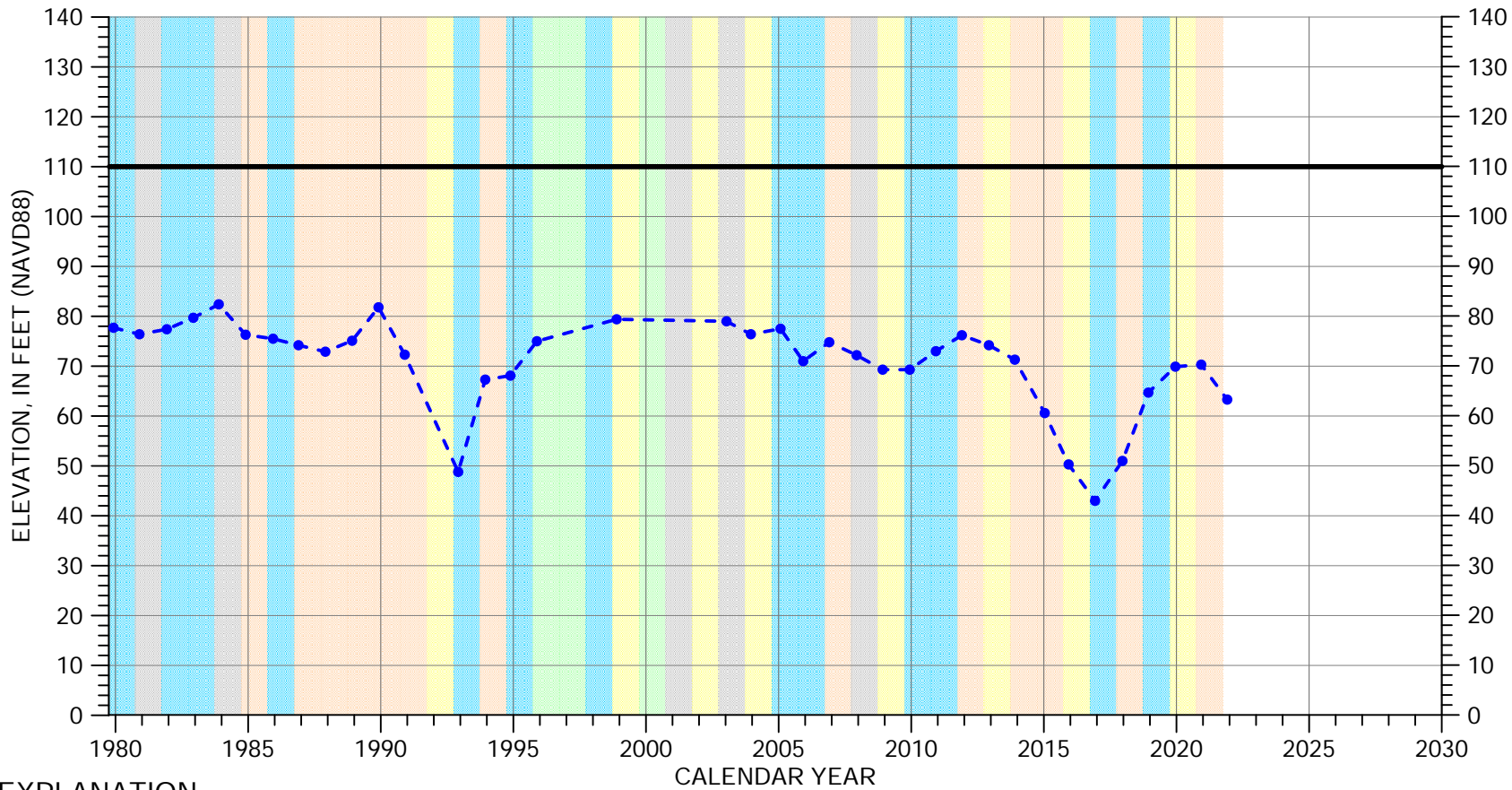
Multiple perforated intervals from -12 to -80 feet msl



Well bottom -200 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-25G01

180/400-Foot Aquifer Subbasin

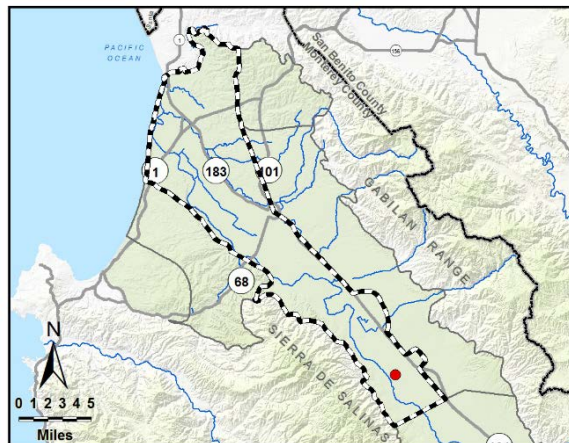


EXPLANATION

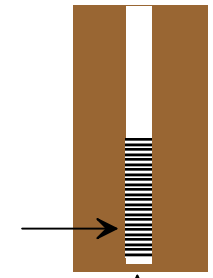
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



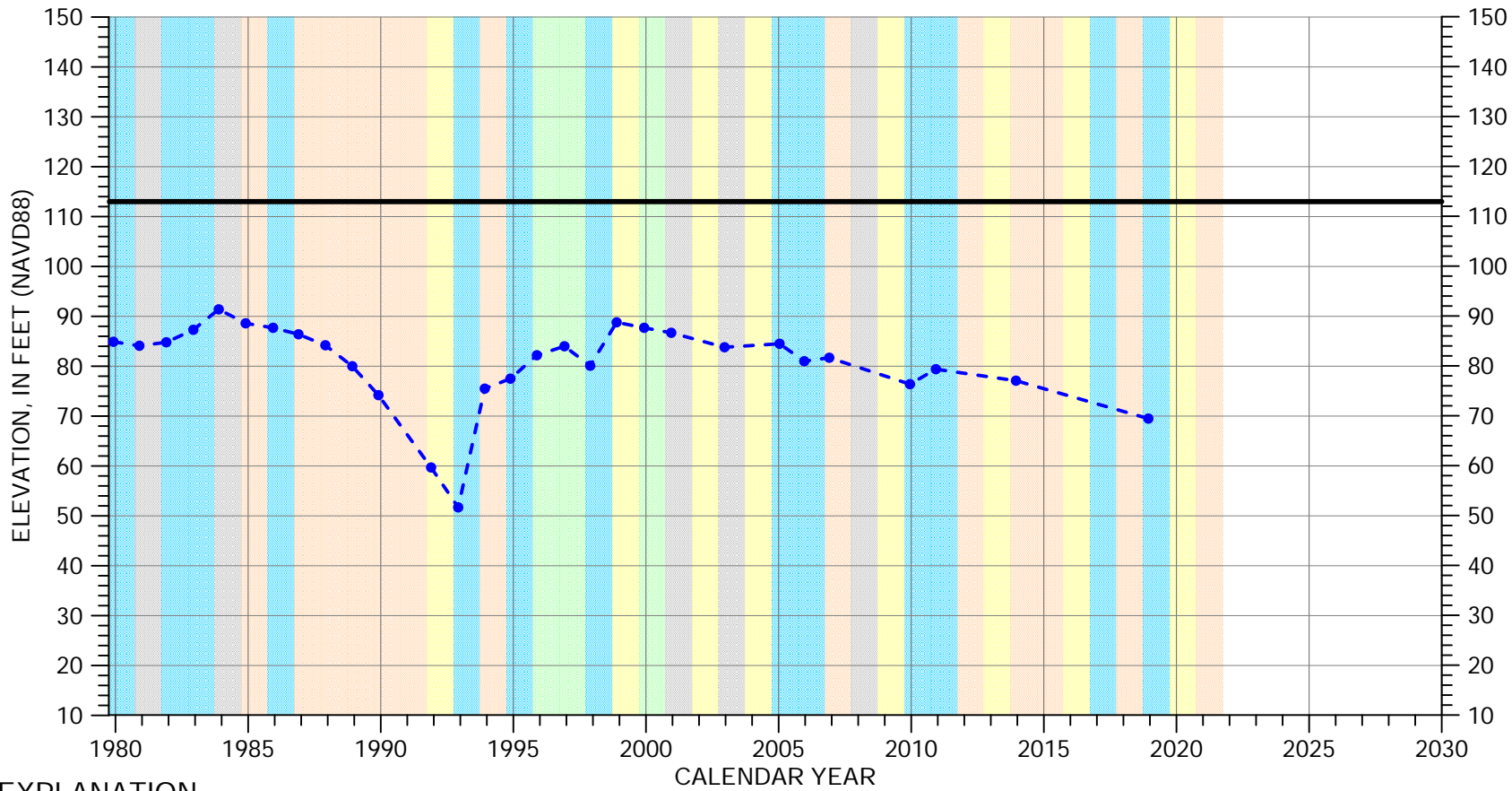
Multiple perforated intervals from -322 to -438 feet msl



Well bottom -452 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-27B02

180/400-Foot Aquifer Subbasin

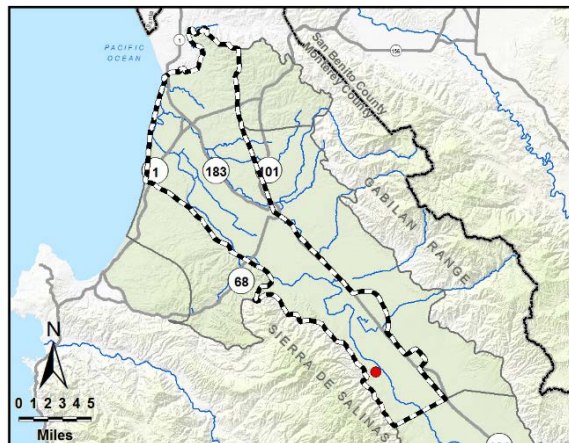


EXPLANATION

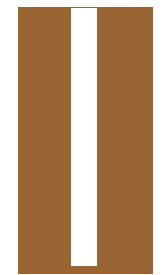
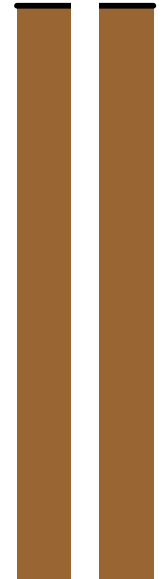
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



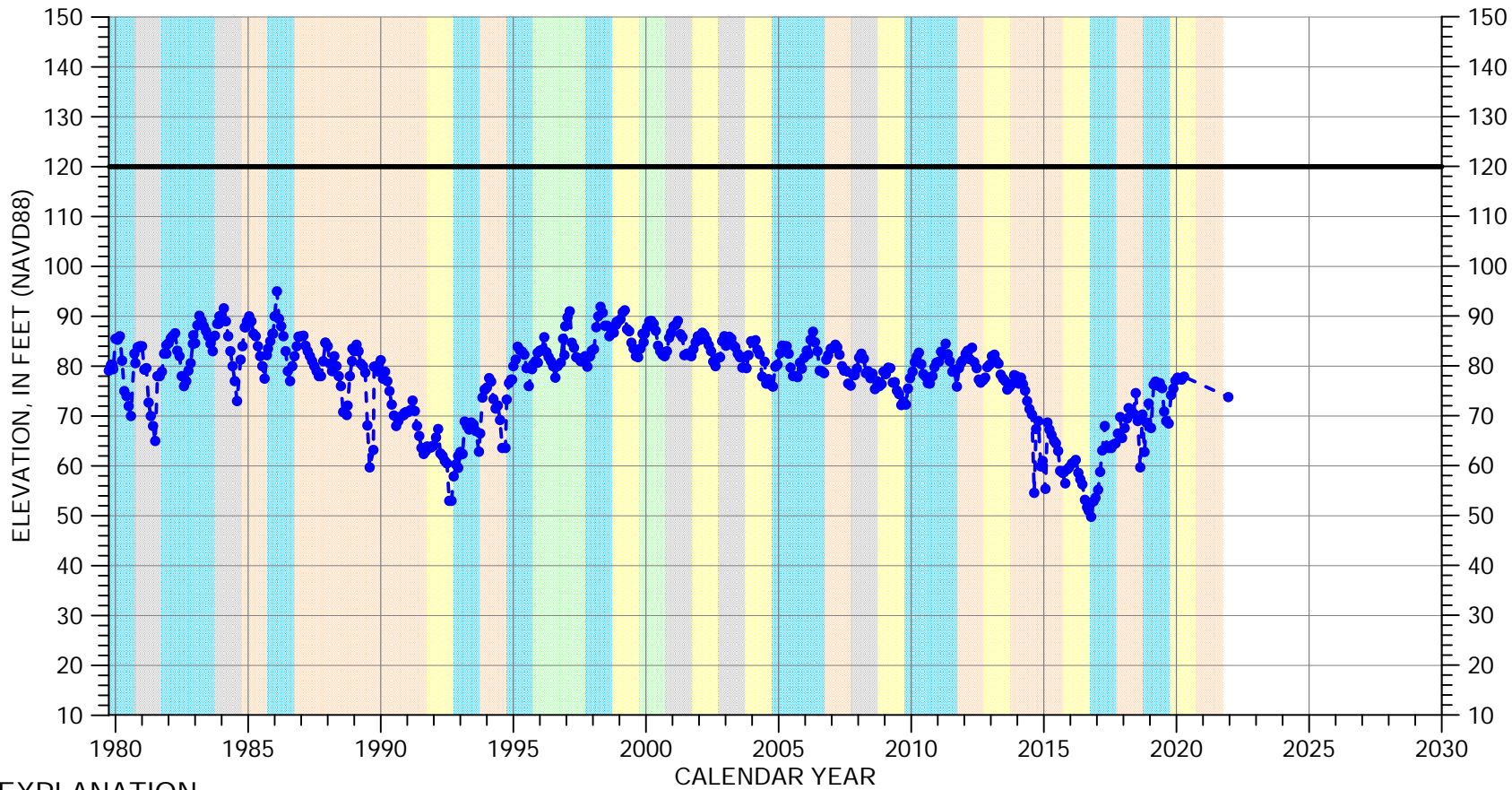
Perforated interval
unknown



Well bottom
-192 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/05E-30E01

180/400-Foot Aquifer Subbasin

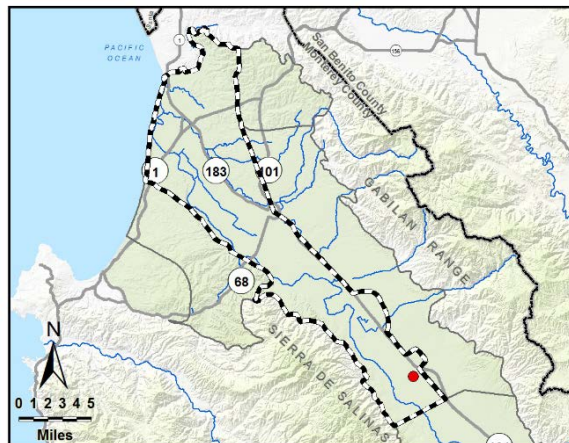


EXPLANATION

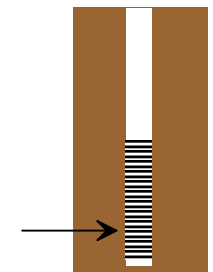
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



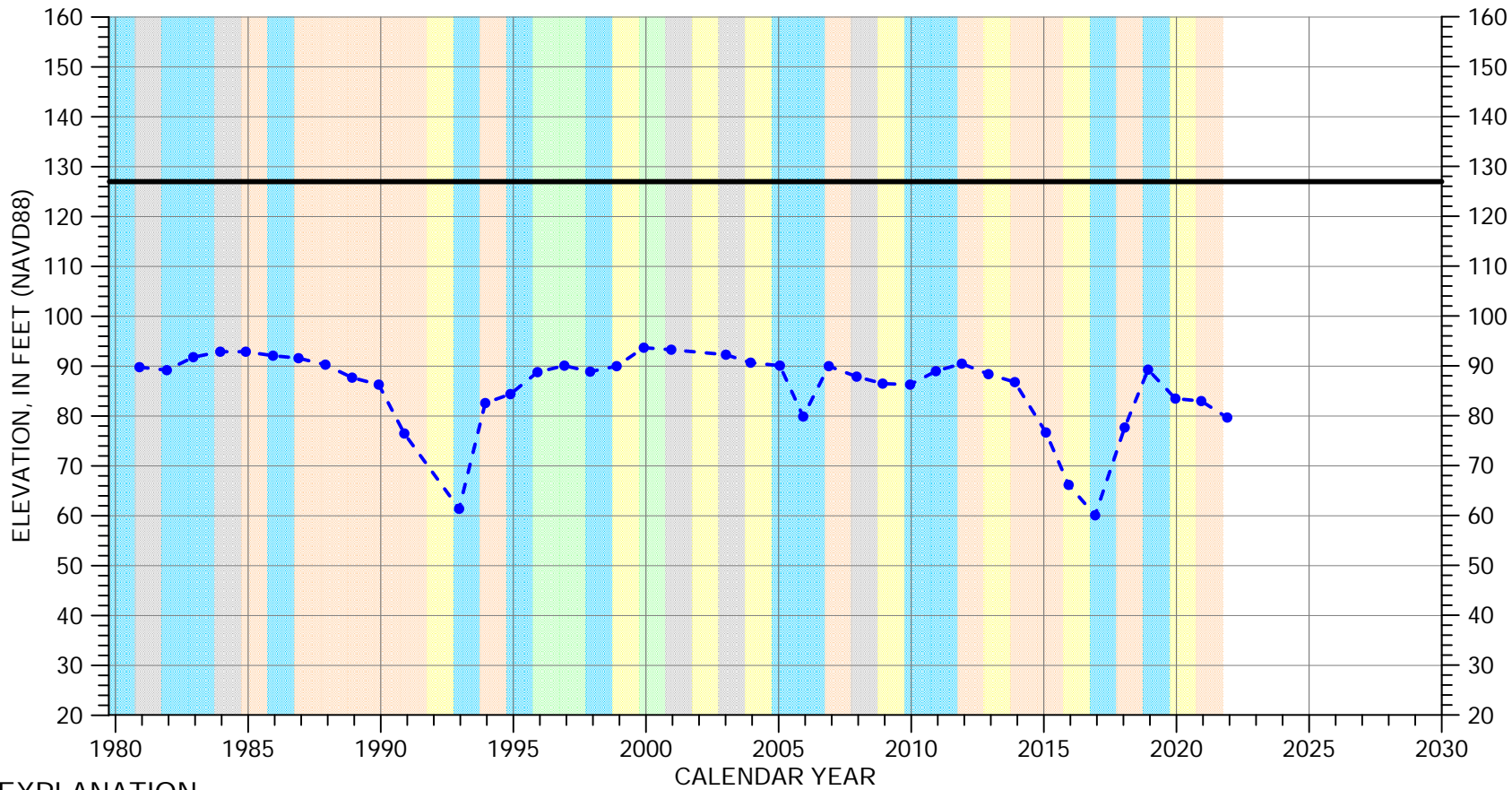
Multiple perforated intervals from -5 to -145 feet msl



Well bottom -145 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/05E-30J02

180/400-Foot Aquifer Subbasin

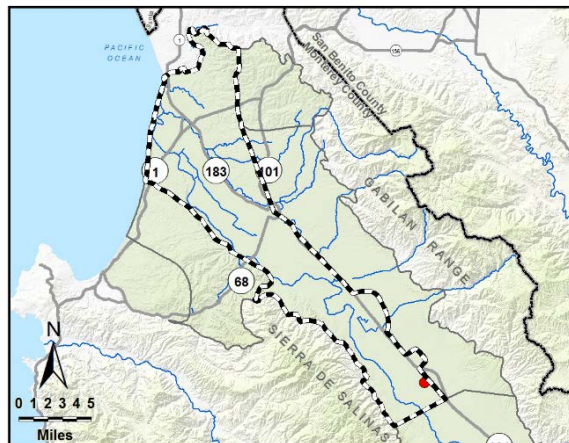


EXPLANATION

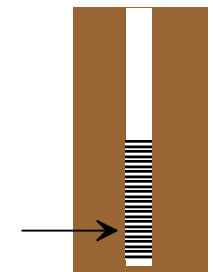
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



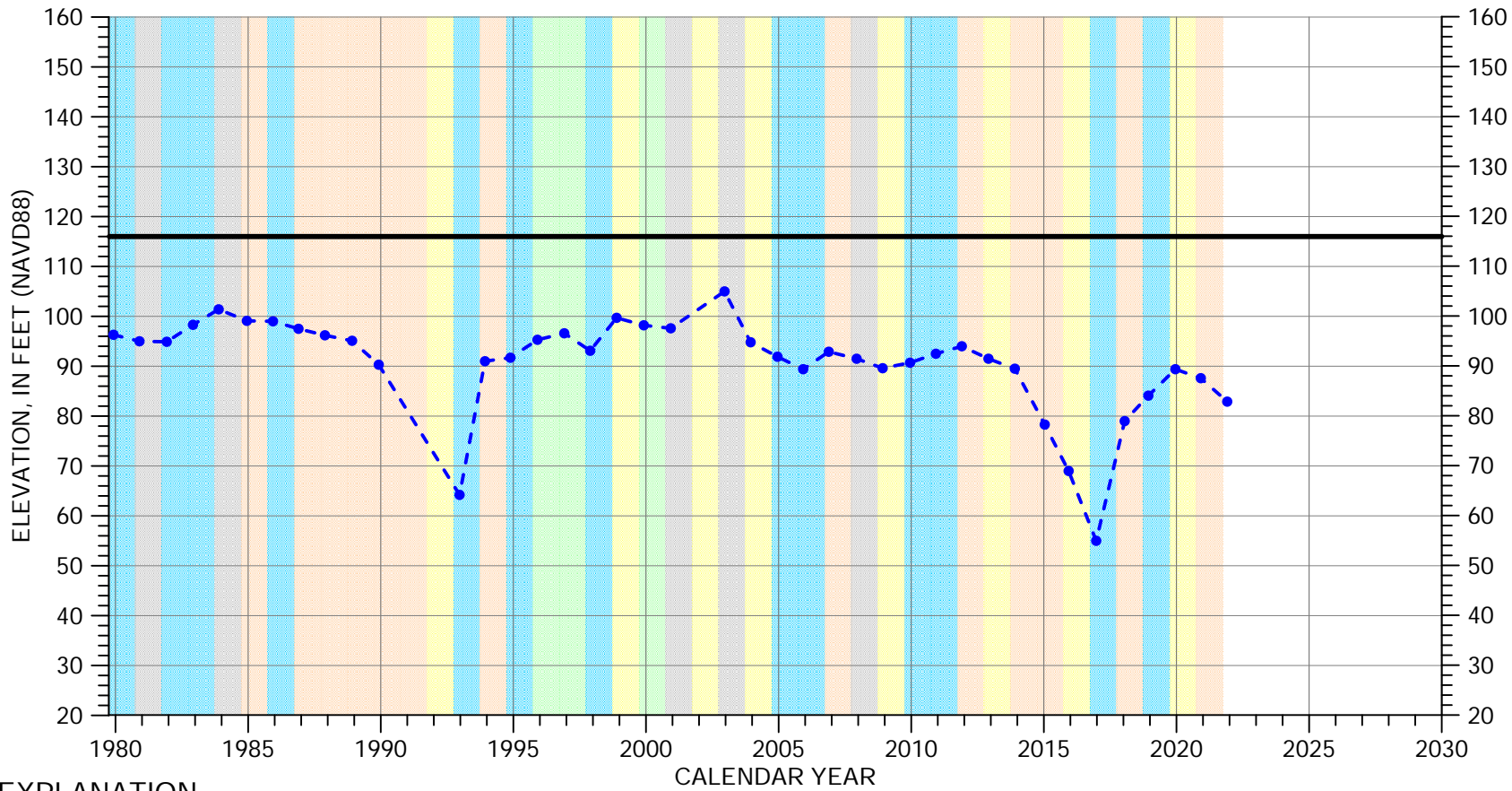
Multiple perforated intervals from -63 to -308 feet msl



Well bottom -316 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/05E-31M01

180/400-Foot Aquifer Subbasin

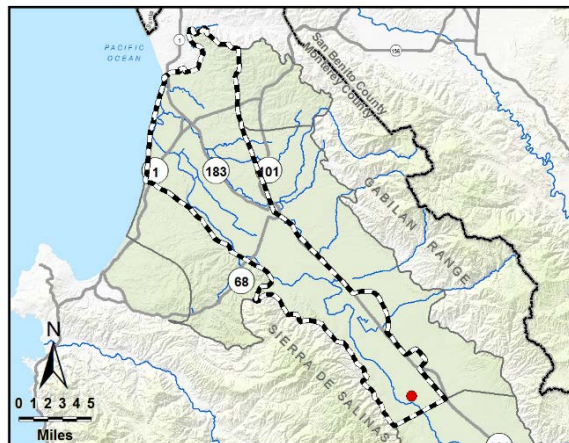


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | | | |
|--|--------------|--|--------------|
| | DRY | | WET - NORMAL |
| | DRY - NORMAL | | WET |
| | NORMAL | | |



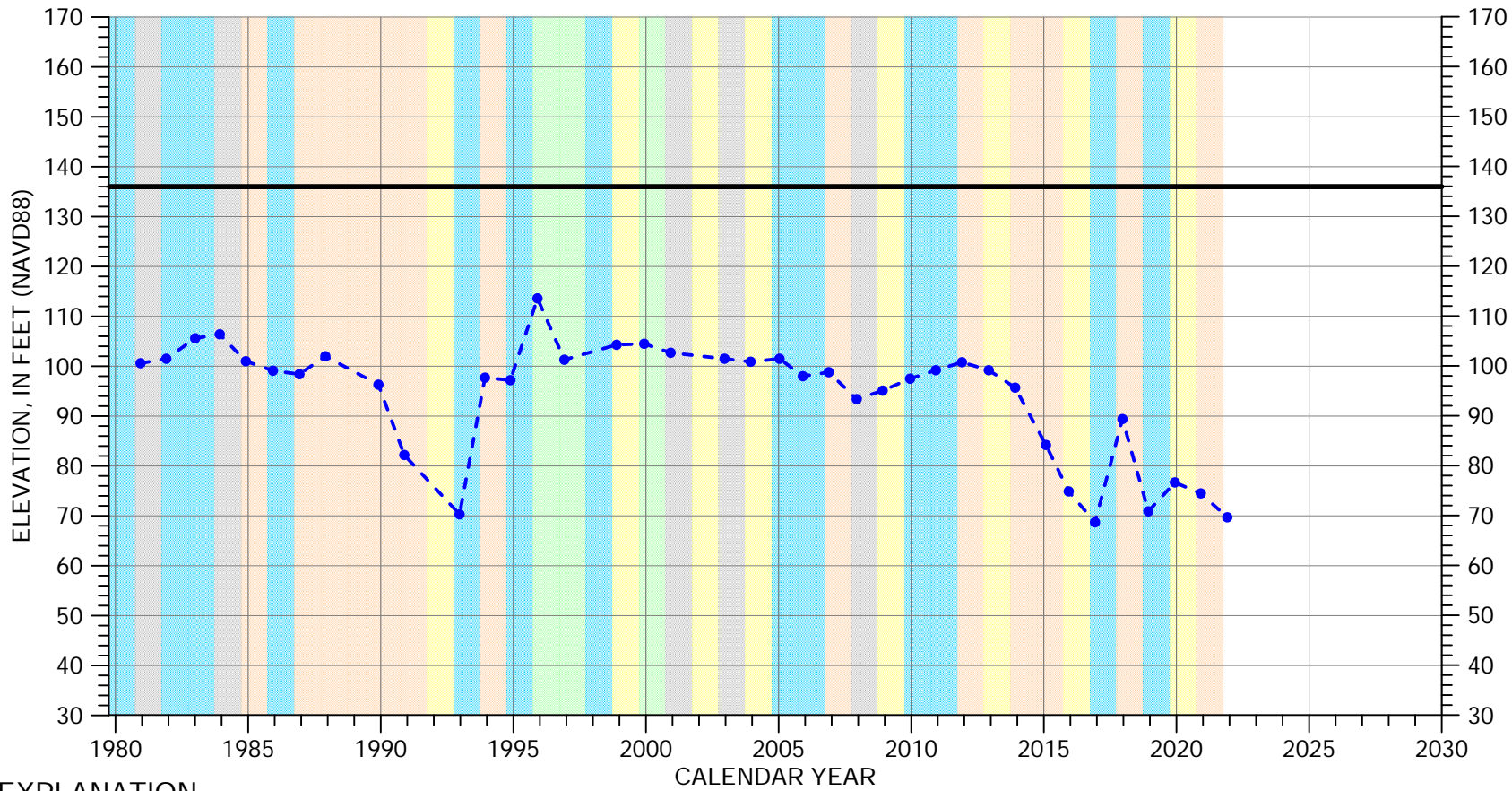
Perforated interval
unknown



Well bottom
-51 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 17S/04E-01D01

180/400-Foot Aquifer Subbasin

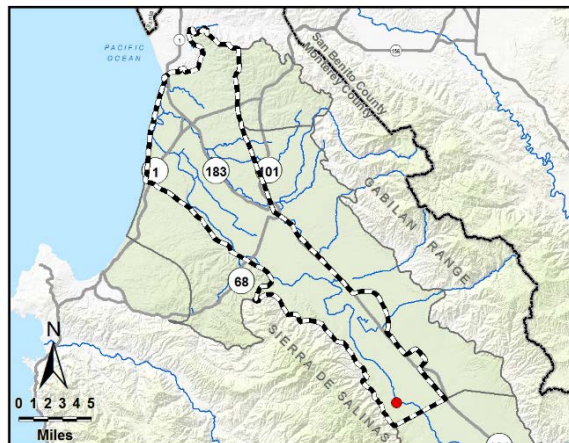


EXPLANATION

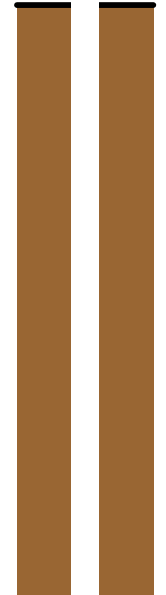
- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



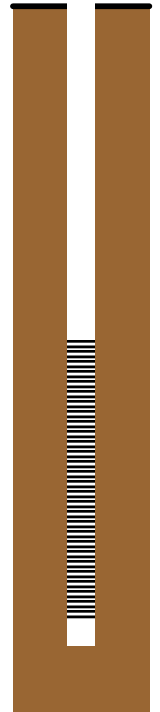
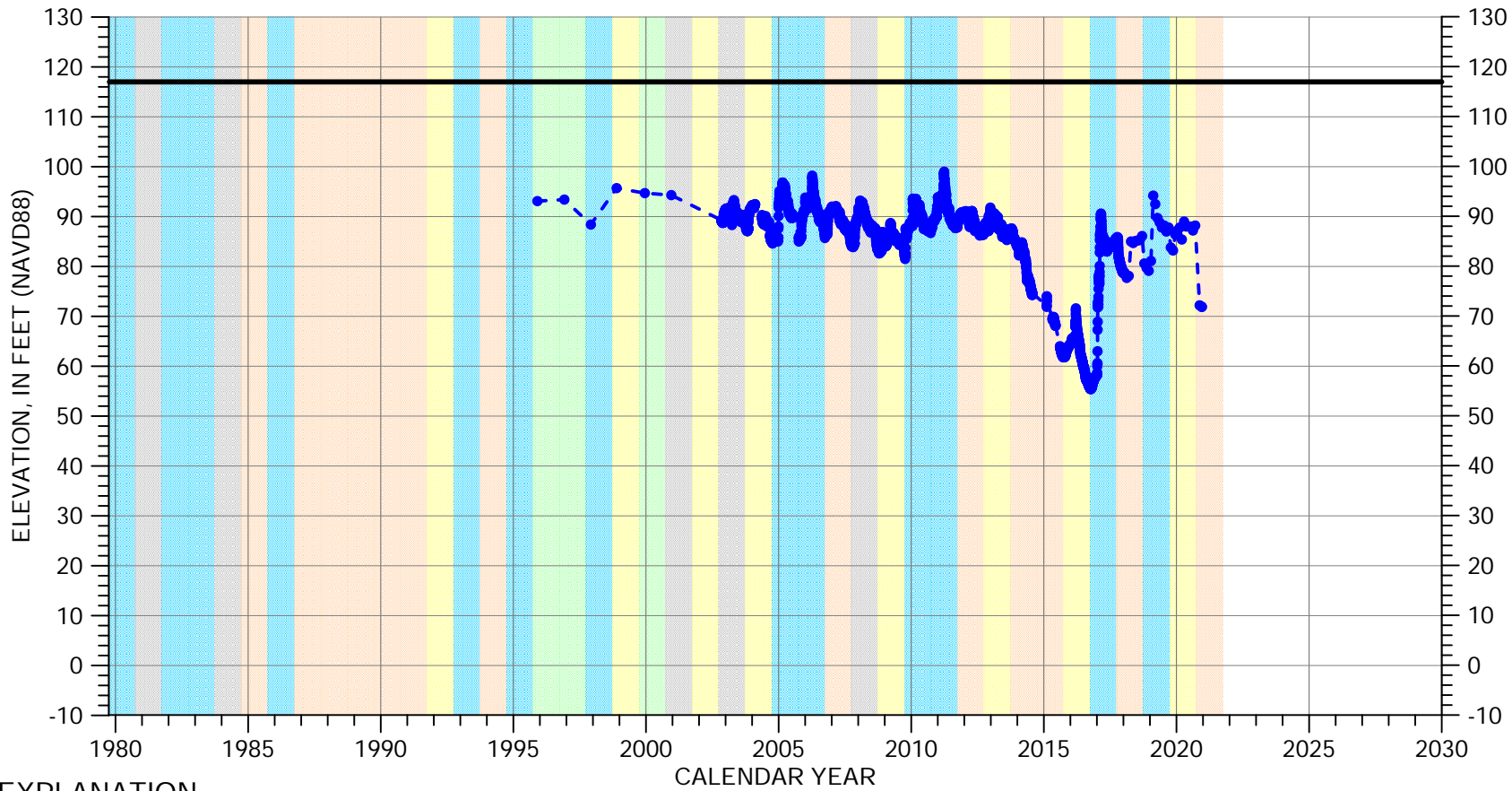
Perforated interval
unknown



Well bottom
-175 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 17S/05E-06C02

180/400-Foot Aquifer Subbasin

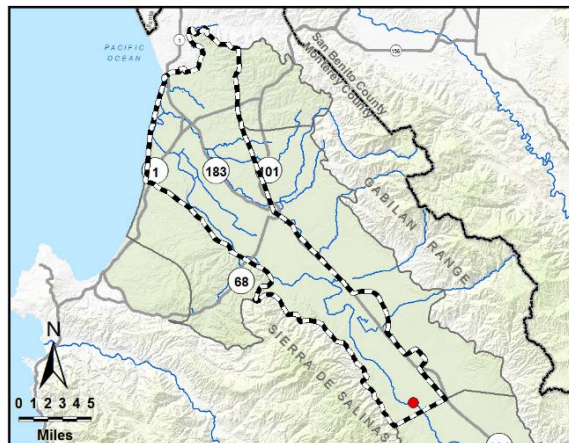


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



Chapter 5
Appendix 5-B

Storage Coefficient Description

AQUIFER STORAGE COEFFICIENTS USED IN GROUNDWATER STORAGE CHANGE CALCULATIONS FOR 180/400-FOOT AQUIFER SUBBASIN GSP UPDATE

The change in storage due to groundwater elevations in the non-seawater intruded part of the 180/400-Foot Aquifer Subbasin is based on the change in groundwater elevations. The observed groundwater elevation changes provide a measure of the amount of groundwater that has moved into and out of storage during a given time period. Aquifer properties that characterize the relationship between groundwater elevations and the amount of water stored in an aquifer are specific yield and specific storage. Specific yield is the ratio of the volume of water which a saturated porous medium will yield by gravity drainage to the volume of the porous medium (dimensionless units) (Lohman, 1972). Specific yield is generally applied to unconfined or “water table” aquifers. Specific storage is the volume of water released from or taken into storage per unit volume of a confined aquifer per unit change in head (units of 1/length) (Lohman, 1972).

Change in storage due to change in groundwater elevations is equal to the change in groundwater elevation multiplied by the non-intruded subbasin area multiplied by a storage coefficient. For confined aquifers, the storage coefficient, or storativity, is equal to the specific storage multiplied by the aquifer saturated thickness. For unconfined aquifers, the storage coefficient is specific yield. Storage coefficients are commonly estimated through long-term pumping tests, laboratory tests, or groundwater modeling. Very few estimates of storage coefficients are available for the 180/400-Foot Aquifer Subbasin. To calculate aquifer-specific and Subbasin-wide storage changes due to changes in groundwater elevations, the GSP Update uses 3 different storage coefficients: one for the whole Subbasin, one for the 180-Foot Aquifer, and one for the 400-Foot Aquifer.

Subbasin-Wide Storage Coefficient

Previous estimates of groundwater storage were developed in the *State of the Basin Report* (Brown and Caldwell, 2015) and the *Salinas Valley Historical Benefits Analysis* (Montgomery Watson, 1998). Both these reports developed change in storage estimates for the Pressure Subarea which overlaps with most of the 180/400-Foot Aquifer Subbasin. Both these reports use one average storage coefficient for the Subarea, not distinguishing between aquifers. However, these estimates are likely greater than the groundwater storage changes in the Subbasin because the Pressure Subarea covers a larger area than the Subbasin (Figure 5-14). Furthermore, the model used for the *Salinas Valley Historical Benefits Analysis* did not explicitly simulate the surficial sediments, and therefore the top model layer shows greater water level fluctuations than might be expected in a water table aquifer.

These previous reports cover different time periods, but both include data between 1980 and 1994. The *State of the Basin* report estimates that groundwater storage in the Pressure Subarea declined by approximately 2,200 AF/yr. from 1980 to 1994 due to changes in groundwater elevations. The *Salinas Valley Historical Benefits Analysis* estimates that groundwater storage in the Pressure Subarea declined by approximately 15,600 AF/yr. from 1980 to 1994 due to changes in groundwater elevations. Neither report estimates groundwater storage changes due to the advancing seawater intrusion front.

The previous reports provide starkly different estimates of the historical change in storage, and therefore provide minimal guidance for establishing a reliable change in storage methodology. There are no tools currently available to reliably estimate groundwater storage changes due to both groundwater elevations and seawater intrusion in the Subbasin, although the final SVIHM is anticipated to provide reliable estimates of change in storage due to groundwater elevations when it is released. Therefore, the method used in Chapter 5 that calculates change in groundwater storage as the sum of the change in storage due to groundwater elevations outside of the seawater intruded area and change in storage due to seawater intrusion within the seawater intruded area provides the best available method.

The Subbasin-wide storage coefficient is used to compare current groundwater conditions to SMC and to estimate change in storage for the water budget. When developing the reduction in storage SMC described in Chapter 8, two previous storage coefficients were considered. A storage coefficient of 0.036, inclusive of the 180-Foot, 400-Foot, and Deep Aquifers, was used in the *State of the Basin* report that MCWRA has used to calculate cumulative change in storage based on groundwater elevation changes. This number is the average of 3 previous estimates: 0.018, 0.015, and 0.075 for the northern, southern, and central parts of the Subbasin, respectively, based on Bulletin 118 for the 180/400-Foot Aquifer Subbasin (DWR, 2004). Although most of the aquifers in the Subbasin are considered to be confined or partially confined, changes in storage due to groundwater elevations in the unconfined parts of the Subbasin likely drive the Subbasin-wide total change in storage due to groundwater elevation changes because groundwater is more easily drained from an unconfined aquifer than a confined aquifer. Changes in groundwater elevation in an unconfined aquifer represents a larger change in storage than the same change in groundwater elevation in a confined aquifer. Therefore, a storage coefficient of 0.12, which is the initial estimate of specific yield in the Salinas Valley Integrated Hydrologic Model (SVIHM) and ongoing seawater intrusion modeling of the Subbasin, is investigated for this analysis in addition to the 0.036 storage coefficient mentioned above. The groundwater storage change due to changes in groundwater elevations is calculated based on an average groundwater elevation difference between 0.036 and 0.12, multiplied by the area of the Subbasin that is not seawater intruded and a storage coefficient. The groundwater in storage between minimum threshold and measurable objectives groundwater elevations, using the storage coefficient of 0.036, yields a groundwater level-based change in groundwater storage of 41,000 AF, similar to the 33,000 AF of groundwater storage that was lost in the 15 years

reported in the *State of the Basin* report. While the storage coefficient of 0.12 yields a groundwater level-based change in groundwater storage of 138,000 AF. Both these estimates are based on an area of 84,200 acres, which is the non-seawater intruded area in the Subbasin at the measurable objective.

Change in storage due to seawater intrusion is estimated as the volume of water in both the 180-Foot and 400-Foot Aquifers that would transition from saline to fresh based on the location of the minimum threshold and measurable objective 500-mg/L chloride isocontour locations. This volume is calculated using the mapped seawater intruded acreage produced annually by MCWRA, multiplied by the approximate aquifer thickness of 150 feet for the 180-Foot Aquifer and 200 feet for the 400-Foot Aquifer. The volumes for the individual aquifers are added and then multiplied by an effective porosity of 0.12 from the SVIHM to calculate the total volume of seawater intruded groundwater in the Subbasin. Effective porosity represents the portions of the aquifer that are able to transmit water and it is used in this case because seawater is coming into the aquifers not being drained from them. If the 500-mg/L isocontour is moved to the measurable objective location from the minimum threshold location in each respective aquifer, the total increase in usable stored water due to reduced seawater intrusion would be 536,000 AF (334,000 AF in the 180-Foot Aquifer and 202,000 AF in the 400-Foot Aquifer).

Total change in groundwater storage is the sum of the storage change due to groundwater elevations and the storage change due to seawater intrusion. The total water in storage between minimum threshold and measurable objective groundwater conditions is 577,000 using the storage coefficient of 0.036 and 674,000 AF using the storage coefficient of 0.12. Although the smaller storage coefficient is more representative of confined aquifers, changes in groundwater elevation in an unconfined aquifer have greater influence in the overall change in storage than the same elevation change in a confined aquifer, so the average of 0.036 and 0.12 (0.078) is used to set the SMC for reduction of storage to be more representative of the conditions that occur in the Subbasin. Using the average storage coefficient of 0.078, the total volume of groundwater in storage between minimum threshold and measurable objective groundwater conditions is 626,000 AF. Reduction in seawater intrusion accounts for about 86% of the total average storage change between minimum thresholds and measurable objective conditions so the choice of storage coefficient only has a small influence on the SMC.

Aquifer-Specific Storage Coefficients

The aquifer-specific storage coefficients for this analysis were derived from the aquifer properties used in the SVIHM. Aquifer-specific storage coefficients are necessary to comply with GSP Regulations that require annual reports to calculate annual change in groundwater storage by aquifer. These aquifer-specific storage coefficients are used to calculate storage change caused by changes in groundwater elevations in the non-seawater intruded areas of the Subbasin. Specific storage values specified in the SVIHM are $8.2 \times 10^{-5} \text{ ft}^{-1}$ and $2.7 \times 10^{-5} \text{ ft}^{-1}$ for

the 180-Foot and 400-Foot Aquifers, respectively. These numbers are consistent with the specific storage estimates for the 180-Foot and 400-Foot Aquifers in the North Marina Groundwater Model (NMGWM), as presented in *North Marina Groundwater Model Review, Revision, and Implementation for Slant Well Pumping Scenarios* (HydroForcus, 2016). The NMGWM estimates that the 180-Foot Aquifer specific storage ranges from 2.0×10^{-5} to 8.2×10^{-3} ft⁻¹ (layer 4), and specific storage in the 400-Foot Aquifer ranges from 1.0×10^{-5} to 8.2×10^{-3} ft⁻¹ (layer 6). The lower specific storage estimates in the NMGWM are typically specified for onshore areas, and are comparable to the SVIHM onshore specific storage values. Given the similarities between the NMGWM and SVIHM specific storage estimates, this GSP Update adopts the SVIHM estimates to calculate change in groundwater storage due to changes in groundwater elevations.

As previously described, a storage coefficient is equal to the specific storage multiplied by the aquifer saturated thickness. Specific storage estimates from the SVIHM multiplied by the approximate thicknesses of 150 feet for the 180-Foot Aquifer and 200 feet for the 400-Foot Aquifer. This yields storage coefficients of 0.012 and 0.005 for the 180-Foot and 400-Foot Aquifers, respectively. The specific storage estimates will likely change when the SVIHM is finalized; however, these values are reasonable and are the best available data. When the final SVIHM is released the specific storage estimates will be updated for the aquifer-specific storage change calculations due to changes in groundwater elevations.

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- HydroFocus. 2016. North Marina Groundwater Model Review, Revision, and Implementation for Slant Well Pumping Scenarios. <https://ia.cpuc.ca.gov/Environment/info/esa/mpwsp/deir-eis/Appendix%20E2.pdf>.
- Lohman, S.W., 1972, Groundwater hydraulics: U.S. Geological Survey Professional Paper 708.
- Montgomery Watson. 1998. Salinas Valley Historical Benefits Analysis (HBA). Accessed January 27, 2022. <https://www.co.monterey.ca.us/government/government-links/water-resources-agency/documents/historic-benefits-analysis>.

Chapter 5
Appendix 5-C

COC Exceedance Maps

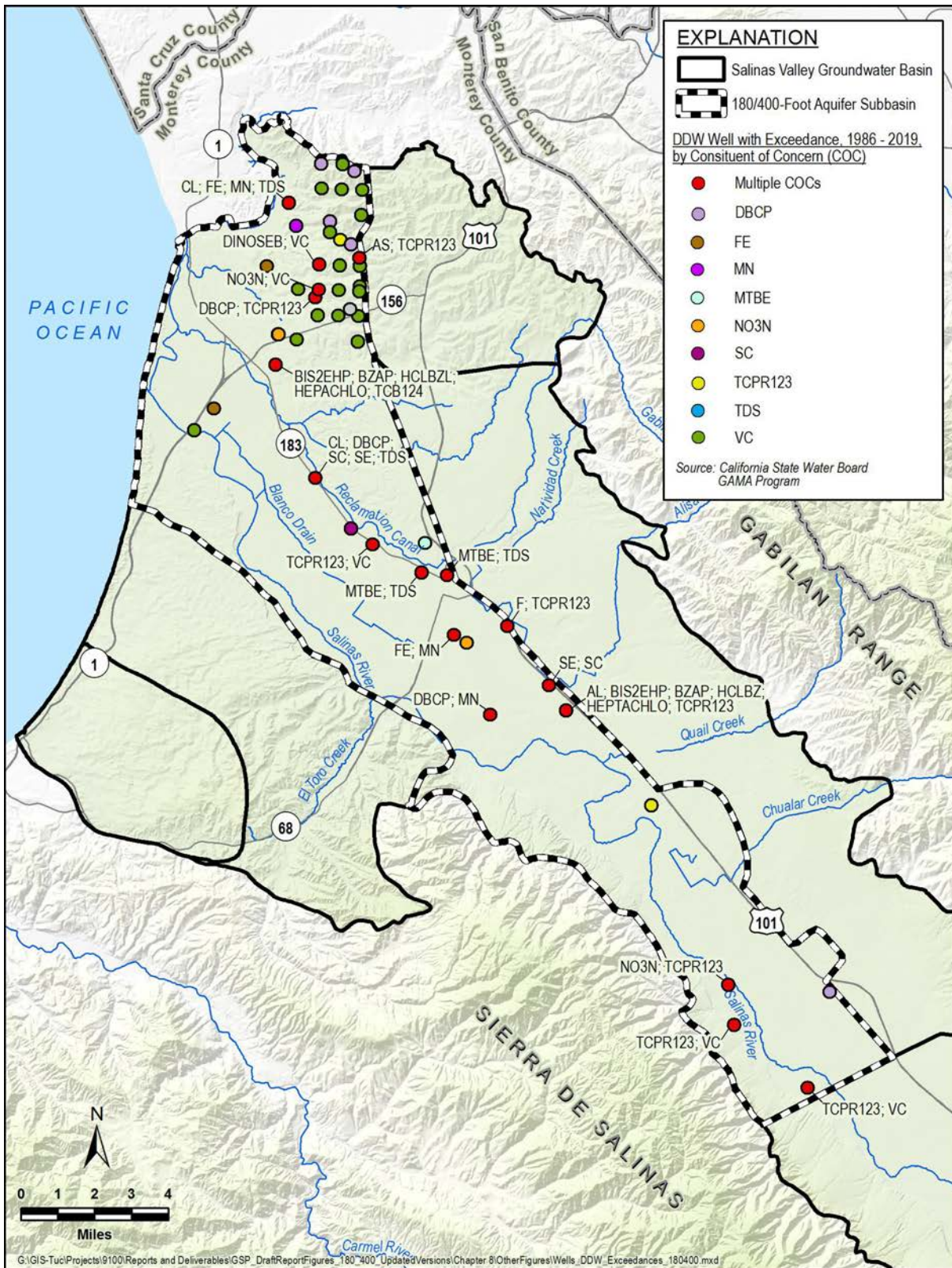


Figure 1. Water Quality Exceedances for DDW Wells

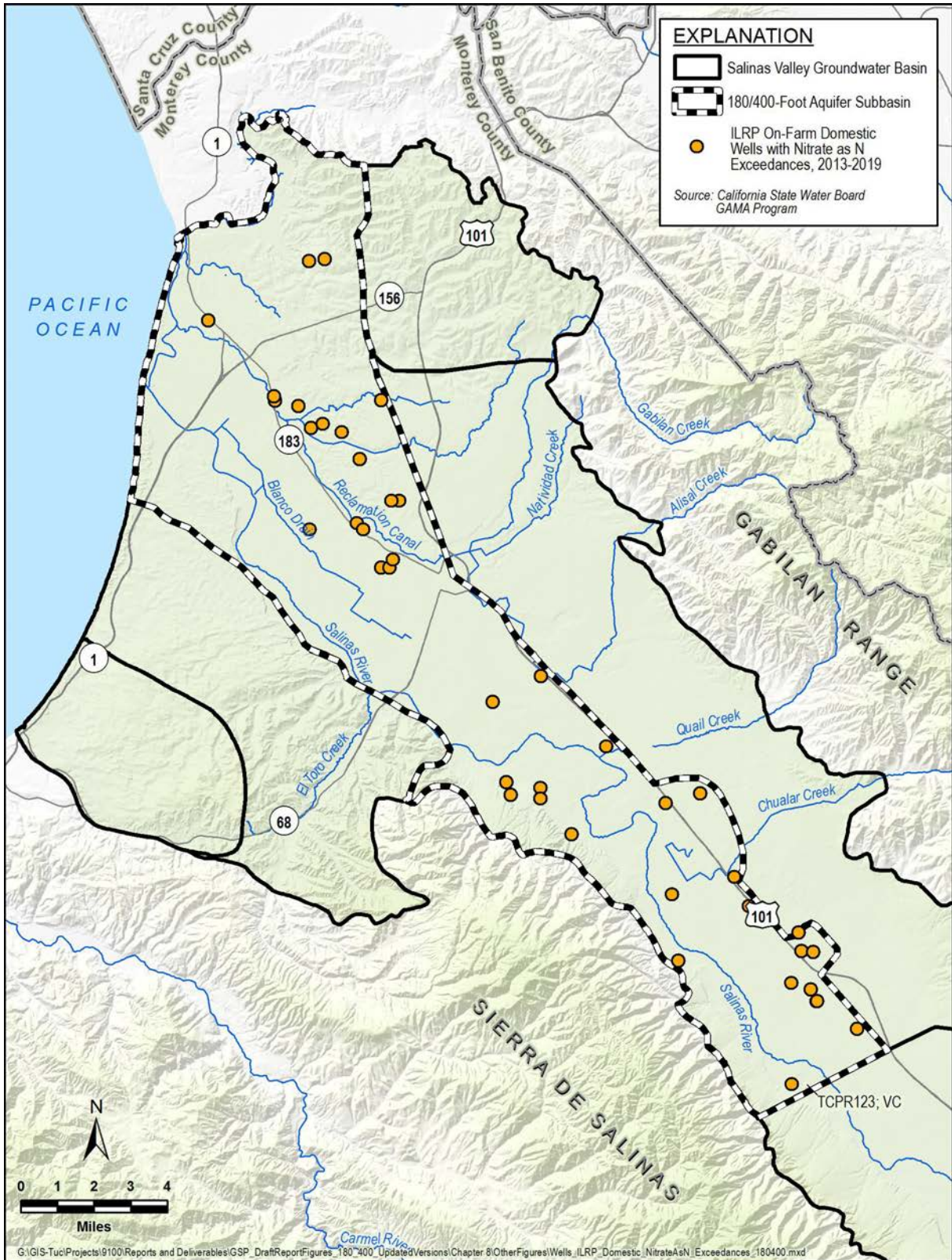


Figure 2. Nitrate Exceedances for ILRP On-Farm Domestic Wells

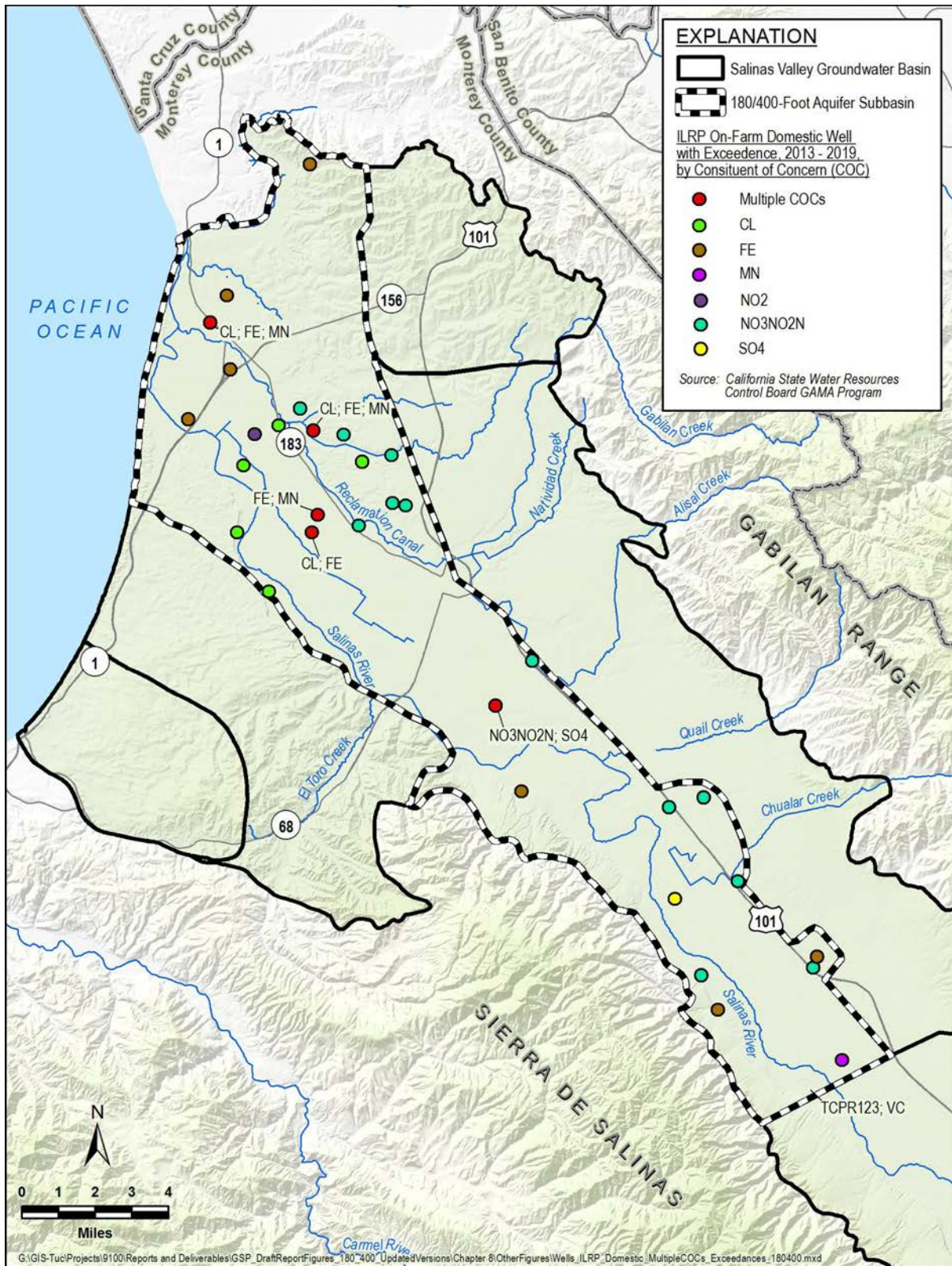


Figure 3. Exceedances for other Constituents of Concern for ILRP On-Farm Domestic Wells

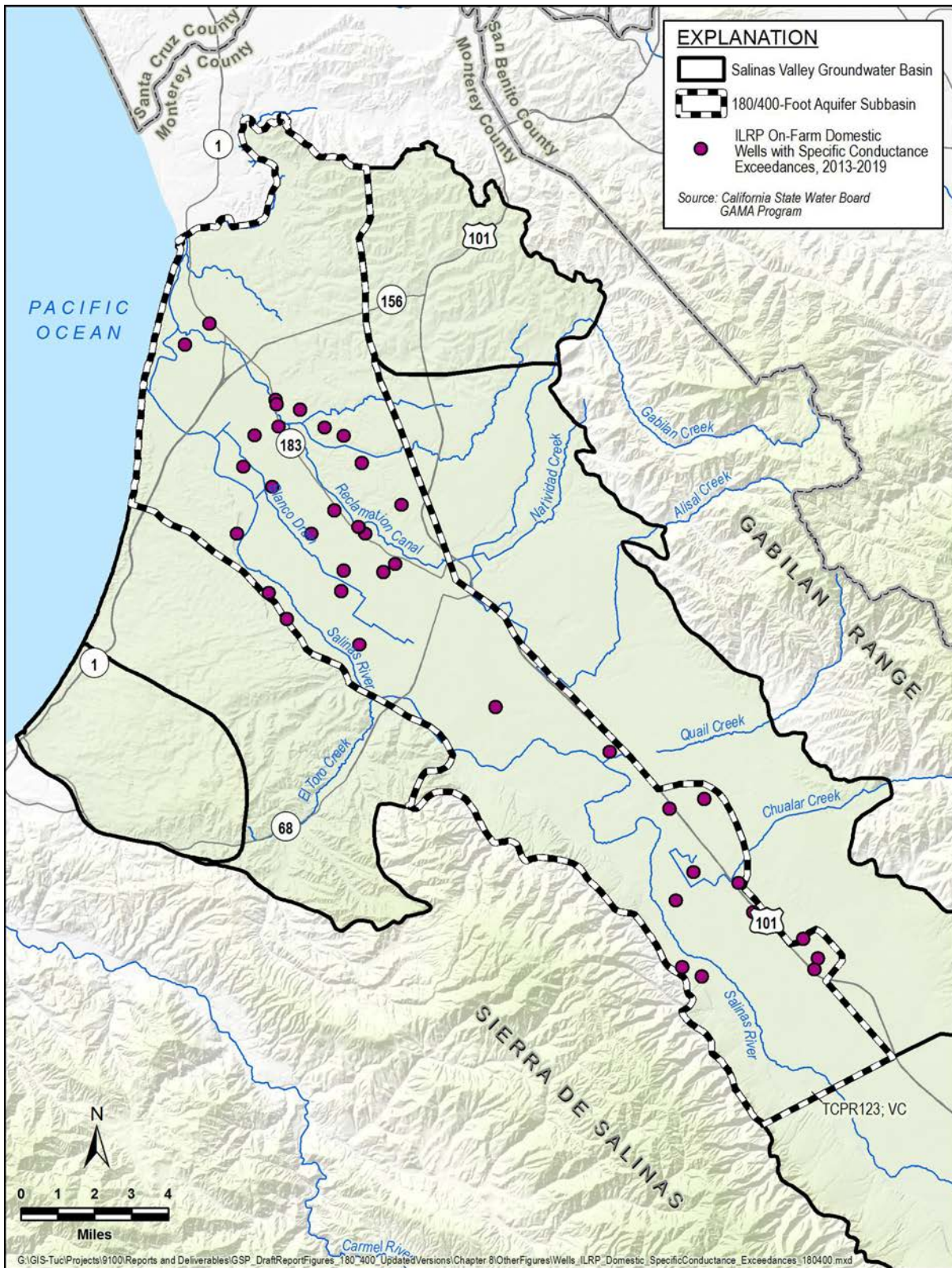


Figure 4. Exceedances for Specific Conductance for ILRP On-Farm Domestic Wells

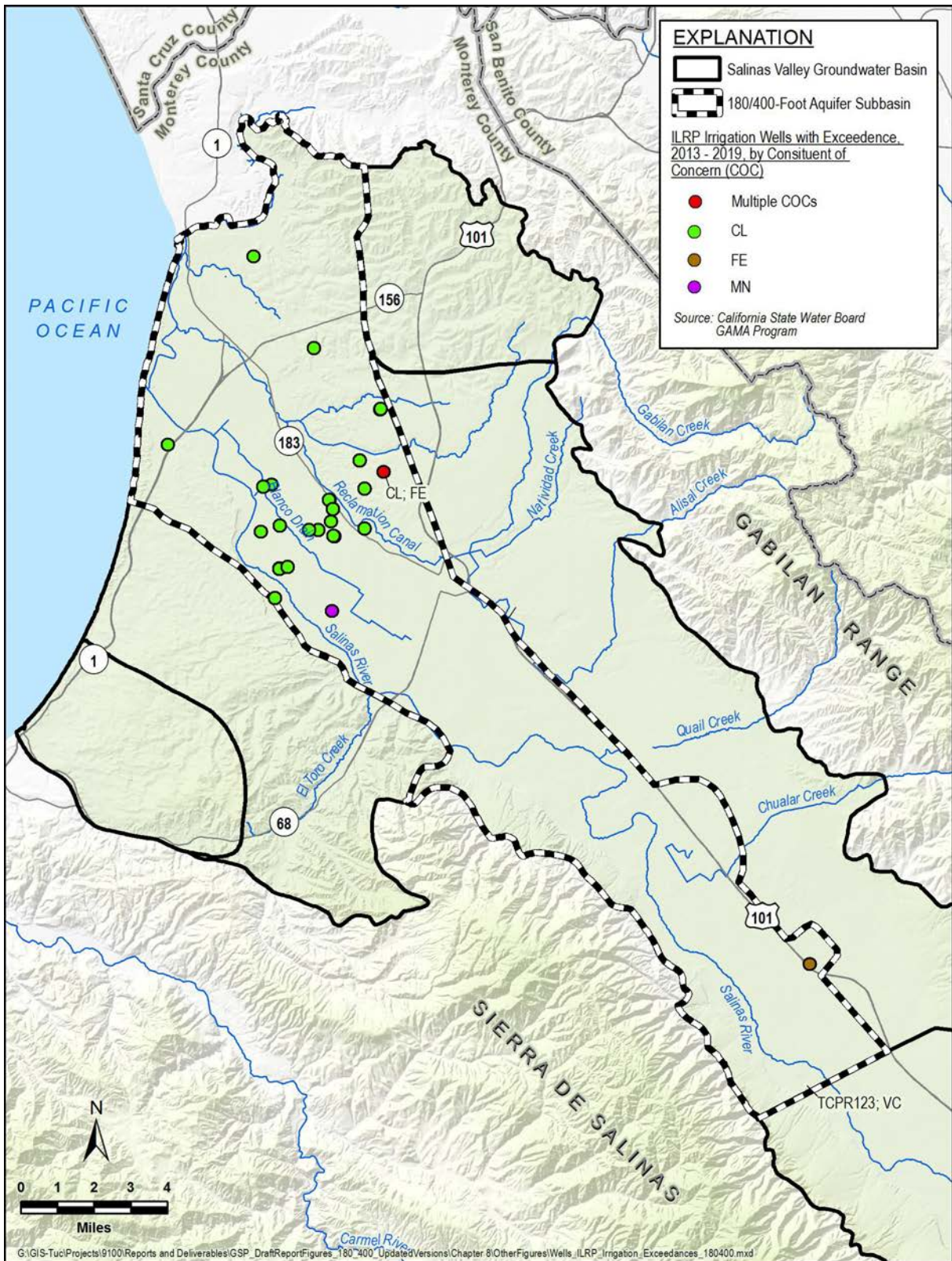


Figure 5. Water Quality Exceedences for ILRP Irrigation Wells

Chapter 6
Appendix 6-A

Salinas Valley Models Project Progress Report



United States Department of the Interior

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Sacramento, California 95819-6129

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<http://water.usgs.gov>

Project Progress Report

November 2, 2021

Wesley Henson, PhD., Project Chief, US Geological Survey California Water Science Center

In cooperation with Monterey County, Monterey County Water Resources Agency, and the Salinas Valley Basin GSA.

Overview of Salinas Valley Models

Introduction

In January 2016, the U.S. Geological Survey California Water Science Center (USGS CAWSC) began collaborating with Monterey County and the Monterey County Water Resources Agency (MCWRA) to create a suite of geologic and hydrologic models. The primary purpose of these models is to inform the County's five-year (2014 – 2018) hydrologic study of the water supply and groundwater quality in the MCWRA's Zone 2C, within the Salinas Valley Aquifers as part of a settlement agreement (Monterey County 2010). The suite of models include: (1) a geologic model to estimate aquifer properties and aquifer and aquitard extents; (2) a watershed model to simulate surface processes and inflows to the groundwater basin from adjacent catchments; (3) an integrated hydrologic model of the Salinas Valley Groundwater Basin; and (4) an operational reservoir model. The Salinas Valley models will contribute to several other regional modeling efforts: for MCWRA's Interlake Tunnel Project, the development of Groundwater Sustainability Plans under the State's Sustainable Groundwater Management Act (SGMA; CADWR, 2014), and a future water supply risk assessment for the Salinas and Carmel River Basins Study (SCRBS) by the U.S. Bureau of Reclamation (2015) in cooperation with local partners.

Salinas Valley model development and use in these studies are keystones of regional drought planning tools for managing conjunctive use of groundwater and surface water. These models provide vital information for evaluating strategies to achieve groundwater sustainability. These decision tools provide estimates of groundwater storage, surface and subsurface storage and flows, groundwater-surface water (GW-SW) interactions, and hydrologic and agricultural budgets. In addition, the cooperative research partnership between the Monterey County Water Resources Agency and the USGS has resulted in development of model update utilities, cutting-edge reservoir simulation and land use methods, and SGMA reporting utilities that will benefit multiple California modeling efforts.

The purposes of this project update are to (1) describe the model development (2) describe how model results are used to understand seawater intrusion, water levels (hydraulic heads), and land use, (3) provide

an overview of the model review process and anticipated completion timeline, and (4) discuss how modeling results and future model updates can be used in ongoing and future hydrologic investigations in the basin.

Model development and Updates

Model development has been a collaborative process with regular guidance and input from Monterey County, MCWRA, and their consultants. Additional guidance and review were provided by an independent Technical Advisory Committee with regional stakeholders, consultants, agricultural commissioners, and the Salinas Valley Basin Groundwater Sustainability Agency.

The models were constructed using published open-source modeling software. The Salinas Valley integrated hydrologic model (SVIHM) and Salinas Valley Operational Model (SVOM) are built using the latest version of MODFLOW-OWHM (Boyce and others, 2020) with the MODFLOW Farm Process (Schmid and others (2006), Schmid and Hanson (2009)). The software can be downloaded in its entirety here, <https://code.usgs.gov/modflow/mf-owhm>. You can also find helpful information on this webpage <https://www.usgs.gov/software/modflow-one-water-hydrologic-flow-model-conjunctive-use-simulation-software-mf-owhm>. The SVIHM has been developed using two sub-models, a 3-D geologic framework and texture model (Salinas Valley Geologic Model; SVGM; Sweetkind and others, In Prep), and a Hydrologic Simulation Program – Fortran watershed model (HSPF; Bicknell and others, 1997) for the entire Salinas Valley Watershed (Salinas Valley Watershed Model, SVWM).

Geologic Framework and Texture Model

The geologic framework model was used to define the spatial extent, depth, and distribution of geologic material textures for the offshore region, five major aquifers of the Salinas Valley, aquitards between each aquifer, and the depth to bedrock. The aquifers are defined consistent with previous studies and include the surficial aquifer, 180-ft aquifer, 400-ft aquifer, Purisima aquifer, and Paso Robles aquifer.

Each of the aquifers was explicitly defined using well borehole data, and local geologic investigations (Tinsley, 1975; Feeney and Rosenberg, 2003; Kennedy/Jenks, 2004; Hanson and others, 2002; Colgan and others, 2012; Langenheim and others 2012, Hanson and Sweetkind, 2014; Taylor and Sweetkind, 2014; Hanson and others, 2014a; Baillie and others, 2015;). The distribution of texture in each aquifer was developed for each borehole location and kriged to create a continuous surface. These depth-discrete spatial layers for each aquifer were used to define a geologic texture for each model cell as a percentage of coarse material (K_{coarse}). This method has been widely used in hydrologic models (Faunt and others, 2009a; Faunt and others, 2009b; Faunt and others, 2010) to relate geologic texture to hydraulic properties. This approach defines aquifer properties using a coarse-grained (K_{coarse}) and fine-grained (K_{fine}) end member defined as:

$$K_{fine}=1.0-K_{coarse}$$

Hydraulic conductivity ranges for each aquifer were defined using data from previous models (Hanson and others, 1990; Hanson and Benedict, 1993; Hanson and others, 2003, 2004, 2014 a,c,d,e; Sweetkind and others, 2013; Phillips and others, 2007; Faunt and others, 2009a,b; Ludington and others, 2007; MCWRA

monitoring well database), aquifer tests, and estimated ranges for geologic materials.

The hydraulic conductivity value at the upper extent of the range is assigned to cells in areas where the percentage of coarse material is 100% ($K_{\text{coarse}} = 1.0$). Similarly, the hydraulic conductivity value at the lower extent of the range is assigned to cells in areas where the percentage of coarse material is 0% ($K_{\text{fine}} = 1.0$). For all other model cells, a composite hydraulic conductivity was generated using a power law relationship between the values for the K_{coarse} and K_{fine} end members.

Data from previous offshore studies (Johnson and others, 2016) were used to define the structure, distribution, and properties of the offshore region. The offshore region was parameterized similarly to the onshore region of the model domain providing continuity between the offshore and onshore regions of each aquifer that facilitates a robust estimation of fluxes between the offshore and onshore areas of each aquifer.

Climate data

Climate data for the SVWM and SVIHM include minimum and maximum air temperature, precipitation, and potential evapotranspiration. Climate data for both models were developed using the Basin Characteristics Model (BCM) tools (Flint and others, 2004; Flint and Flint, 2007 a,b,c) from national climate data stations (for example, Daly and others, 2004) and data from the California Irrigation Management System stations (CIMIS, 2005). The BCM tools were used to develop daily spatially distributed 270-m resolution climate datasets for the future climate scenarios. Climate input datasets are precipitation, maximum and minimum air temperature, and solar radiation; the latter two are used to compute evapotranspiration.

Climate input were developed as spatially distributed grids. Gridded data were interpolated onto the model grid using an area-weighted approach. For the SVWM, the 270-m climate data were interpolated onto the hydrologic response units (HRUs). For the SVIHM, the 270-m climate grids were interpolated onto the model grid.

Salinas Valley Watershed Model

The (SVWM) simulates watershed processes for the entire Salinas River watershed (figure 1). The model simulates the historical period between 10/1/1948 - 9/30/2018. Each sub-catchment in the domain was defined as a hydrologic response unit (HRU). Hydrologic processes simulated for each HRU include evapotranspiration, runoff, interflow and baseflow. Each HRU is connected to stream segments and tributaries that represent a drainage network to route surface water through the SVWM from upland areas to the Pacific Ocean. Streamflow in each stream segment is simulated using the kinematic wave method. The simulation includes the discharge volume, stream velocity, stage, and water volume for the segment, as well as stream losses from evaporation and streamchannel infiltration.

The SVWM combines the BCM tools and HSPF models to simulate the climate and hydrology for the upland areas and tributaries draining into the alluvial valleys simulated by the SVIHM. The SVWM domain consists of an upper Salinas Valley subarea and lower Salinas Valley subarea simulated as sub-catchments connected at the location of USGS streamgage 11150500 (SALINAS R NR BRADLEY CA, https://waterdata.usgs.gov/nwis/uv?site_no=11150500), with all surface water outflows from the upper SVWM entering the lower SVWM as Salinas River streamflow at the location of the streamgage. The upper SVWM includes five sub-watershed areas that contain most of the Paso Robles area of the Upper Salinas

River Valley in San Luis Obispo County area, while the lower SVWM contains most of the SVIHM area within its five sub-watershed areas.

Salinas Valley Watershed Model Domain

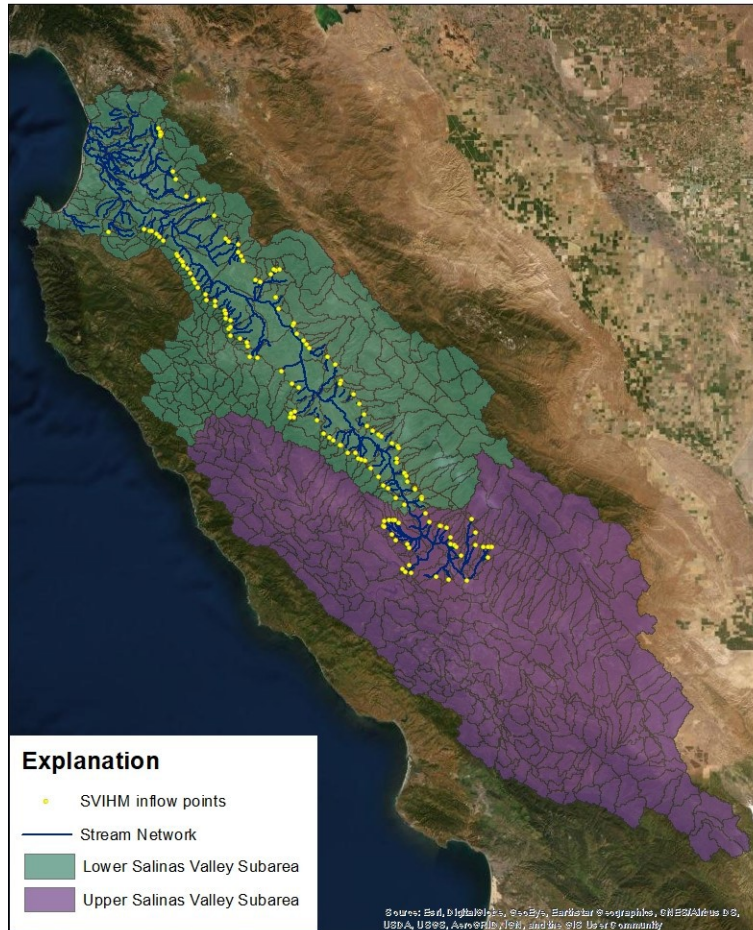


Figure 1: Salinas Valley Watershed Model (SVWM) domain showing Upper and Lower Salinas Valley Subareas, stream network, and inflow points where watershed flows are routed into the Salinas Valley Integrated Hydrologic Model (SVIHM).

Spatial discretization of the SVWM was based on topographically defined watersheds that were subdivided into smaller sub-drainage areas using a combination of surface flow-routing defined by a 10-meter digital elevation model (DEM) and pre-defined sub-drainages (CalWater version 2.2.1, Department of Forestry and Fire Protection, <http://frap.fire.ca.gov/data/fraggisdata-sw-calwaterdownload>). The smaller sub-drainages were used to (1) represent spatially varying climate and topography in the upland areas of the SVWM model domain, and (2) define pour points to route estimated ungaged flows from the SVWM to the SVIHM stream networks. The SVWM spatial discretization resulted in HSPF segments varying in area from 65 acres to about 25,000 acres and a total of 148 pour-point connections for inflows from upstream drainages along the Salinas Valley.

The HSPF model is run as a continuous simulation using an hourly time step; however, in the current

SVWM version, the daily climate inputs are uniformly distributed to hourly values. Therefore, only daily results are used for calibration and for developing SVIHM inflows.

SVWM model parameters were developed using geographic information system (GIS) data sets that included: DEM-derived elevation, slope and aspect, estimated soil water storage capacity (State Soil Survey Geographic ((SSURGO), Web Soil Survey, available online at <https://websoilsurvey.nrcs.usda.gov/>), percent forest canopy and impervious land cover (National Land Cover Data, NLCD; U.S. Geological Survey, 2007, 2011, 2014). For discrete data such as land cover type, GIS analysis was used to calculate the weighted average values for each HSPF parameter based on the fractional area of a given discrete data value within each HSPF segment. The fractional areas for discrete data are calculated in GIS, and the weighted averages are calculated in spreadsheets, resulting in a unique set of HSPF parameters for each model segment. This method provided a better representation of the physical watershed characteristics for each segment as compared to simply using the dominant discrete data within each segment. Continuous data such as slope and percent canopy cover were mapped directly to HSPF segments as area-average values using GIS.

The SVWM was used to estimate inflows into the Salinas Valley from adjoining un-gauged watersheds. These inflows are provided as a monthly inflow time series to the SVIHM. Although the model is only used to estimate un-gauged watershed inflows to the SVIHM, the SVWM is calibrated for the entire basin, providing many opportunities for future evaluations where surface water and sediment and nutrient transport are of greater concern than groundwater storage. These potential applications will be discussed in the section on Future model updates, applications, and developments.

Salinas Valley Integrated Hydrologic Model

The Salinas Valley Integrated Hydrologic Model (SVIHM) is an integrated water resources management tool that simulates the conjunctive use of groundwater and surface-water in the Salinas Valley (Figure 2). The Salinas Valley model simulates the period between 10/1/1967 to 9/30/2018 and has been calibrated for the period from 10/1/1967 to 12/31/14. The SVIHM includes explicit representation of climate, groundwater and surface water, recharge, runoff, inflows from un-gauged watersheds, reservoir releases, Salinas River diversions, municipal and industrial water supply pumping, and a rigorous simulation of the substantial Salinas Valley agricultural industry.

The SVIHM is built using the latest version of MODFLOW-OWHM (Boyce and others, 2020) with the MODFLOW farm process. OWHM simulates water supply and demand for natural, urban, and cultivated lands. OWHM uses an embedded land use and crop model based on the widely used FAO56 method (Allen and others, 2005) to estimate water demands for a set of user-specified land uses. If precipitation and direct groundwater root uptake are insufficient to meet simulated land use water demands, then additional supplies can be provided to meet the deficit (groundwater pumping, surface water diversions, wastewater reclamation, and reservoirs). Additionally, for cultivated lands, water demand efficiencies can be specified for land-use type, irrigation type, climate regime (wet or dry), and region. This well-developed model framework facilitates evaluation of water demand by region, crop, and climate regime and allows for scenario testing to evaluate the effects of potential changes in agricultural practices, increases in efficiency, and optimization of agricultural development within the basin. This tool is well suited for the analyses that will be needed throughout the next century to manage sustainability of the Salinas Valley aquifer system.

Salinas Valley Integrated Hydrologic Model Domain

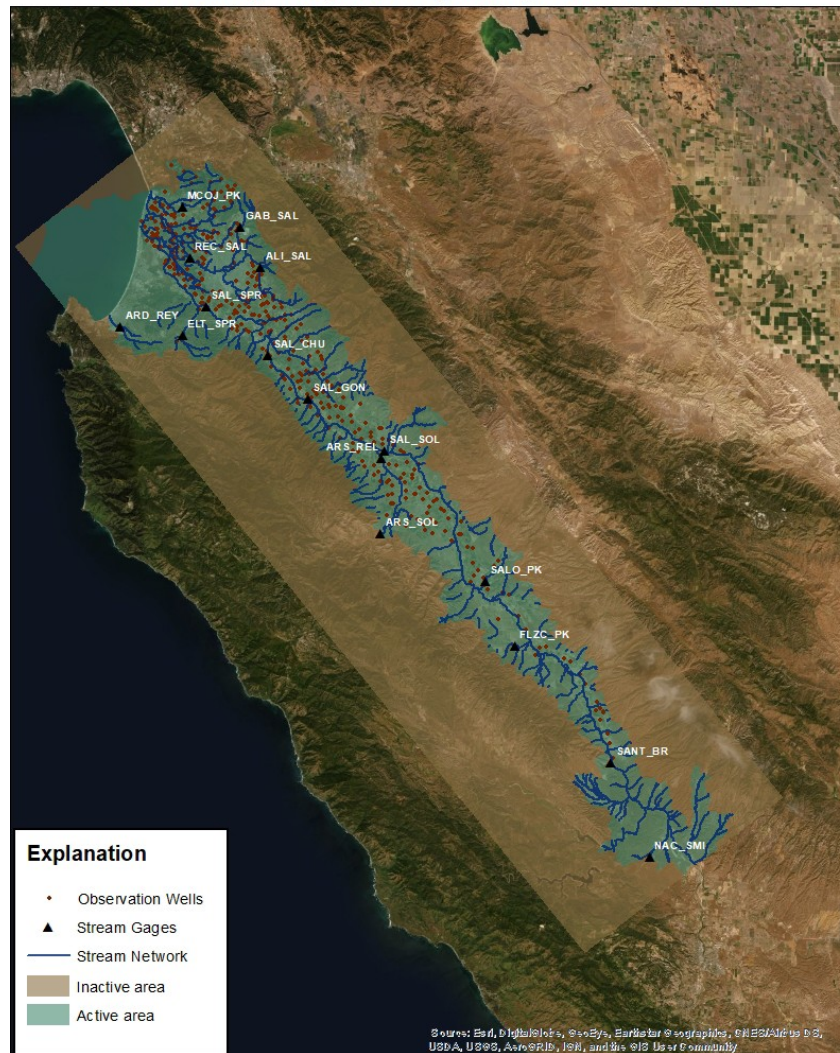


Figure 2: Salinas Valley Integrated Hydrologic Model (SVIHM) showing domain extent with inactive and active areas, stream network, stream gages, and observation wells.

The total active modeled area in the SVIHM is 10,266 mi². The model grid is uniform, where each grid cell is approximately 6.42 acres (529-by-529 ft). There are 976 rows, 567 columns, and 9 layers having a varying number of active cells in each layer, for a total of 265,382 active model cells. To assess changes in aquifer storage due to seawater intrusion, the model includes approximately 84,000 active cells onshore and 11,000 active cells offshore. The SVIHM includes nine model layers that correspond to locally defined hydrostratigraphic units such as the defined aquifers (180-Foot and 400-Foot aquifers), confining units, and geologic units (e.g., basement bedrock). The top of SVIHM is represented by the altitude of the land surface, but because hydrostratigraphic units are discontinuous across the study area, the uppermost active layer is a composite of model layers 1, 3, 5, 7, and 9.

The SVIHM is partitioned into 31 water balance subregions (WBS; Figure 3 and Table 1). Each WBS has

simulated water demands for each land use and a unique set of available water supplies that can be used by the model to meet the demands. The model includes WBS representing the Zone 2C jurisdictional area and associated subareas, the Castroville Seawater Intrusion Project (CSIP) area, Seaside Basin, and areas outside the Zone 2C boundary but within the SVIHM model domain.

Table 1. Summary of water-balance subregions within the Salinas Valley Integrated Hydrologic Model, Monterey and San Luis Obispo Counties, California. (SW= Surface water, GW = Groundwater, None = No Deliveries).

Water Balance Subregion	Region Name	Region Description	Irrigation Water Supply
1	Riparian Corridor	Monterey and SLO Counties	None
2	CSIP Area	Castroville Seawater Intrusion Project Region	GW/SW/recycled water
3	Coastal Urban areas	Salinas, Castroville, Marina, Seaside, Sand City, Monterey, Del Rey Oaks	None
4	Inland Urban areas	Chualar, Gonzales, Soledad, Greenfield, King City, & San Ardo	None
5	Highlands South	North of Eastside outside of Zone 2C	GW
6	Granite Ridge	North of Eastside outside of Zone 2C	GW
7	Corral De Tierra	South of Pressure part within Zone 2C	GW
8	Blanco Drain Area	Drain subarea within Pressure subarea of Zone2C	GW
9	East Side	Remainder of Eastside subarea in Zone2C	GW
10	Pressure Northeast	Pressure subarea NE of Salinas River in Zone 2C	GW
11	Pressure Southwest	Pressure subarea SW of Salinas River in Zone 2C	GW
12	Forebay Northeast	Forebay subarea NE of Salinas River in Zone 2C	GW
13	Forebay Southwest	Forebay subarea SW of Salinas River in Zone 2C	GW
14	Arroyo Seco	Subarea SW of Salinas River outside of Zone 2C	GW
15	Clark Colony	Subarea SW of Salinas River partly outside of Zone 2C	SW/GW
16	Upper Valley Northeast	Upper Valley subarea NE of Salinas River and northeast of King City in Zone 2C	GW
17	Upper Valley Northwest	Upper Valley subarea NW of Salinas River and west of King City in Zone 2C	GW
18	Upper Valley Southeast	Upper Valley subarea SE of Salinas River and east of King City in Zone 2C	GW
19	Upper Valley Southwest	Upper Valley subarea SW of Salinas River and west of King City in Zone 2C	GW
20	Below Dam	Subregion below Nacimiento Dam and within Zone 2C	GW

21	Westside Region	Westside Regions of SVIHM outside of Zone 2C boundary in Monterey County Inland Southwest of Arroyo Seco and Clark Colony subregion	GW
22	Hames Valley	Outside Zone 2C but in Monterey County	GW
23	NE Quarries	Outside Zone 2C but in Monterey County	GW
24	Northeast Region	Northeast Regions of SVIHM outside of Zone 2C on the Northeast side of the Eastside, Granite Ridge, and Highlands South subregions	GW
25	Southwest Region	Southwest regions of SVIHM outside of Coastal Pressure subregion Zone 2C boundary in Monterey County	GW
26	Northeast Region	Northeast Region of SVIHM outside of Zone 2C Forebay subregion in Monterey County	GW
27	Southwest Region	Southwest regions of SVIHM outside of the Upper Valley and Forebay regions subregions of Zone 2C in Monterey County plus outside of Arroyo Seco, Hames Valley, and SLO active subregions	GW
28	Southeast Region	Southeast Region of SVIHM outside of Below Dam and Upper Valley subregions of Zone 2C boundary in Monterey County	GW
29	Paso Robles Region	Remainder of Paso Robles Basin in active model grid in San Luis Obispo County	GW
30	Seaside Basin	Seaside Adjudicated Basin (landward only)	GW
31	Offshore	Offshore (groundwater analysis only)	None

Water Balance Subregions

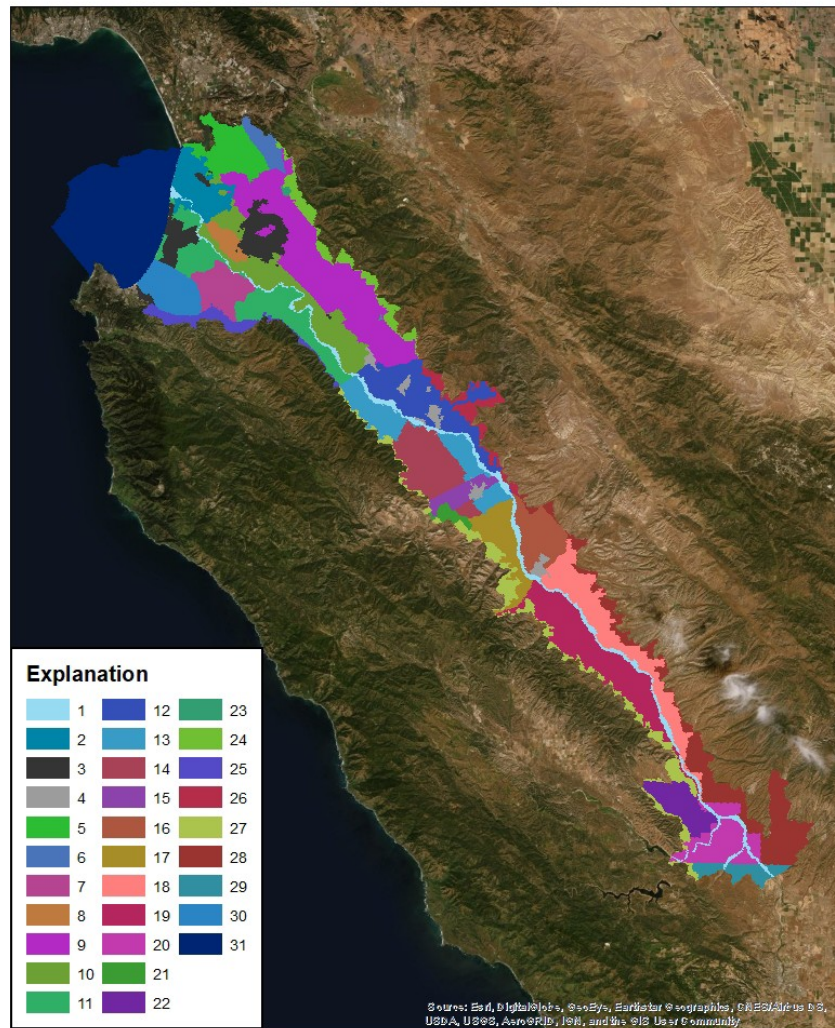


Figure 3: Salinas Valley Integrated Hydrologic Model Water Balance Subregions.

The SVIHM has 56 specified land use types (Table 2), each with defined water sources, irrigation type and efficiency (if applicable), and crop water demand properties (crop coefficients, area, crop development timeline). For each model year, two six-month land use maps were generated using a composite of available land use data from California Department of Water Resources, Monterey County, and the National Land Cover Database (NLCD, U.S. Geological Survey, 2014) and a newly developed method that leverages the California Pesticide Use Reporting (CalPUR) database.

The new CalPUR method is used to provide greater detail about the distribution of crops within areas with vague land use types such as “truck and vegetable crops” (Henson and others, in Prep). This approach captures complex cultivation methods including multi-cropping and crop rotations, providing a rich dataset for estimating agricultural water demands.

Table 2: Salinas Valley Integrated Hydrologic Model (SVIHM) Land Use Types

Land Use Type		Land Use Type		Land Use Type	
1	Celery – coastal	20	Root vegetables – inland	39	Outdoor nurseries – coastal
2	Celery – inland	21	Tomato/pepper – coastal	40	Outdoor nurseries – inland
3	Cucumber/melon/squash – coastal	22	Tomato/pepper – inland	41	Indoor nurseries
4	Cucumber/melon/squash – inland	23	Strawberries – coastal	42	Artichokes
5	Legumes – coastal	24	Strawberries – inland	43	Pasture
6	Legumes – inland	25	Corn – coastal	44	Non-irrigated
7	Lettuce – coastal	26	Corn – inland	45	Semi-agricultural
8	Lettuce – inland	27	Field crops – coastal	46	Idle/fallow
9	Rotational 30-day – coastal	28	Field crops – inland	47	Ag-trees
10	Rotational 30-day – inland	29	Grain crops – coastal	48	Golf course turf/parks
11	Crucifers/cabbages – coastal	30	Grain crops – inland	49	Urban
12	Crucifers/cabbages – inland	31	Cane/bush berries – coastal	50	Quarries
13	Unspecified irrigated row crops – coastal	32	Cane/bush berries – inland	51	Water
14	Unspecified irrigated row crops – inland	33	Deciduous fruits and nuts – coastal	52	Riparian
15	Carrots – coastal	34	Deciduous fruits and nuts – inland	53	Upland grasslands/shrub lands
16	Carrots – inland	35	Citrus/subtropical – coastal	54	Woodlands
17	Onions/garlic – coastal	36	Citrus/subtropical – inland	55	Beach/dunes
18	Onions/garlic – inland	37	Vineyards – coastal	56	Barren/burned
19	Root vegetables – coastal	38	Vineyards – inland		

The SVIHM was calibrated using over 63,098 monthly observations including: 1,738 measurements from the MCWRA observation well network (Figure 2); 6,448 streamflow measurements of at 17 streamgages (Figure 2 and Table 3); 127,683 monthly reported groundwater extraction values; and 162 reported monthly diversions. In addition, calibration included second-order observations of streamflow differences between gages and vertical hydraulic head differences between aquifers with multiple nested observation wells.

Table 3: Stream gage information showing Gage ID, U.S. Geological Survey National Water Information System (NWIS) gage number and gage name.

Gage ID	NWIS Gage Number	Gage Name
ARS_SOL	11152000	ARROYO SECO NR SOLEDAD CA
ARS_REL	11152050	ARROYO SECO BL RELIZ C NR SOLEDAD CA
SAL_SOL	11151700	SALINAS R A SOLEDAD CA
ELT_SPR	11152540	EL TORO C NR SPRECKELS CA
SAL_CHU	11152300	SALINAS R NR CHUALAR CA
ALI_SAL	11152570	ALISAL C NR SALINAS CA
SANT_BR	11150500	SALINAS R NR BRADLEY CA
SAL_SPR	11152500	SALINAS R NR SPRECKELS CA
SALO_PK	11151500	SAN LORENZO C A KING CITY CA
NAC_SMI	11149500	NACIMIENTO R BL NACIMIENTO DAM NR BRADLEY CA
REC_SAL	11152650	RECLAMATION DITCH NR SALINAS CA
GAB_SAL	11152600	GABILAN C NR SALINAS CA
ARD_REY	11143300	ARROYO DEL REY A DEL REY OAKS CA
FLZC_PK	11150700	FELIZ CYN TRIB NR SAN LUCAS CA
MCOJ_PK	11152700	MORO COJO SLOUGH TRIB NR CASTROVILLE CA
SAL_GON	11152200	SALINAS R NR GONZALES CA

In collaboration with MCWRA and the Pajaro Valley Water Management Agency, self-updating model tools have been developed which allow temporal datasets of MODFLOW-OWHM models to be updated using spreadsheets with updated temporal data. This approach is an improvement that allows models to continue to be updated and useful for the wide range of resource questions and scenarios that arise. These self-updating model tools can be used to update or correct input data describing climate data, ungauged inflow data, land use properties, observed hydraulic heads, groundwater extraction, wastewater reclamation, surface water diversions, reservoir releases, and agricultural pumping, irrigation types and efficiencies. All these updates can be completed without rebuilding the entire model. Model updates are described in the section “Future model updates, applications, and developments”.

Salinas Valley Operational Model

The Salinas Valley operational model (SVOM) uses the Surface Water Operations Module of MODFLOW-OWHM. This implementation of reservoir operations is based on a wealth of prior publications (Ferguson and others 2015; Ferguson and others, 2016; Hevesi and others, 2019; Hanson and others, 2020; Boyce and others, 2020). The SVOM is a baseline model that is used to evaluate water supply projects such as the reservoir modification and changes to operations to aid with groundwater sustainability efforts. The SVOM is similar to the SVIHM for simulation of hydrologic processes, surface and subsurface properties, and simulation of agricultural operations. In this model, the land use is fixed to 2014, the time step is shorter, about five to six days, and the reservoir operations are explicitly simulated. The reservoir operations rules are human readable text files that formulate the logic for the current mandated operational rules for conservation, water supply, flood mitigation, and water rights. These operations include fish passage rules that support the life cycle of threatened steelhead fish populations. These input

data just translate existing flow charts and figures from the approved operations into text that the model can read in. These data are available from MCWRA upon request, both in the form used in the model and in public documents.

Model Representation of Seawater Intrusion, Groundwater Levels and Land Use

The following descriptions of methods are provided to illustrate how the model will inform future evaluations of Seawater Intrusion, groundwater sustainability evaluations and scenarios, and responses to changes in land use and climate.

Seawater Intrusion

Interactions with onshore freshwater aquifers and near-shore saltwater aquifers are driven by contrast in aquifer hydraulic heads and pore water densities between freshwater and seawater and the distribution of aquifer permeability along the coast. Seawater Intrusion (SWI) is estimated in the SVIHM as flux across the coastal boundary. The monthly elevation of the 9413450 NOAA Station buoy in Monterey Bay is used as a proxy for the sea water elevation (H_{sw}). In the model, the sea level is simulated as an equivalent freshwater head (h_{fw}) using the following relation from Motz (2005):

$$h_{fw} = \frac{\rho_{sw}}{\rho_{fw}} h_{sw} - \left(\frac{\rho_{sw} - \rho_{fw}}{\rho_{fw}} \right) Z$$

where

- h_{fw} is the seawater's equivalent freshwater hydraulic head at elevation Z (L),
- ρ_{sw} is the seawater density (M/L^3),
- ρ_{fw} is the freshwater density (M/L^3), and
- Z is the elevation point where the equivalent freshwater head is calculated (L).

Similar to other models in the region (Hanson, 2003a,b), the freshwater-seawater interface is simulated as general head boundary (GHB), that is, a boundary that depends on the aquifer hydraulic heads along the coast. To specify an ocean boundary condition with the GHB, the sea level is converted to an equivalent freshwater head at the model cell's center. The density of seawater is assumed to have an average value of $1,025 \text{ kg/m}^3$, and the density of freshwater is assumed to be $1,000 \text{ kg/m}^3$ (Motz, 2005). When hydraulic head in an aquifer is greater than h_{fw} along the coast, hydrologic flows are seaward. Conversely, when hydraulic head in an aquifer is less than h_{fw} along the coast, seawater intrusion into the aquifer occurs. The net annual flux values along the coastline for each aquifer are simulated by the SVIHM to inform interpretation of chloride monitoring by MCWRA.

Although these estimates do not provide information about the onshore spatial extent of SWI, the model is well-poised to be used to provide this information in future model updates and applications. These more explicit methods will be described in the Future model updates, applications, and developments section.

Groundwater Elevations

The SVIHM and SVOM estimate groundwater elevations using well-developed methods of the MODFLOW framework. MODFLOW uses the method of finite differences to solve the groundwater flow equation for

each model cell. This approach assumes Darcian flow that is based upon hydraulic gradients within and among aquifers and the spatial distribution of hydraulic conductivity. Additional boundary conditions or processes that can increase or decrease hydraulic heads in the model are simulated such as barriers to flow (for example, faults), groundwater extraction (for example, municipal and agricultural pumping), stream-aquifer interactions, sea water intrusion, and recharge.

After successful calculation of the hydraulic head in each aquifer, well depth-weighted composite heads are developed for wells screened in multiple aquifers. Composite- and single-well aquifer values for the simulated and observed hydraulic heads are compared. If the comparison between simulated and observed hydraulic heads is reasonable, the spatial distribution of simulated aquifer hydraulic heads provides another source for evaluating groundwater elevations and complements independently developed groundwater contour maps by MCWRA.

Land Use

Land use will be updated in future updates of the SVIHM using available spatial datasets and the CalPUR method to attribute vague land use categories. As new spatial data become available, they can be prioritized in the composite land use map and replace co-located data. The process for developing land use input data has four steps: develop a composite map, enhance map with CalPUR data, interpolate onto model grid, and generate the input files. In the future, new land use properties may need to be developed for new crop types not already represented in the current version of the historical model. An example of the 2017 land use map is provided to illustrate the representation of land use for every year in the model (Figure 4).

Salinas Valley Integrated Hydrologic Model 2017 Land Use

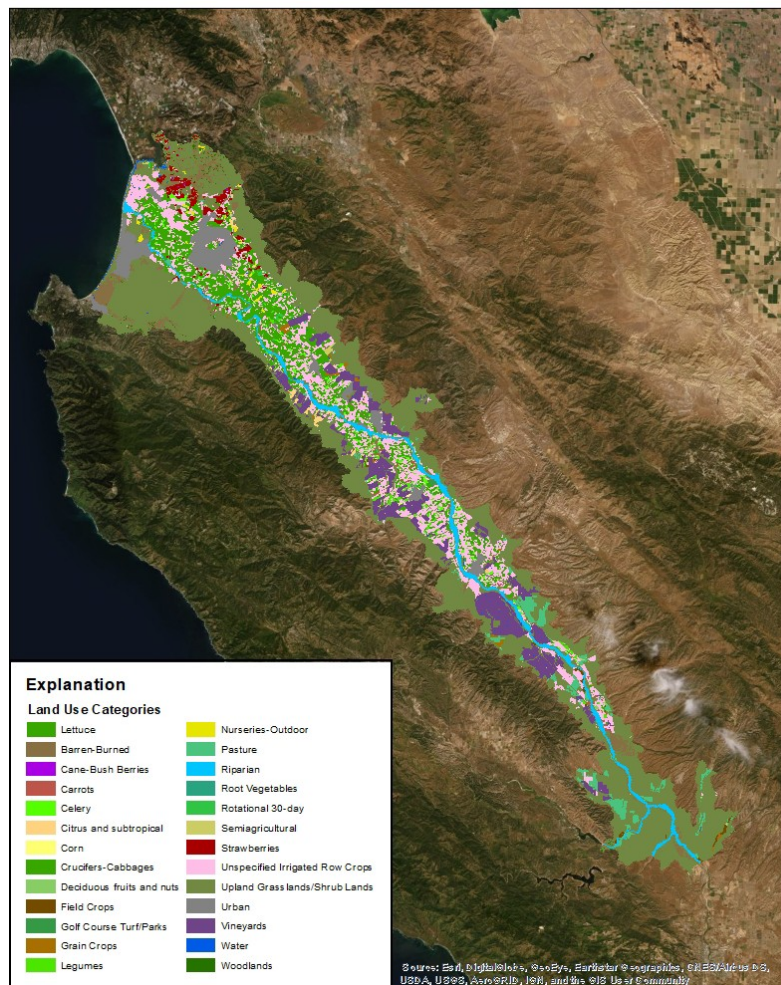


Figure 4: Salinas Valley Integrated Hydrologic Model (SVIHM) 2017 land use.

Model Review and Public Release

The model public release will consist of three elements: (1) a report about geologic and development and calibration of hydrologic models, (2) a data release with SVGW model input files and metadata, and (3) a data release with SVWM, SVIHM, and SVOM model input files and metadata in a public repository. The SVWM and SVIHM reports will document how the historical models were constructed. The SVOM report will include a description of the adaptations to the SVIHM to generate a baseline reservoir operations model, describe reservoir model implementation, and document implementation of rules. The report and data releases will be publicly available after completion of fundamental science review by the USGS. The USGS fundamental science review has multiple levels of scientific and technical review. These include technical, scientific, editorial, and regional review. This review ensures complete and accurate documentation of model development and results before data are potentially used for decision-making. The model is undergoing final calibration and has been updated through water year 2018. Final calibration is occurring simultaneously with report development.

The Salinas Valley models have been developed to address additional applications for ongoing regulatory and management efforts. A comprehensive 51-year climate, surface and groundwater, agricultural and reservoir operations model of the entire Salinas Valley is a substantial effort that

warrants and benefits greatly from a sufficient technical review. This review provides a rigorous basis for further tool development and refinement and scenario testing. The technical review has been enhanced by use and further development of the Salinas Valley Suite in two regional projects, (1) the WaterSMART water supply vulnerability study cooperatively funded in partnership with the U.S. Bureau of Reclamation and (2) the Interlake Tunnel project. The WaterSMART Study includes forecast and analysis framework to evaluate conditions to 2100 for multiple possible climates, socio-economic growth scenarios, projects, and conservation strategies in the Salinas Valley and region. The Interlake Tunnel benefit analysis facilitated the operational model development which will benefit future project evaluations for years to come. These applications of the model allowed for more rigorous review of model input data, better implementation of important processes, and improved representation of land use.

Every effort is being made to publish the models within the estimated timeframe. However, it is important to note that the initial model scope was to address specific concerns about historical conditions for the Monterey County Basin Investigation. Since the start of project, the models have been refined with better representation wells and updated with four additional years of critical climate, land use, water supply, and reservoir storage, that represent drought recovery between 2014 and 2018. These data allow for (1) better representation of stakeholder conservation efforts that are essential for evaluation of water budgets and potential sustainability projects, (2) a longer duration for evaluation of operations, and (3) many updates to model input data sets to better represent the groundwater well network.

The Salinas Valley hydrologic model suite development has leveraged a unique opportunity to benefit multiple projects for stakeholders throughout the entire Salinas Valley. Although the technical review and model development has taken longer than anticipated, the value-added information and consistent analysis framework for these concurrent studies benefits both stakeholders and the models. As presented at the Model Workshop, the SVIHM is expected to be submitted for USGS Specialist Review in winter 2021-2022

Future model updates, developments, and applications

The SVWM and SVIHM will need annual updates to keep the models relevant for evaluating and reporting sustainability efforts for Sustainable Groundwater Management Act (SGMA) compliance or for use with other future projects. Updates to the SVIHM conceptual model, aquifer parameters, and input data facilitate timely SVOM updates, so that reservoir operations can continue to be refined to meet stakeholder needs. The SVWM and SVIHM will require periodic calibration to maintain model accuracy with potential changes in hydrology, climate, and land use. The model can also be improved with additional stakeholder support and refined to keep the model relevant to decision-making.

MCWRA and USGS continue to develop workflows and train staff to use model update tools. These self-updating model tools can convert MCWRA hydrologic data into model input. However, climate, land use, observation, extraction, diversion, and reservoir release datasets require some development. Data describing observed hydraulic heads, municipal and industrial groundwater extraction, wastewater reclamation, reported diversions, reservoir releases, and reported agricultural pumping are readily available in various MCWRA and Monterey County databases and require monthly aggregation and conversion to model units. These tools facilitate a model framework that can be readily updated with minimal lag time with support from the USGS.

PRISM climate data and climate station data are used to generate spatially distributed temperature,

precipitation and potential evapotranspiration estimates using the BCM tools. There is a six-month lag time for some of these climate datasets. Climate data are used in the SVWM to develop ungaged watersheds inflows to the valley.

Land use will be updated in future updates of the SVIHM using available spatial datasets and the CalPUR method to attribute vague land use categories. As new spatial data become available, they can be prioritized in the composite land-use map and replace co-located data. The process for developing land-use input data will be to develop a composite map, enhance with CalPUR data, map onto model grid, and generate the input files. Additionally, new land use properties may need to be developed for new crop types not already represented in the current version of the historical model. As remote sensing technologies, such as satellite multi-spectral data analysis, are developed and refined alternate approaches to assigning time series crop water demand will be evaluated for future model updates.

The SVWM can be extended to look at nutrient and sediment loading and transport in the Salinas River watershed. This could be a powerful tool for soil conservation, nutrient evaluations, and water quality assessments. The SVWM can also be used to examine changes in runoff and recharge in response to land surface change. This can be a useful tool for initial assessments of potential surface storage sites, habitat restoration and flood flows.

The SVGM provides a basis for evaluating aquifer structure, evaluation of faults and other structures that may influence subsurface flow paths and facilitate interpretation of geophysics such as airborne electromagnetic (AEM) surveys.

The SVIHM can be extended to provide insights into several county initiatives: (1) assessment of Sea Water Intrusion (SWI) and contaminant transport, (2) evaluation of conceptual models of potential interactions between 180-ft and 400-ft aquifers (3) evaluation of optimal monitoring network expansion, (4) uncertainty estimates for important hydrologic predictions (SWI, GW-SW interactions, recharge).

The SVIHM could be extended to evaluate Sea Water Intrusion (SWI) more completely. Currently the model examines net volumes of landward flow from the ocean. In order of increasing effort, other options for SWI evaluation include particle tracking, the sharp water interface Modflow package (SWI2, Bakker and others 2013)), and coupled simulation of sea- and fresh water such as SEAWAT (Guo and Langevin, 2002; Langevin, 2001). The SVIHM geologic texture model, aquifer parameters, and model structure provide a backbone for any of these options for evaluating SWI.

SWI monitoring and analysis by the MCWRA has identified the occurrence of vertical migration of seawater from the overlying intruded Pressure 180-foot aquifer to the Pressure 400-foot aquifer (MCWRA, 2017). More information is needed to understand these interactions among aquifers and aquifer responses to stress. As monitoring and data collection efforts are refined and expanded, along with continued refinement of hydrostratigraphic information, the SVIHM can be used to evaluate new conceptual models of the aquifers and evaluate the aquifer's response under various management scenarios.

Summary

A suite of geologic and hydrologic models has been developed to estimate water supply and availability in the Salinas Valley. These models will be documented and released to the public after completion of review and approval according to USGS fundamental science practices. After publication these models will continue to be updated to support future water management objectives.

Disclaimer

Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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Chapter 7
Appendix 7-A

Monitoring Procedures from MCWRA CASGEM
Monitoring Plan

4.0 Monitoring Procedures

This section addresses the various procedures and protocols involved in collecting, processing, and reporting data from wells in the CASGEM network.

4.1 Monitoring Frequency and Timing

Nineteen (19) of the CASGEM wells are currently, and will continue to be, measured on a monthly basis. The three (3) voluntary wells are also measured monthly. MCWRA will use the monthly measurements from August and either January, February, or March to satisfy the biannual CASGEM reporting criteria.

To determine the monthly distribution of seasonal high and low groundwater elevations, MCWRA analyzed measurements from approximately 50 wells throughout the Salinas Valley Groundwater Basin. This included wells in the 180/400 Foot Aquifer, East Side Aquifer, Forebay Aquifer, and Upper Valley Aquifer. The measurements were collected during eight (8) different Water Years (WY): WY 1985, representative of near normal conditions; WY 1991, representative of dry conditions; and the six most recent Water Years, WY 2009 through WY 2014. MCWRA reports this data on a quarterly basis; a sample report is included in Appendix B.

Based on this analysis of historical data, August is typically representative of seasonal low conditions (Figure 10). A relaxation of groundwater levels, or seasonal high conditions, is evident during the period from January to March (Figure 11). Data from these three months will be evaluated and the highest groundwater elevation from that series will be submitted to the CASGEM online submittal system. The month chosen to be representative of the seasonal high groundwater conditions will be consistent across all data groups.

Nineteen (19) of the CASGEM wells are equipped with pressure transducers which collect depth to water data on an hourly basis. This data will be synthesized so that biannual measurements representing seasonal high and low conditions are available for CASGEM reporting. The groundwater level measurement collected at noon on the fifteenth day of the month will be selected and compared to other monthly data to ensure that it is a representative value. Data from the month of August will be used to represent the seasonal low and a fall/winter measurement from either January, February, or March will be used to represent the seasonal high; the same month will be used as was selected based on monthly well measurements, as discussed above.

Four (4) of the wells in the CASGEM network are currently measured once per year, during the period from November to January. Based on the recent analysis of seasonal groundwater highs, this period will be shifted to cover the months from January through March. An additional measurement event will be added during the month of August for these wells in order to also capture the seasonal groundwater low.

Appendix C contains a summary of the frequency and timing of measurement of wells in the CASGEM network. Any new wells that are brought into the CASGEM program will be monitored on a

biannual basis, with data collection occurring on the same schedule as the other wells that are measured twice a year.

4.2 Well Locations

The latitude and longitude of each well was collected using a handheld GPS unit, which has accuracy to within one (1) meter. Coordinates for wells in the CASGEM network are shown in Appendix A. Any wells incorporated into the CASGEM network in the future will be geographically located using a similar method.

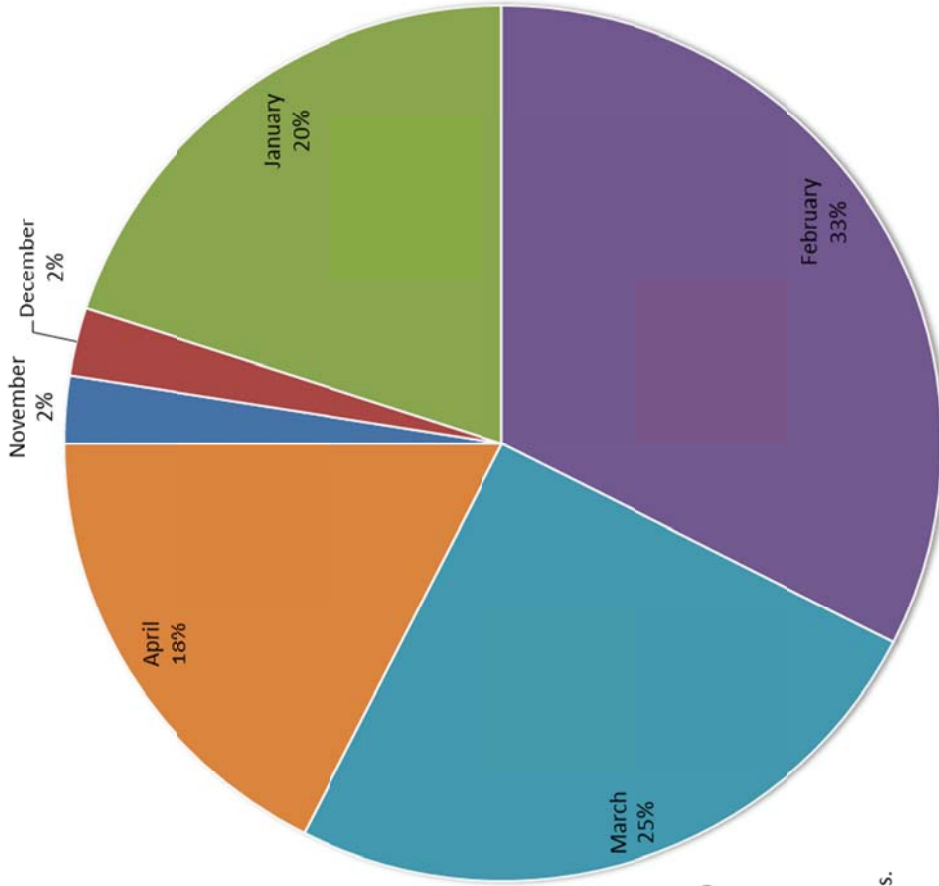
4.3 Reference Points

All of the wells that comprise the CASGEM network described herein are currently part of a groundwater level monitoring program conducted by MCWRA. As part of the existing monitoring programs, reference points (RP) have been established for all of the wells. To ensure consistency in measuring depth to water, a description of each well's RP is recorded in a field data collection notebook. In many cases, photographs have also been taken of the RP. Reference point elevations have been determined for all wells that are currently in a monitoring program; this data is listed in Appendix A.

A reference point will be determined for any new wells that are brought into the CASGEM network. Reference point elevations are determined using a digital elevation model from the United States Geological Survey (USGS) with a cell size of 32 feet by 32 feet.

Figure 10 – Distribution of Seasonal High Groundwater Elevations by Month

Distribution of Seasonal High Groundwater Elevations by Month



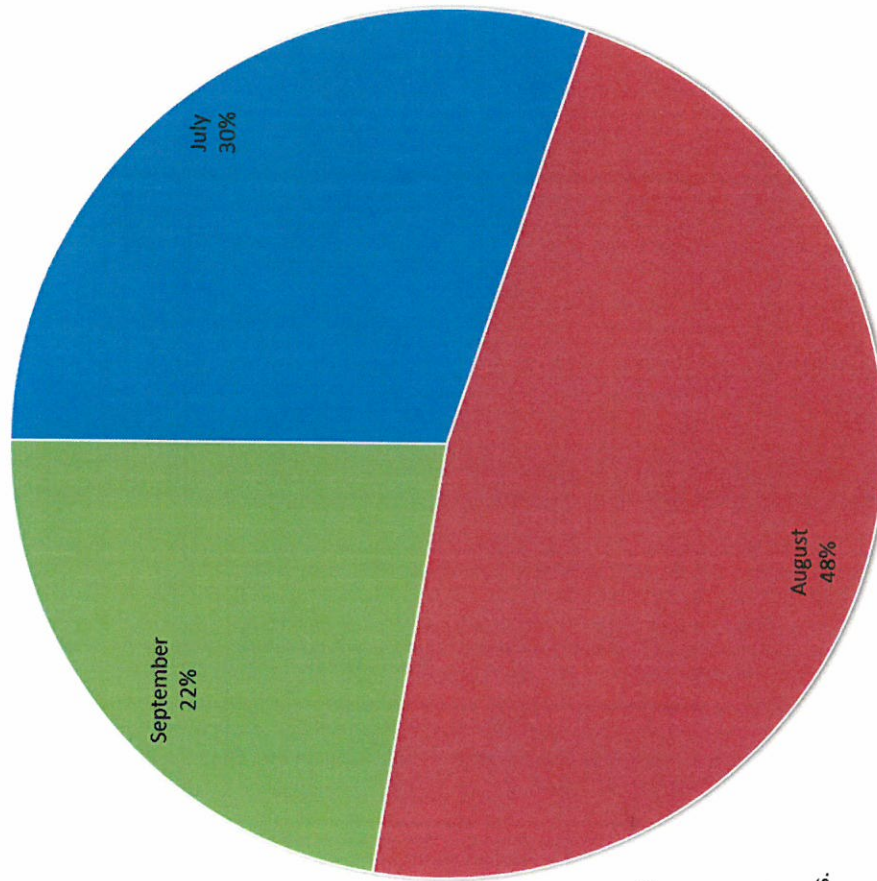
Notes

(1) Chart reflects data from the following subbasins of the Salinas Valley Groundwater Basin: 180/400 Foot Aquifer, East Side Aquifer, Forebay Aquifer, and Upper Valley Aquifer.

(2) Water Years 1985, 1991, and 2009-2014 were used in this analysis. These years represent near normal conditions (WY85), dry conditions (WY91), and the six most recent water years.

Figure 11 – Distribution of Seasonal Low Groundwater Elevations by Month

Distribution of Seasonal Low Groundwater Elevations by Month



Notes

(1) Chart reflects data from the following subbasins of the Salinas Valley Groundwater Basin: 180/400 Foot Aquifer, East Side Aquifer, Forebay Aquifer, and Upper Valley Aquifer.

(2) Water Years 1985, 1991, and 2009-2014 were used in this analysis. These years represent near normal conditions (WY85), dry conditions (WY91), and the six most recent water years.

4.4 Field Methods

Groundwater elevation data collected from wells in the CASGEM network is intended to reflect static conditions. Best efforts will be made to ensure that wells have not recently been pumped prior to collecting a data point. Depth to water measurements will be made using one or more of the methods discussed in the following sections. Measurement methods described in the following sections are based on the Department of Water Resources document *Groundwater Elevation Monitoring Guidelines* (December 2010) with some alterations specific to wells in the monitored basins/subbasins described in this Monitoring Plan.

4.4.1 Graduated steel tape

Prior to measurement:

- Ensure that the reference point on the well can be clearly determined. Check notes in the field data collection notebook.
- Review the notes and comments for previous measurements in the field data collection notebook to determine if there are any unique circumstances at this well.
- Take note of whether oil has previously been present at this well; this will be recorded in the comments section of the data form.

Making a measurement:

- Use the previous depth to water measurement to estimate a length of tape that will be needed.
- Lower the tape into the well, feeling for a change in the weight of the tape, which typically indicates that either (a) the tape has reached the water surface or (b) the tape is sticking to the side of the well casing.
- Continue lowering the tape into the well until the next whole foot mark is at the reference point. This value on the tape should be recorded in the field data collection notebook.
- Bring the tape to the surface and record the number of the wetted interval to the nearest foot.
- If an oil layer is present, read the tape at the top of the oil mark to the nearest foot. Note in the comments section of the data form that oil was present.
- Repeat this procedure a second time and note any differences in measurement in the field data collection notebook.

4.4.2 Electric water level meter

This method of measurement employs a battery-powered water level meter and a small probe attached to a ruled length of cable. Depth to water measurements collected using this equipment are recorded to the nearest tenth of an inch. This instrument is sometimes referred to as a “sounder”.

Prior to measurement:

- Review the field data sheet for the well and note whether oil has been present at this well in the past. The electric water level meter should not be used in wells where oil is present.
- Ensure that the reference point on the well can be clearly determined. Check notes in the field data collection notebook.
- Confirm that the water level meter is functioning and is turned on so that the beeping indicator will operate properly.

Making a measurement:

- Review previous depth to water measurements for the well to estimate the length of tape that will be needed.
- Lower the electrode into the well until the indicator sounds, showing the probe is in contact with the water surface.
- Place the tape against the reference point and read the depth to water to the nearest 0.1 foot. Record this value on the field data sheet.
- Make a second measurement and note any differences in measurement in the field data collection notebook.

4.4.3 Sonic water level meter

This meter uses sound waves to measure the depth to water in a well. The meter must be adjusted to the air temperature outside the well; there is a card with reference temperatures in the case with the sonic meter.

Making a measurement:

- Insert the meter probe into the access port and push the power-on switch. Record the depth from the readout.
- Record the depth to water measurement in the field data collection notebook.

4.4.4 Pressure transducer

Automated water-level measurements are made with a pressure transducer attached to a data logger. Pressure transducers are lowered to a depth below the water level in the well and fastened to the well head at a reference point. Data points are logged on an hourly basis. MCWRA uses factory-calibrated, vented pressure transducers (Appendix D). MCWRA staff collects the pressure transducer data once per quarter. During the data collection process, data loggers are stopped, and the data is downloaded onto a laptop, and then the data logger is reactivated and scheduled to begin collecting data again on the next hour. Upon return from the field, data is processed and reviewed for errors.

4.5 Data Collection, Processing, and Reporting

Following completion of all fieldwork, data is transcribed from field data sheets and checked for errors before being loaded into MCWRA's Oracle platform database. All data will be stored in the MCWRA database before being uploaded to the CASGEM website. Submittal of data to the CASGEM website will occur at a minimum of twice per year, no later than January 1 and July 1, per DWR CASGEM program guidelines.

Bi-annual submittal of data to the CASGEM website will include the following for each well in the CASGEM network, as described in the DWR document *CASGEM Procedures for Monitoring Entity Reporting*:

- Well identification number
- Measurement date
- Reference point and land surface elevation, in feet, using NAVD88 vertical datum
- Depth to water, in feet
- Method of measuring water depth
- Measurement quality codes
- Measuring agency identification
- Comments about measurement, if applicable

The following information will also be submitted to the CASGEM online system, as it is required by DWR unless otherwise noted:

- Monitoring Entity name, address, telephone number, contact person name and email address, and any other relevant contact information
- Groundwater basins being monitored (both entire and partial basins)
- State Well Identification number (recommended)
- Decimal latitude/longitude coordinates of well (NAD83)
- Groundwater basin or subbasin
- Reference point elevation of the well, in feet, using NAVD88 vertical datum
- Elevation of land surface datum at the well, in feet, using NAVD88 vertical datum
- Use of well
- Well completion type (e.g. single well, nested well, or multi-completion well)
- Depth of screened interval(s) and total depth of well, in feet, if available
- Well Completion Report number (DWR Form 188), if available

Chapter 7
Appendix 7-B

**MCWRA's Quality Assurance Project Plan (QAPP) for SWI
Monitoring**

Quality Assurance Project Plan (QAPP)
For
Water Quality Monitoring
Associated with the Salinas Valley Integrated
Water Management Plan (SVIWMP)

EPA R9#03-238
X-97994701-0



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Website: <http://www.mcwra.co.monterey.ca.us>

1.0 PROJECT MANAGEMENT

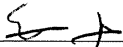
1.1 TITLE AND APPROVAL PAGE

Quality Assurance Project Plan
For
Water Quality Monitoring Associated with
The Salinas Valley Integrated Water Management Plan (SVIWMP)
EPA R9#03-238
X-97994701-0

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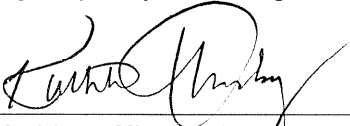
Approval Signatures



Elizabeth Krafft
Agency Project Manager:

8/12/07

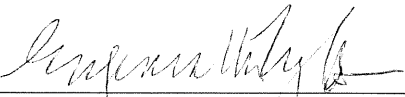
Date:



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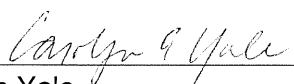
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Date:



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22 Oct 2007

Date:

1.2 TABLE OF CONTENTS

1.0 PROJECT MANAGEMENT

1.1 Title and Approval Page.....2

1.2 Table of Contents.....3

1.3 Distribution List.....6

1.4 Project/Task Organization.....7

1.5 Problem Identification/Background.....9

 1.5.1 Background.....9

 1.5.2 Program Objectives.....10

 1.5.3 Program Goals.....10

1.6 Project/Task Description.....11

 1.6.1 Work Statement and Produced Products.....11

 1.6.2 Constituents to be monitored and measurement techniques.....11

 1.6.3 Project Schedule.....12

 1.6.4 Geographical Setting.....12

 1.6.5 Constraints.....12

1.7 Data Quality Objectives for Measurement Data.....13

 1.7.1 Objectives and Project Decisions.....13

 1.7.2 Action Limits/Levels.....14

 1.7.3 Measurement Performance Criteria.....14

1.8 Training Requirements/Certification.....16

 1.8.1 Training of Field Personnel.....16

 1.8.2 Training of Laboratory Personnel.....17

 1.8.3 GPS Training Documentation.....17

1.9 Documentation and Records.....17

 1.9.1 QA Project Plan Distribution.....17

 1.9.2 Field Documentation and Records.....17

 1.9.2.1 Field Sheets.....17

 1.9.2.2 Chain of Custody (COC) Forms.....18

 1.9.2.3 Photographs.....19

 1.9.2.4 Labels.....19

 1.9.2.5 Field Quality Control Sample Records.....19

 1.9.3 Laboratory Documentation and Reports.....20

 1.9.4 Technical Reviews and Evaluations.....20

 1.9.4.1 Field Activities Review Checklist.....20

 1.9.4.2 Laboratory Data Review Checklist.....20

 1.9.5 Technical Memorandum.....21

2.0 DATA GENERATION AND ACQUISITION.....21

2.1 Sampling Process Design.....21

 2.1.1 Salinas Valley Ground Water.....22

 2.1.2 Coastal Ground Water.....22

2.2 Sampling Methods23

2.3 Sample Handling and Custody.....23

 2.3.1 Sample Containers and Preservatives.....24

 2.3.2 Sample Packaging and Transport.....24

 2.3.3 Sample Custody.....24

 2.3.4 Sample Disposal.....25

2.4	Analytical Methods.....	25
2.5	Quality Control.....	25
	2.5.1 Field Sampling Quality Control.....	25
	2.5.2 Laboratory Analyses Quality Control.....	26
2.6	Instrument/Equipment Testing, Inspection, and Maintenance.....	26
2.7	Instrument Calibration and Frequency.....	26
2.8	Inspection/Acceptance Requirements for Supplies.....	26
	2.8.1 Initial Inspection of Supplies.....	26
	2.8.2 Field Inspection of Supplies.....	26
	2.8.3 Laboratory Inspection of Supplies.....	27
2.9	Data Acquisition Requirements (Non-Direct Measurements).....	27
2.10	Data Management.....	27
3.0	ASSESSMENT AND RESPONSE ACTIONS.....	27
3.1	Reviews.....	27
	3.1.1 Readiness Reviews.....	27
	3.1.2 Field Reviews.....	27
	3.1.3 Post Sampling Reviews.....	28
	3.1.4 Laboratory Data Reviews.....	28
3.2	Reports.....	28
4.0	DATA VALIDATION AND USABILITY.....	28
4.1	Data Verification and Validation.....	28
	4.1.1 Field Data.....	28
	4.1.2 Laboratory Data.....	28
4.2	Reconciliation with User Requirements.....	29
5.0	REFERENCES.....	30

FIGURES

- 1 Monterey County, California
- 2 Salinas Valley Hydrologic Subareas
- 3 Salinas Valley Wells in the Pressure Subarea
- 4 Salinas Valley Wells in the East Side Subarea
- 5 Salinas Valley Wells in the Forebay Subarea
- 6 Salinas Valley Wells in the Upper Valley Subarea
- 7 Coastal Ground Water Monitoring Program Wells

TABLES

- 1 Complete Mineral Panel Analytes
- 2 Quality Control Requirements for Laboratory Analyses
- 3 Laboratory Data Quality Objectives (DQOs)
- 4 Salinas Valley Wells and Locations
- 5 Coastal Wells and Locations
- 6 Requirements for Sample Collection

APPENDICES

- A GPS Training Record
- B Field Documentation
 - B-1 Example of Field Sheet
 - B-2 Example of Chain of Custody Form (COC)
 - B-3 Example of Photo-Log

B-4 Example of Sample Labels

C Review Checklists

C-1 Field Activities Review Checklist

C-2 Laboratory Data Review Checklist

D Monterey County Consolidated Chemistry Laboratory

D-1 QA Manual

D-2 Specific Conductance

D-3 pH

D-4 Total Alkalinity

D-5 Metals

D-6 Anions

1.3 DISTRIBUTION LIST

The following is a list of organizations and persons who will receive copies of the approved QA Project Plan and any subsequent revisions:

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1.4 PROJECT/TASK ORGANIZATION

The organization responsible for overseeing this ground water monitoring program is the Monterey County Water Resources Agency (Agency). This project is funded through a grant from the Environmental Protection Agency (EPA), under the authority of Section §104 (b)(3) of the Clean Water Act. This project falls under the Monitoring and Assessment funding category. The Monterey County Health Department's Consolidated Chemistry Laboratory is a California state certified laboratory that will perform the chemical analyses for this ground water monitoring program. The laboratory will use standard analytical methods.

The roles and responsibilities of those involved in the implementation of the ground water monitoring program are described below. An organizational chart for the program is shown below.

Project Manager is the responsible official who will oversee the preparation of grants and the fiscal management of the project.

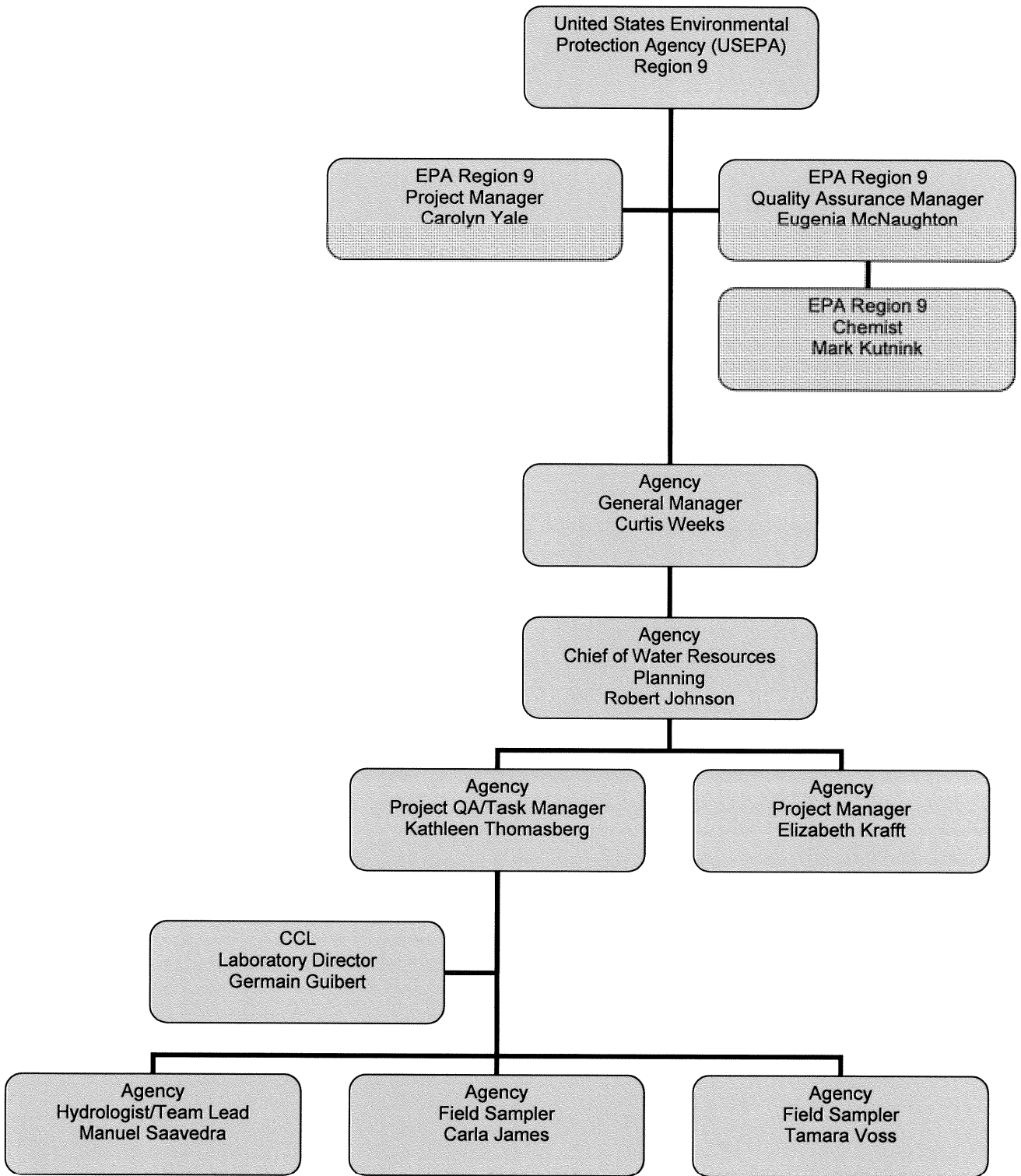
Project QA Manager is in charge of establishing the QA/QC protocols found in the QAPP as part of the sampling and analysis procedures. The QA Manager will also review and assess all analytical data from the contract laboratory and will be the liaison regarding data quality issues and concerns. She may stop all actions, including those conducted by the contract laboratory and will be responsible for ensuring that any amended versions of the QAPP are distributed to the organizations and individuals listed in Section 1.3.

Project Task Manager will oversee the ground water monitoring program. She will ensure that all QAPP protocols are followed and will oversee the writing and revisions of the QAPP. Since the Agency's Water Quality Department is not large, the Project Task Manager will function in the dual role of Task Manager and QA Manager.

Hydrologist/Team Lead will be responsible for coordinating with the Water Resources Technicians/ Field Samplers to review field and analytical requirements, documentation, and sampling schedules.

Water Resources Technicians/Field Samplers will be responsible for sample collection and communication with the contract laboratory regarding the sampling shipment schedule. They are also responsible for writing the QAPP.

ORGANIZATIONAL CHART



1.5 PROBLEM DEFINITION/BACKGROUND

1.5.1 Background

The Monterey County Water Resources Agency's (Agency) mission is to manage, protect, and enhance the quantity and quality of water for present and future generations of Monterey County (County). Monterey County, located along the California Central Coast, covers 3,322 square miles (8604 km²) and has a resident population of 424,842 (Fact Finder, 2007). The County supports a \$3.4 billion agricultural industry (Ag Commission, 2006) and a \$1.75 billion tourism industry (EPA Grant R9#03-238). The primary land use within the Salinas Valley is agricultural. Since the 1940's, irrigated acreage within the valley has increased substantially. Coastal regions of California are subject to rapid urbanization, and the milder coastal climate supports year-round intensive cultivation of many high-value crops (Hunt et al, 2003). As agricultural and urban areas have expanded, so have the water needs of the County (EPA Grant R9#03-238).

The Agency uses a network of wells to monitor ground water conditions in the Salinas Valley Ground Water Basin (Basin) (Geomatrix, 2001). The Basin is situated entirely within the County (EPA Grant R9#03-238). The Salinas Valley is surrounded by the Gabilan and Diablo Ranges on the east, by the Sierra de Salinas and Santa Lucia Range on the west, and is drained by the Salinas River, which empties into Monterey Bay in the north (DWR 1946a) (Fig 1). Four subareas based on differences in local hydrogeology and recharge have been identified (White Paper, 1995; DWR, 2003). These are known as the Pressure, East Side, Forebay, and Upper Valley subareas (Fig 2). These subareas are hydrologically and hydraulically connected (EPA Grant R9#03-238); all information collected to date indicates there are no barriers to the horizontal flow (of ground water) between these subareas (White Paper, 1995). The "boundaries" between these subareas have been identified as zones of transition between different depositional environments in past millennia (White Paper, 1995).

The primary surface water features overlying and influencing the Basin's hydrology are the Salinas River and its tributaries, the Nacimiento and San Antonio reservoirs, and the Monterey Bay (EPA Grant R9#03-238). The Salinas River extends approximately 120 miles from the river's headwaters in San Luis Obispo County, near Santa Margarita, and flows north/northwest and discharges into the Monterey Bay National Marine Sanctuary near Moss Landing in Monterey County (EPA Grant R9#03-238). The Nacimiento and San Antonio reservoirs, located in the upper watershed, serve as storage and flood control for the Basin.

Ground water recharge in Salinas Valley is principally from infiltration from the Salinas River, Arroyo Seco Cone, and to a much lesser extent, from deep percolation of rainfall (White Paper, 1995). Deep percolation of applied irrigation water is the second largest component of the ground water budget, but because it represents recirculation of existing ground water rather than an inflow of "new" water, it is not considered a source of recharge (White Paper, 1995). Nitrate contamination of ground water poses a significant threat to the beneficial use of ground water for drinking water and for some agricultural water uses (White Paper, 1995). Nitrate concentrations exceed drinking water standards in some parts of the Basin (MCWRA, 1997). The principal source of nitrates to ground water is almost certainly excess fertilizer that is leached by rainfall and applied irrigation water (White Paper, 1995).

Seawater intrusion is another source of inflow to the Basin, but because it is not usable freshwater it is also excluded as a source of recharge (White Paper, 1995). Historically, ground water flowed from subareas to the south and east through the (Pressure) and seaward to discharge zones in the walls of the submarine canyon in Monterey Bay (Durbin et al 1978; Greene 1970). Within the Pressure subarea, due to the impermeable nature of the clay aquitard above the 180-Foot Aquifer,

recharge from precipitation, agricultural return flows, or river flow is nil (DWR, 2003). Instead, recharge is from underflow originating in Upper Valley areas such as the Arroyo Seco Cone and Salinas River bed or the East Side subarea, and more recently, from seawater intrusion (DWR, 2003). Heavy pumping of the Pressure-180 Foot and Pressure-400 Foot aquifers has caused significant seawater intrusion into both of these aquifers, which was first documented in the 1930's (DWR 1946a). Ground water flow in the northernmost area of the Pressure subarea has been directed from the Monterey Bay inland since this time (DWR, 2003). With increased pumping in the East Side subarea since the 1970's, ground water flow is dominantly northeast in the Pressure's central and southern locations (DWR, 2003).

Declining ground water levels in the Pressure and East Side subareas, Basin overdraft, ground water contamination, including nitrate and seawater intrusion are serious concerns for the Agency. (EPA Grant R9#03-238)

1.5.2 Program Objectives

The Agency is charged with management of the Basin's ground water resources. Much of the Agency's investigative work pertaining to the occurrence and use of ground water is to identify the quality, quantity, and temporal trends of ground water resources within the County. A network of monitoring wells provides the information needed to manage and protect ground water resources and sustain beneficial uses. In order for the Agency to develop projects to mitigate problems, such as seawater intrusion, local ground water overdraft, and high nitrate concentrations, the Agency must first implement an effective and accurate monitoring program to identify the extent of the potential problem.

The Ground Water Quality Monitoring Objectives are:

- continued monitoring of the ambient ground water quality, including general minerals
- continued monitoring of coastal aquifers (including Pressure Deep Aquifer) for detection of advancing seawater intrusion
- continued monitoring to determine distribution of conductivity in ground water
- continued monitoring to determine distribution of nitrate in ground water and identification of problem areas

Ambient ground water quality will be used to establish a cohesive and succinct Water Quality Management Plan in accordance to the work begun under EPA-I and continued under EPA-II. For the purposes of this QAPP, the EPA-I grant has funded the Agency to develop this QAPP. The EPA-II grant is funding the Agency to implement the sampling described in the QAPP.

1.5.3 Program Goals

The ground water monitoring objectives in the Salinas Valley will be met by the goal of sampling all 344 wells located throughout the four subareas within the Salinas Valley Ground Water Basin, during the 2007 summer field season.

The ground water monitoring objectives along the coast, specifically located within the Pressure subarea will be met by the goal of sampling all 85 monitoring wells, during the 2007 summer field season.

The Agency's overarching goal for this program is the continued monitoring of the Basin's ambient ground water for use in the management of this important resource, and *not* for the purpose of regulatory control.

1.6 PROJECT/TASK DESCRIPTION

1.6.1 Work Statement and Produced Products

The Salinas Valley Ground Water monitoring will sample 344 wells located throughout the Salinas Valley Ground Water Basin for ten constituents (Table 1). Each well will be sampled once. Samples will be collected during the 2007 summer agricultural growing season and analyzed for a complete mineral panel. The Coastal Ground Water monitoring will sample 85 wells located within the area of historic seawater intrusion. Each well in the Coastal Program will be sampled once a month during the agricultural growing season. The first month's sample will be analyzed for complete mineral panel and the two remaining sampling events will be analyzed for partial mineral panel (three constituents) (Table 1). All water monitoring samples will be delivered the same day as collected to the contract laboratory for analysis.

All ground water sampling locations are accessible using a 4-wheel drive vehicle. All samples will be collected as a grab sample. All sampling locations will be recorded using global positioning system (GPS) equipment, and digital pictures will be taken at each site.

After laboratory analysis and data validation is completed, a technical memorandum (EPA II, XP-96995301 Task 2 Water Quality Assessment) will be written and submitted to US EPA. The technical memorandum, EPA II, XP-96995301 Task 2 Water Quality Assessment, will include result tables for chloride, nitrate, and specific conductivity, and maps of chloride, nitrate, and specific conductivity gradient contours.

1.6.2 Constituents to be monitored and measurement techniques

Samples will be sent to an off-site laboratory for analysis. Ground water samples will be analyzed for either complete or partial mineral panels. A complete mineral panel includes calcium, cation-anion balance, chloride, conductivity, magnesium, nitrate, pH, potassium, sodium, sulfate, and total alkalinity. A partial mineral panel consists of chloride, conductivity, and nitrate.

Sample analysis will be performed at the Monterey County Consolidated Chemistry Laboratory (CCL), which is part of the Environmental Health Department. Listed below is the laboratory's contact information and ELAP Certification number.

<i>Laboratory Name</i>	<i>Contact Information</i>	<i>Abbreviation</i>
Monterey County Consolidated Chemistry Laboratory ELAP Certification No 1395	1270 Natividad Road Salinas, CA 93906 Phone: 831-755-4516 Fax: 831-755-4652 http://www.co.monterey.ca.us/health	CCL

1.6.3 Project Schedule

The proposed project schedule is summarized below.

Prior to Sample Collection

- January 2006 - : Develop project strategy
- January 2007
- 15 January, 2007 : Submit Draft QA Project Plan
- 22 March, 2007 : Receive review comments on QA Project Plan from US EPA
- 6 July, 2007 : Submit Draft Final QA Project Plan
- 13 July, 2007 : Obtain QA Project Plan approval (to begin fieldwork)
- 20 July, 2007 : Submit Final QA Project Plan (signatory copy) EPA R9#03-238; X-97994701-0

Sample Collection

- August 2007 - : Coastal Ground Water (each well 3x, once per month)
- September 2007
- August 2007 - : Salinas Valley Ground Water (each well 1x)
- September 2007

Post Sample Collection

- November 2007 : Compile all remaining laboratory analyses reports
 - 1 - 15 December, 2007 : Evaluate laboratory data for QA/QC requirements
 - 15 December, 2007 : Copy of analytical results sent to well owner/operators
 - 16 - 31 December, 2007 : Summarize and tabulate data
 - January 2008 : Write Technical Memorandum (EPA II, XP-96995301 Task 2 Water Quality Assessment)
 - March 2008 : Submit Technical Memorandum (EPA II, XP-96995301 Task 2 Water Quality Assessment) to US EPA
-

1.6.4 Geographical Setting

The Salinas Ground Water Basin encompasses approximately 537.5 square miles (1,392 km²). The regional ground water flow is to the northwest. Seawater intrusion is a result of coastal pumping (Figure 3). Ground water pumping can dramatically impact localized coastal ground water flow.

1.6.5 Constraints

Ground water samples must be taken from the well while the pump is operating to ensure that the sample is representative of the aquifer and not standing water within the well casing. The Agency wants to measure the water quality when the aquifers are stressed due to pumping. For this reason the 2007 field sampling season will coincide with the agricultural irrigation season.

1.7 DATA QUALITY OBJECTIVES FOR MEASUREMENT DATA

This section describes the data objectives of the project and defines the measurement performance criteria deemed necessary to meet those objectives.

1.7.1 Objectives and Project Decisions

In Monterey County the Salinas Valley and Coastal Ground Water ambient monitoring programs are designed to characterize the ground water quality conditions of the Basin. All data generated from the sampling program in this project are tabulated as they have been over the many years of the program. Data generated from these monitoring activities allows the Agency to track changes in ground water quality over time and to assess potential impacts to ground water in the Basin. Water resource management and policy decisions may follow based on maps and tabulated data generated as a part of this project (program).

For the coastal ground water sampling program, the general mineral data are evaluated to determine if seawater intrusion is progressing landward as indicated by increasing well chloride values. The chloride values for all wells are evaluated, and then the 500mg/L chloride isochlor contours are mapped for the two coastal aquifers. When the maps are published, the information generated by MCWRA staff and approved by the MCWRA Board of Directors, is posted and passed on to Monterey County departments, regional government regulatory agencies, and public / private entities via the MCWRA web page, presentations, public meetings, and networking.

Monterey County departments such as the Planning Department and Health Department utilize the advancement of seawater as it relates to potable water and public health, while the agricultural community becomes aware of the proximity of their wells to the intrusion advancement, and the possible need for funds to drill new, deeper, wells and destroy the older high nitrate wells. Actions by regulators, depending on the entity, are related to prioritization of Regional Watershed and Water Quality Action Plans, and the associated success of MCWRA capital projects to halt seawater intrusion as governed by the State Water Resources Control Board adjudication process.

Actions by the MCWRA after the landward advancement of seawater have been ongoing for many years. Actions include consideration of more stringent Monterey County well drilling ordinances for assuring the continued prevention of cross-aquifer contamination in the coastal Salinas Valley, "Zone 6 Drilling Standards", April 19, 1988; the development and implementation of the Monterey County Recycling Projects, a tertiary treatment plant and treated water distribution system, to help further reduce agricultural pumping in the coastal Salinas Valley for halting seawater intrusion; and future use of these data will be utilized by the newly established Seaside Watermaster for comparison to and the development of the Monterey Peninsula seawater intrusion front.

For the Salinas Valley general mineral ground water sampling program, nitrate data tabulation and map representation has been the focus of the MCWRA for many years. All results over the laboratory's practical quantitative limit generated from this program are tabulated to evaluate the minimum, maximum, median, and mean value of nitrate as NO_3 in mg/L for each of the Salinas Valley Hydrogeologic Subareas.

For the Salinas Valley monitoring program, the Agency sends the general mineral testing results, including nitrate, to the well owners/growers who operate the wells sampled. Also, in this transmittal, the well operators are also provided with a conversion sheet of the nitrate concentration from mg/L nitrate as NO_3 to pounds of nitrate per acre inch of water, agricultural terms. If a nitrate

value in ground source water is elevated, then that growers can incorporate this available nitrate into their fertilizer crop scheduling. This is a method for growers to reduce applied nitrate to crops, while maintaining maximum crop productivity.

And, as with the Coastal monitoring program, the tabulated and mapped Salinas Valley nitrate data are posted and passed on to Monterey County departments, regional government regulatory agencies, and public / private entities via the MCWRA web page.

The MCWRA uses the well nitrate data during the technical well application review process. Monterey County Health Department (Health Department) issues well permits after the Agency provides a technical review of well applications for new, abandoned, or repaired wells. The well application proposal is evaluated with other well construction and water quality within a one miles radius of the new well and represented on a map. Agency staff makes qualitative recommendations to the Health Department on the new well's sanitary seal based on other well seals, the perforated intervals, and the nitrate values of wells in the area. The final decision for the well construction is made by the Health Department after the well drilling progresses.

Actions taken by the MCWRA are conditional. If extreme nitrate values are observed in agricultural production wells, then re-sampling of the wells may take place to confirm the elevated concentrations and may lead to increased sampling points for wells in the same vicinity and with the same well design. Continued increases in Salinas Valley ground water nitrate values could lead to special nitrate investigations on movement of nitrate in ground water and also outreach to the public on the reduction of nitrate to the environment.

1.7.2 Action Limits/Levels

Since the overarching goal for this project is the continued monitoring of ambient ground water, the Agency has set no specific water quality standards. As a result, the laboratory's practical quantitation limits (PQL) will serve as the Project Action Levels (PALs). Table 1 provides a listing of the parameter to be sampled and a summary of the laboratory's method detection limit, those minimum concentrations that can be detected above the instrumental background/baseline signal noise. Table 1 also provides the PQL, lowest calibration standard and PALs required by the Agency for the QAPP. The quality limits listed are deemed acceptable by the Agency to meet the project objectives.

1.7.3 Measurement Performance Criteria

The objective of data collection for this Monitoring Project is to produce data that represent the *in situ* conditions of the ground water. This objective will be achieved by using accepted standard methods for water collection and analysis and defining data quality indicators (DQIs) for each analytical parameter. The DQIs include accuracy, precision, comparability, sensitivity, completeness, and representativeness and are defined below and presented in Table 2. Some DQIs will be assessed quantitatively, while others will be qualitatively assessed. Example calculations have been provided for quantitative assessments and appropriate quality control (QC) samples have been identified. Laboratory Data Quality Objectives are given in Table 3.

Accuracy, or bias, is a measure of how close a result is to the expected value of the target analyte in a sample. Accuracy will be determined by the analysis of certified reference materials and matrix spikes, where the results can be compared with an expected value and expressed as %recovery. This is an assessment of laboratory analytical methods. For Laboratory Control Samples (LCS), it will be expressed as %recovery by the following equation:

$$\% \text{Recovery} = \frac{X}{T} \times 100$$

where,

X = Measured concentration
T = True spiked concentration

or, for Matrix Spike (MS) samples, by the following equation:

$$\% \text{Recovery} = \frac{(B - A)}{T} \times 100$$

where,

B = Measured concentration of spiked sample
A = Measured concentration of unspiked sample
T = True spiked concentration

The frequency of the LCS and MS samples associated with the analytical parameters will be 5%. MS and MSD samples will be spiked at 3-10 times the native sample concentration.

Accuracy/bias as related to contamination involves both field and laboratory components. Field blanks will be collected at a frequency of 5%. Laboratory blanks will be prepared and analyzed at a one per batch or 5% frequency.

Precision is concerned with the ability to quantitatively repeat results. To demonstrate the precision of a method or instrument, field duplicates will be collected, analyzed, and their results compared. Precision is expressed as relative percent difference (RPD) by the following equation:

$$\text{RPD (\%)} = \frac{|X_1 - X_2|}{(X_1 + X_2) / 2} \times 100$$

where,

X₁ = Original sample concentration
X₂ = Duplicate sample concentration
|X₁ - X₂| = Absolute value of X₁ - X₂

Field duplicates will be collected at a frequency of 10% for the first two sampling events. If the criterion of <25% RPD is met, then the remaining field duplicates will be collected at a 5% frequency. Laboratory duplicates will be prepared and analyzed at a one per batch or 5% frequency.

Comparability of the data can be defined as the similarity of data generated by different monitoring programs. Comparability helps to measure the scientific coherence and validity of a project. This objective is addressed primarily by using standard sampling and analytical procedures. Additionally, comparability of analytical data is addressed by result comparison of certified reference materials.

Sensitivity of the analytical instrument or method is the ability to detect and quantify an analytical parameter at the concentration level of interest. Sensitivity can be evaluated by method or instrument detection limit studies (MDL and IDL) or calculated practical quantitative limits (PQL) and method report limits (MRL).

Completeness is a measure of the amount of successfully collected and validated data relative to the amount of data planned to be collected for the project. Project completeness is typically based on the percentage of the data needed for the program or study to reach statistically valid conclusions. Because the SVIWMP is a monitoring program, data that are not successfully collected for a specific sample event or site can typically be recollected at a later sampling event. For this reason, most of the data planned for collection can not be considered statistically critical, and it is difficult to set a meaningful objective for data completeness. However, some reasonable objectives for the data are desirable, if only to measure the effectiveness of the Monitoring Program. %Completeness will be expressed by the following equation:

$$\%Completeness = \frac{N}{T} \times 100$$

where,

N = Number of usable results

T = Total number of samples planned to be collected

A completeness goal of 90% has been set for the ground water monitoring program.

Representativeness can be defined as the degree to which the environmental data generated by the monitoring program accurately and precisely represent actual environmental conditions. This objective is addressed by the overall design of the monitoring program. Specifically, assuring the representativeness of the data is addressed primarily by selecting appropriate locations, methods, times, and frequencies of sampling for each environmental parameter, and by maintaining the integrity of the sample after collection. Representativeness judges how well a single sample can describe the conditions of an entire sample population. Accurate, artifact-free sampling procedures and appropriate sample homogenization achieve representativeness.

1.8 TRAINING REQUIREMENTS/CERTIFICATION

1.8.1 *Training of Field Personnel*

A specialized training requirement for this project is for the use of Global Positioning Systems (GPS) Technology. Training in the use of handheld GPS units and software will be performed on an individual basis between the trainer and the trainee. Training will be provided by staff experienced in the use of GPS and Geographic Information Systems (GIS).

Field personnel will also be given initial instructions prior to the beginning of sample collection activities. These initial instructions will help familiarize the field personnel with sample collection containers, sample handling techniques, chain-of-custody forms, and sample transport. New field personnel will be accompanied by a trainer in the field as part of the initial instructions. All field samplers have completed a four-hour training session in the field. Training included confirmation of the well ID electrical meter tag number and MCWRA tag number, recognizing the appropriate sampling port, sample collection technique, proper handling of the sample during transportation to the lab, and accurate completion of the chain-of-custody forms. The completion of field training session has been documented in the Agency's personnel files.

All field personnel will follow sample collection procedures from accepted methods for the collection of ground water. Sample collection will follow protocols in accordance with recommended guidelines established by the U.S. Geological Survey (USGS) for ground water collection as described in the

National Field Manual for the Collection of Water-Quality Data, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 9, Chapters A1-A9. Field personnel will be familiar with the above-mentioned document.

Field personnel will also read and be familiar with this Quality Assurance Project Plan (QAPP) prior to beginning any sample collection activities.

1.8.2 Training of Laboratory Personnel

No specialized training of laboratory personnel is required for this project. The ground water constituents to be analyzed by the laboratory are routine and do not require additional expertise. In addition, the laboratory's QA plan notes that analysts 'must conduct sufficient preliminary tests using the methodology and typical samples to demonstrate competence in the use of the measurement procedure'.

1.8.3 GPS Training Documentation

Documentation of field personnel training for GPS includes: the name of the staff member being trained, the training date, the name of the trainer (instructor), and a checklist of satisfactory completion of each step. These training records are stored inside a monitoring binder and filed in the Agency's Water Quality Section. A sample GPS training record is attached in Appendix A.

Training documentation of laboratory personnel for routine methods is kept on file at the Consolidated Chemistry Laboratory (CCL). The CCL has written a policy regarding laboratory personnel training in their lab QA plan.

1.9 DOCUMENTATION AND RECORDS

1.9.1 QA Project Plan Distribution

The MCWRA Hydrologist/ Team Lead will safeguard the original QAPP and any subsequent revisions (both hard and electronic), plus keep a record of the distribution list in order to send out amendments to the QAPP and retrieve any obsolete versions (from the individuals listed earlier in section 1.3).

1.9.2 Field Documentation and Records

All field documentation generated by the sampling program will be kept on file in the Water Quality Section of the Agency. Field documentation includes field sheets, chain of custody (COC) forms, photographs, and labels (see Appendix B for examples of each).

1.9.2.1 Field Sheets

Field sheets are used to aid in the identification of each ground water source (well). The field sheets list the name of each well (as assigned by the well owner) and the State Well Number. The field sheets also contain a section that describes who the sampler should contact in order to have a well turned on, where to find the sample port, etc. The sampler is responsible for recording the sample date and time on the field sheet. Site observations should be written in the comments section of the field sheet, and initialed by the sampler. Site observations may include information such as detailed directions to the well location, changes to the electrical meter tag number, and the owner contact name and phone number. Field sheets also contain PG&E electrical meter numbers, which can be either verified or updated while the sampler is in the field.

Field sheets are double-checked by the sampler for completeness and accuracy while still in the field. The sampler should look for: incomplete and/or missing data/omissions, incorrect or invalid information, and clarity problems. Any discrepancies should be cleared up before the sampler leaves the field. Data that has been entered by one field sampler will be reviewed by a different field sampler to verify that no transcription errors have occurred. These data entry reviews will take place at least weekly.

Original field sheets are categorized (according to Coastal wells or Salinas Valley wells) inside binders which are kept in the Water Quality Section at the Agency for a period of 10 years. After such time, the copies are transferred to the Monterey County Record Retention Center and archived for a period of 5 years.

Data collected on field sheets will also be recorded electronically and stored in an Access database inside a shared network drive that is backed-up on a daily basis. These electronic records will be retained permanently.

1.9.2.2 Chain Of Custody (COC) Forms

Chain-of-custody (COC) forms will be provided by the Consolidated Chemistry Laboratory and filled out while the sampler is in the field. The COC will accompany the samples at all times in order to insure the custodial integrity of the samples. A sample is considered to be in custody if it is: in someone's physical possession, in someone's view, locked up, or secured in an area that is restricted to authorized personnel.

Care should be taken to protect the COC from physical damage (i.e., water, wind, etc). The COC will have the following information:

- Client Code
- Client Name
- Client Address
- Client Phone Number
- Client Fax Number
- Report Attention
- Sampler Name
- Collection Date
- Collection Time
- Sample Site (identified by state well identification number) or QC sample (if appropriate)
- Sample Type (all of the samples in this project will be **grab** samples)
- Matrix (all of the samples in this project will be **ground water** samples)
- Analyses Requested

Upon relinquishing the sample(s) to the Consolidated Chemistry Laboratory, the sampler will sign and date the COC form. Lab personnel will then receive the sample(s), mark the date and time received, assign unique lab identification numbers (lab IDs) to each sample, and sign the COC form. The signed COC form is then photocopied; the lab keeps the original, and a copy is given to the sampler.

Hard copies of COC forms are categorized (Coastal wells or Salinas Valley wells) inside binders which are kept in the Water Quality Section at the Agency for a period of 10 years. After such time,

the copies are transferred to the Monterey County Record Retention Center and archived for a period of 5 years.

Electronic COC information is also stored in an Access database inside a shared network drive that is backed-up on a daily basis. These electronic records will be retained permanently.

1.9.2.3 Photographs

The Agency maintains a photo catalog which contains photographs of the Coastal well site locations. The photo catalog is carried into the field to assist with the identification of each well. If there are significant changes to the appearance of the well site, then staff will take a new digital photo. The old photo in the catalog will then be replaced with a copy of the new photo. Photographs will be taken of the Salinas Valley wells after confirming the correct well location of each.

Two photographs of each well location will be taken using a high resolution digital camera. One photograph will be from a distance of 100 ft. or more to aid in the identification of the correct site location. The second photograph will be a close up of the well and pump head, which will be used to verify location of the correct sampling port. Printed hard copies of these two photographs for each well will be kept in the photo log book and labeled with the state well identification number as listed on the field sheets.

Photographs will serve to help verify information entered into the field sheets. Photographs are stored in an electronic database and labeled according to site number and date last photographed. Previous photos will be archived electronically for retrieval purposes if the need arises.

1.9.2.4 Labels

Labels for each sample site are pre-printed on Avery (size 5163) sheets (10 labels per sheet). Indelible ink will be used on the labels and clear packing tape will be applied over the label to prevent it from coming off if it gets wet. Each label will have the following information:

- Sample Site (pre-printed)
- Collection Date (to be filled out in the field)
- Collection Time (to be filled out in the field)
- Analyses Requested (complete or partial mineral panel)
- Sampler Name (to be filled out in the field)
- Comments (if any)

The sample site name (state well identification number) will serve as the unique identifier for each sample (e.g. 14S/02E-08M02). When the samplers arrive at the CCL a unique in-house lab number is assigned to each sample.

1.9.2.5 Field Quality Control Sample Records

Quality Control samples from the field will be identified using the state well identification number plus either -1 or -2 (e.g. 14S/02E-08M02-1, for a field blank).

- -1 = Field Blank
- -2 = Field Duplicate

1.9.3 *Laboratory Documentation and Records*

The Consolidated Chemistry Laboratory will keep a sample receiving log containing the completed COC forms submitted with the samples collected for this project. The CCL will keep records of all analyses performed as well as associated QC information, including: laboratory blanks, laboratory duplicates, matrix spikes, matrix spike duplicates and laboratory control samples. Hard copy data of analytical results will be maintained for three years by the CCL. The CCL maintains a Laboratory Information Management System (LIMS) which will be used to store electronic data.

The data generated by the CCL for each sampling event will be compiled into individual data reports. The individual data reports will include the following information:

- Sample results and associated Quantitative Limits (QLs)
- Cation-Anion Balance Sheet
- QC check sample records and acceptance criteria for the following:
 - Laboratory Control Sample(s)
 - Matrix Spike(s)
 - Matrix Spike Duplicate(s)
 - Analytical Duplicate(s)
 - Method Blank(s)
- Project narrative including a discussion of problems or unusual events (including, but not limited to, topics such as: receipt of samples in incorrect, broken, or leaky containers, with improperly or incompletely filled out COC forms; receipt and/or analysis of samples after the holding times have expired; summary of QC results exceeding acceptance criteria; etc.)

The above information is logged into the LIMS database at CCL.

The Public Health Chemist of the Consolidated Chemistry Laboratory will be responsible for reviewing, validating, and/or qualifying results on the data reports. Any deviations from sample preparation, analysis, and/or QA/QC procedures will be documented. Departure from QC acceptance limits will be highlighted. Once the data reports are finalized, the hard copy will be sent to the Project QA Manager at the Agency.

At the end of the sampling season, all data for both programs (Coastal and Salinas Valley) will be electronically transferred to the Agency. After data verification, the Agency Hydrologist/ Team Lead will upload the data to the Agency's Water Resources Agency Information Management System (WRAIMS) relational database.

1.9.4 *Technical Reviews and Evaluations*

Technical reviews and evaluations are limited to Field Activities and Laboratory Data Review Checklists.

1.9.4.1 *Field Activities Review Checklist*

Field personnel will be required to fill out a Field Activities Review Checklist as part of the double-check process upon returning from the field after each sampling event (see Appendix C).

1.9.4.2 *Laboratory Data Review Checklist*

Laboratory data reports from the CCL will be routed to the Project QA Manager at the Agency, who will do a preliminary assessment of the data. The data reports will then be given to the Agency

Hydrologist/ Team Lead who will be responsible for completing a Laboratory Data Review Checklist (see Appendix C).

1.9.5 Technical Memorandum

The Agency Project QA Manager is responsible for the preparation of the technical memorandum. The technical memorandum will be written in the "post sample collection" phase (see section 1.6.3). The technical memorandum will be submitted to USEPA for review by the EPA Region 9 Project Manager.

The technical memorandum will contain the following elements:

- Table of results for Chloride
- Table of results for Nitrate
- Table of results for Specific Conductance
- Map of Chloride contours for 500 mg/L values
- Map of Nitrates showing those sites which have values above and below the Drinking Water Standard Limit of 45 mg/L (nitrate as NO₃)
- Map of Conductivity contours

2.0 DATA GENERATION AND ACQUISITION

2.1 SAMPLING DESIGN

In the Salinas Valley, there are four hydrogeologic subareas: Pressure, East Side, Forebay, and Upper Valley. All four subareas were selected using a directed sampling design approach. These subareas were selected deliberately based on knowledge from previous monitoring work to contain analytes of interest, specifically nitrate and conductivity in the Salinas Valley Program, and chloride and conductivity in the Coastal Program. Actual sampling sites/wells within the Salinas Valley Basin Monitoring Program were chosen using a non-deliberate sampling approach. The wells included are acquired opportunistically. Site accessibility is a key issue for sampling. Permission of property owners must be secured before accessing private wells.

There are just over 1700 active wells in the Salinas Valley. Of this total number of wells, 344 wells make up the Salinas Valley Ground Water program and 85 wells make up the Coastal Ground Water program. The wells that make up these two programs have all been sampled in the past; some have data sets as far back as the 1950's, when this was a State of CA Department of Public Works (now the Department of Water Resources) program. The Agency wants to keep as complete and continuous a data set for each of these wells as possible.

Due to the time constraints the Agency is facing during this shortened 2007 field season, June - September, staff will prioritize which wells within the Salinas Valley portion of this project will be sampled. Wells to be sampled first will be located within approximately one mile radius of municipalities and industries (such as vegetable packing plants). We refer to these areas as high beneficial use areas. Ground water wells will be identified by State Well Numbers (Township, Range, Section, and Subsection).

All wells are high production agricultural wells. All wells are sampled in the same way, if the pump is in operation then a sample will be collected. If the pump is not operating then the field sampler will note it on the field sheets and come back to the well at a later date when the well is in operation. The pump must be operating for a sample to be collected. The age of well does not alter sampling

protocols. If a well is found to have been abandoned since the Agency last sampled the well, a notation will be made on the field sheets and the well will be removed from future sampling efforts.

2.1.1 Salinas Valley Ground Water

While it is known that high levels of nitrates exist in some aquifers of the Salinas Valley Ground Water Basin, a significant sampling effort to determine the extent in the ground water has not been conducted by the Agency for several years. There are a total of 344 sample locations within the Salinas Valley monitoring program. Sample locations are operational ground water wells, the majority of which are used for agricultural irrigation. The Pressure subarea has 158 wells, the East Side subarea has 66 wells, the Forebay has 84 wells, and the Upper Valley has 35 wells (Figures 4-7). Each of these wells will be sampled once during the 2007 summer field season (July-September). The primary criterion currently used to determine if a well will be included in the Salinas Valley monitoring program has been its status as previously sampled. This program is an ongoing ambient ground water monitoring program and continuity in sampling the same wells each field year is of prime importance, especially for water quality trend analysis. Other factors that are important in deciding if a well should be included in the monitoring program are; copy of the well completion report (commonly referred to as the driller's log), location of the perforation interval along the well casing to determine which aquifer is sampled, age of the well, and construction method used to drill the well. Additionally it is useful to know the proximity of the well to other water use (industrial, municipal, or domestic) areas. A list of Salinas Valley well names and locations are given in Table 4. All wells on this program are planned to be part of the monitoring design for subsequent years. Until these monitoring wells are abandoned or destroyed, they will remain part of this program.

2.1.2 Coastal Ground Water

The Agency currently conducts a seawater intrusion monitoring and mapping program (EPA II). This program will continue to evaluate the extent and status of seawater intrusion in the coastal areas of the Salinas Valley Basin (EPA II). The Coastal portion of the ground water program contains 85 wells, most of which are located in the Pressure subarea (Figure 8). Each well will be sampled three times, once each month of the summer 2007 field season (July-September). The first sample collection at each well will be analyzed for a complete mineral panel (Table 1), and following two collections will be analyzed for a partial mineral panel (Table 1). There are 21 wells located in the Pressure 180-Foot Aquifer, 52 wells within the Pressure 400-Foot Aquifer, two wells with perforations within both the Pressure 180-Foot and 400-Foot Aquifers, four wells are located within the Pressure Deep Zone Aquifer, three in the East Side Deep Aquifer, one in the East Side Shallow Aquifer, and one in the Prunedale Aquifer. The principal criterion for inclusion in the Coastal monitoring program is historical sampling and well availability. Additional criteria for selecting a well for inclusion into the Coastal monitoring program are: a well completion report, location of the perforation interval along the well casing to determine which aquifer is sampled (180, 400, or deep zone AQ), well age, and well construction type. A list of Coastal sites and their representative aquifers are listed in Table 5.

It can not be stressed enough how important the continued monitoring of these ground water wells are for the Agency to meet its mission of monitoring the quality of the County's ground water resources. Some of these well have been sampled since the 1950's and the loss of such a long term water quality record within the County of Monterey would irreplaceable.

2.2 SAMPLING METHODS

The objectives of the sampling procedure are to minimize changes in ground water chemistry during sample collection and transport to the laboratory, and to maximize the probability of obtaining a representative, reproducible ground water sample. This well-volume purging procedure provides a reproducible sampling technique with the goal that the samples obtained will represent water quality over the entire screen interval of the well.

Standing water in the well casing can be of a different chemical composition than that contained in the aquifer to be sampled. Solutes may be adsorbed on to, or desorbed from the well casing material, oxidation may occur, and biological activity is possible. Therefore, the stagnant water within the well must be purged so that the sample is representative of the aquifer. As a result, a well may be sampled only after the pump has been in operation for at least 15-20 minutes.

All the wells included in this project, from both the Salinas Valley area and the Coastal monitoring area are high production agricultural wells that contain deep turbine pumps operating at 500-1200 gallons per minute (gpm). Over the years of managing the ambient monitoring program, the Agency has determined that operating a deep turbine pump for 15-20 minutes before taking a sample is sufficient time to clear the entire well casing of three well volumes for ensuring a representative well sample. For referencing well casing volume, the Agency uses the well casing size provided in the well completion reports (driller's log) for each of the wells included in this monitoring program (National Field Manual for the Collection of Water-Quality Data, Chapter A2).

Sample bottles and caps are rinsed three times with ambient ground water prior to collection. The sample container is then filled, tightly capped, and labeled. No field sample filtration is required. Samples are put into a cooler with ice immediately and maintained at 4°C and delivered to the laboratory daily. See Table 6 for sample collection requirements. Extra sample containers, caps and field supplies will be carried in the truck as back-up should any problem arise in the field. Additionally, the Field Sampler will carry and maintain an updated hardcopy of the QAPP in the field to be used as a reference.

The following precautions will be followed in order to limit sampling error at the wellhead:

- Operate the pump long enough to produce water that is representative of the aquifer and not stagnant water from the casing.
- Take samples at the wellhead or near the wellhead and away from fertilizer injection ports.

Sample collection will follow protocols in accordance with recommended guidelines established by the U. S. Geological Survey (USGS) for ground water collection as described in the National Field Manual for the Collection of Water-Quality Data.

The National Field Manual for the Collection of Water-Quality Data, U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 9, Chapters A1-A9 is maintained as a web-based document and is located at <http://pubs.water.usgs.gov/twri9A>. Updates and revisions for the National Field Manual can be found using this web-based approach.

2.3 SAMPLE HANDLING AND CUSTODY

This section describes how all samples will be treated after collection, during transport, and upon arrival at the CCL. It also includes information on proper sample disposal after laboratory analysis.

2.3.1 *Sample Containers and Preservatives*

Sample containers to be used in this project are high density polyethylene (HDPE), one pint (~0.5 L) and 0.5 gallon (~2 liter) sizes, for partial mineral or complete mineral analyses, respectively. The Agency has used these same sample container types during previous years of this ongoing ambient monitoring program and has never had any problems with container contamination issues. Field blanks will be closely monitored and, should a problem arise, corrective actions will be taken. Only one container (pint *or* half gallon) is needed per sampling site to provide the necessary volume to run the required lab analyses (see Table 6). Sample containers and caps are purchased in bulk from a plastic container manufacturer (Consolidated Container Company). The caps for the containers are packaged separately. The containers and caps are clean upon receipt, as long as they arrive with the outer cardboard packaging intact. The containers will be kept in a closed, dry environment away from the outside elements. Sterility is not of importance because this sampling project does not include microbiological testing. As previously mentioned, all containers and caps will be rinsed three times with ambient sample water prior to sample collection.

Sample containers are labeled with pre-printed labels, which lists which panel of analytes is requested, either complete mineral or partial mineral. The collection date, collection time, and sampler name are recorded in the field with an indelible marker. After being filled out, labels will be covered with clear plastic tape (packaging type) to protect the labels from destruction during transport.

No chemical *field preservation* of the samples is required. All samples will be kept at $4\pm 2^{\circ}\text{C}$.

Preservation of samples, if required prior to analysis, will be the responsibility of the contract lab (CCL). Part of the CC lab sample receiving protocols includes lab personnel verifying, at the time of sample receipt, if any samples require lab preservation. Refer to Table 6 for listings of preservatives for specific analytes.

2.3.2 *Sample Packaging and Transport*

All samples will be handled, prepared, transported and stored in a manner so as to minimize contamination and spills. After collection, sample caps will be checked for tightness, and the samples will be put in ice chests immediately. During travel between sites, ice chest lids will be kept tightly closed in order to keep the samples at the correct temperature and protect them from sunlight. Ice used for maintaining sample temperature will be double-bagged inside durable plastic bags (Ziploc type) and be of sufficient quantity so that all samples will be stored at $4\pm 2^{\circ}\text{C}$. Maximum holding times for specific analytes are listed in Table 6.

2.3.3 *Sample Custody*

Chain of custody (COC) procedures require that possession of samples be traceable from the time the samples are collected until completion and submittal of the analytical results. A completed chain of custody form is to accompany the samples to the contract laboratory (CCL). Requirements for COC paperwork can be found in Section 1.9.2.2 of this document.

All samples collected for this project will be transported from the field to the CCL via an Agency vehicle. The field sampler will deliver the samples directly to the CCL daily; there will be no intermediary transfers. Samples need to arrive at the CCL no later than 15:00, to ensure log-in and laboratory preservation. Personnel at the CCL will examine the samples for correct documentation and holding times. The CCL will follow sample custody procedures as outlined in their QA plan (see Appendix D).

2.3.4 *Sample Disposal*

All samples remaining after successful completion of analyses will be disposed of properly. It is the responsibility of the personnel at the CCL to ensure that all applicable regulations are followed in the disposal of samples or related chemicals. Sample disposal procedures used by the CCL are discussed in their QA plan (see Appendix D).

2.4 ANALYTICAL METHODS

All samples will be analyzed at the County Consolidated Chemistry Laboratory (CCL). Analyses will be performed following either EPA approved methods or methods from *Standard Method for the Examination of Water and Wastewater, 18th Edition*, see Table 1 (CCL's QA Manual cites *18th Edition*, see Appendix D). Standard operating procedures (SOPs) from CCL have been included in Appendix D for each of the analyses. Should there be any deviation from these SOPs the Laboratory Director must contact the Project QA Manager.

The CCL will submit a data report and associated QC results after analyses are complete to the Project QA Manager. This data report is described in Section 1.9.3. After a preliminary assessment the Project QA Manager will pass the data on to the Team Lead, who will review the data report and QC results and evaluate its quality and usability in addressing the Project objectives.

2.5 QUALITY CONTROL

2.5.1 *Field Sampling Quality Control*

The assessment of field measurements will be determined from the collection and analysis of field blanks and field duplicates. For this monitoring program the field blanks will be collected at one every 20 samples or a frequency of 5%. Field duplicates will be collected at a frequency of 10% for the first two sampling events. If the criterion of <25% RPD is met, then the remaining field duplicates will be collected at a 5% frequency. Analytical acceptance criteria and corrective actions for field QC are listed in Table 2.

Deionized (DI) water will be acquired from the CCL and kept at $4\pm 2^{\circ}\text{C}$, while transported into the field. Field blank samples will be obtained by pouring DI water into a pint (~500 mL) HDPE sample container that has been triple-rinsed with DI water at the sampling location. The container will be tightly capped, placed in the cooler and delivered to the contract laboratory. Field blanks are labeled with the sampling location (State Well Number) followed by "-1".

Field blanks will be used to evaluate the collection process (from field sampling through sample analysis) for contamination from exposure to ambient conditions, from sample containers or from improper sampling and handling technique. If target analytes are found in field blanks, sampling and handling procedures will be reevaluated and corrective actions taken. Corrective actions may consist of, but are not limited to, re-training of field personnel, discussions with the contract laboratory, invalidation or qualifying of results.

Field duplicates will be collected for every analytical parameter. The duplicate sample will be collected immediately after collection of the native, following the same sampling protocols. Field duplicates are labeled with the sampling location (State Well Number) followed by "-2".

Field duplicates will be used to evaluate the precision of the sample collection through analysis. The combined variability from sampling and analysis technique, in addition to sample heterogeneity, will

be assessed using field duplicates. If acceptance criteria are exceeded, field sampling and handling protocols will be reviewed and problems corrected. These may consist of, but are not limited to, additional training, revised sampling techniques and reevaluation of sampling location.

2.5.2 Laboratory Analyses Quality Control (Contract Laboratory)

The Monterey County Consolidated Chemistry Laboratory's (CCL) personnel are responsible for analytical Quality Control. Standard laboratory quality control elements include method blanks, laboratory control samples, analytical duplicates, matrix spikes and calibration procedures. Laboratory data quality objectives include QC acceptance criteria, frequency of analysis, and corrective actions. These data quality objectives and quality control elements for CCL are described in its QA Manual (Appendix D) and SOPs (Appendix D) and are listed in Table 3. After examination of these documents, the Agency believes that the laboratory will be able to meet the project data quality needs. Any deviation from these written procedures must be documented by the laboratory and reported to the Project QA Manager.

2.6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

Testing, inspection, and maintenance of laboratory equipment are the responsibility of the Monterey County Consolidated Chemistry Laboratory and are detailed in its QA manual in Appendix D.

2.7 INSTRUMENT CALIBRATION AND FREQUENCY

Instrument calibrations are the responsibility of the Monterey County Consolidated Chemistry Laboratory and acceptance criteria for calibrations are detailed in its QA manual in Appendix D.

2.8 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES

2.8.1 Initial Inspection of Supplies

As mentioned previously in Section 2.3.1, sample containers are purchased in bulk from an outside vendor who specializes in supplying plastics to the beverage industry. An initial inspection will be conducted upon receipt of each shipment. Each shipment will be considered acceptable for use if *all* of the following are true:

- The shipment arrives with the outer cardboard packaging intact.
- The containers are the correct type (HDPE) and size (0.5 gal/~2L or 1 pint/~0.5L).
- The insides of the containers are dry.
- The insides of the containers are free of dirt or any particulate matter.

2.8.2 Field Inspection of Supplies

Immediately prior to sample collection, field samplers will visually inspect each sample container for the following:

- Dirt or any particulate matter
- Cracks of any size
- Improper fit of the cap on the container

If the field sampler observes any of the above, then the container will be discarded and an acceptable container will be used instead.

2.8.3 Laboratory Inspection of Supplies

CCL will be responsible for establishing inspection and acceptance criteria for supplies that adhere to their internal QA/QC policies.

2.9 DATA ACQUISITION REQUIREMENTS (NON-DIRECT MEASUREMENTS)

Non-direct measurement data will not be used during this monitoring program. Should at some time in the future the Agency decide to use data from an external source, QA/QC requirements will be established. Should this occur, an addendum to this QAPP will be submitted to USEPA.

2.10 DATA MANAGEMENT

Data, as related to documentation and records, will be managed as outlined earlier in Section 1.9 of this QAPP.

In addition, the CCL will group QA/QC data under a separate client code so that QA/QC data can be filtered from regular sample data before being uploaded into the Agency's Data Management System (WRAIMS). This allows the Agency a greater flexibility both in quickly and easily accessing the data that included QA/QC samples for initial review, and increased flexibility in uploading and moving large data sets.

3.0 ASSESSMENT AND RESPONSE ACTIONS

This section lists review procedures that will be taken to ensure all the protocols outlined in the QAPP are consistently followed.

3.1 REVIEWS

3.1.1 Readiness Reviews

Water Resources Technicians/ Field Samplers will be trained by the Hydrologist/Team Lead before any field sampling begins. Training will cover proper sample collection and handling and the completion of all paperwork (COCs, field logbooks, etc). The Team Lead will ensure that Field Samplers have properly prepared all collection containers, paperwork and other supplies needed to complete a successful sampling event. Any problems discovered during the readiness review will be corrected before the Samplers begin work.

3.1.2 Field Reviews

The Team Lead will be responsible for overseeing that all field activities are in compliance with Agency protocols. The Team Lead will be available via phone should any questions arise while the Samplers are in the field. The Team Lead will also review all field paperwork such as COCs and field logbooks for completion. Additionally the field QC samples (field blanks and duplicates) will be used to evaluate the individual Sampler's technique. If problems are exposed they will be corrected straight away so that all further samples are valid. A stop-work order may be issued by the Project QA Manager at any time if a discrepancy or error is found that could negatively affect the data being collected.

3.1.3 Post Sampling Reviews

Post sampling reviews will be conducted following each sampling event in order to ensure all information is complete. Reviews will be conducted by the Field Sampler due to the small size of the staff. They will include evaluation of sampling activities and field documentation and will take place in the office, not in the field. Findings will be passed on to the Team Lead and the Project QA Manager to be incorporated into the next field event.

3.1.4 Laboratory Data Reviews

The Team Lead will be responsible for reviewing the laboratory's data for completeness and accuracy. The data will also be checked to determine that all specified methods were used and all related QC data was provided with the sample analytical results. These reviews will take place immediately upon receipt of data reports from the laboratory. This will ensure that any method deviations are corrected or explained, and any missing or incomplete data are provided. The Project QA Manager has the authority to request re-testing of laboratory data if it is invalid or would otherwise compromise the quality of the resulting project conclusions.

3.2 REPORTS

The Project QA Manager will be responsible for the technical memorandum (EPA R9# 03-238 Task 3.3) which will be provided in March 2008 to US EPA. The technical memorandum (EPA R9# 03-238 Task 3.3) will include result tables for chloride, nitrate, and specific conductivity, and maps of chloride, nitrate, and specific conductivity gradients. The technical memorandum will include a summary of any significant QA/QC issues and how they were resolved. It is currently understood that this project is of short enough duration that only a final technical memorandum to the EPA is necessary.

4.0 DATA VALIDATION AND USABILITY

4.1 DATA VERIFICATION AND VALIDATION

Data review is the in-house examination to ensure that the data have been recorded, transmitted, and processed correctly. The Team Lead is responsible for the data review. This examination will check for data entry errors, calculation errors, and data omission errors. If possible these errors will be corrected.

4.1.1 Field Data

Field data include logbooks, photographs, and COCs. The Field Sampler is responsible for reviewing the field data at the end of the sampling event. This includes determining that all information is complete and any deviations from the sampling methodologies are documented using the Field Activities Review Checklist (Appendix C).

4.1.2 Laboratory Data

Initial evaluation of the laboratory data are carried out by the CCL in agreement with protocols listed in their SOPs and QA manual. The Team Lead will also conduct an independent review of the data and QC parameters as described in sections 3.1.4 and using the Laboratory Data Review Checklist as detailed in section 1.9.4.4 and Appendix C.

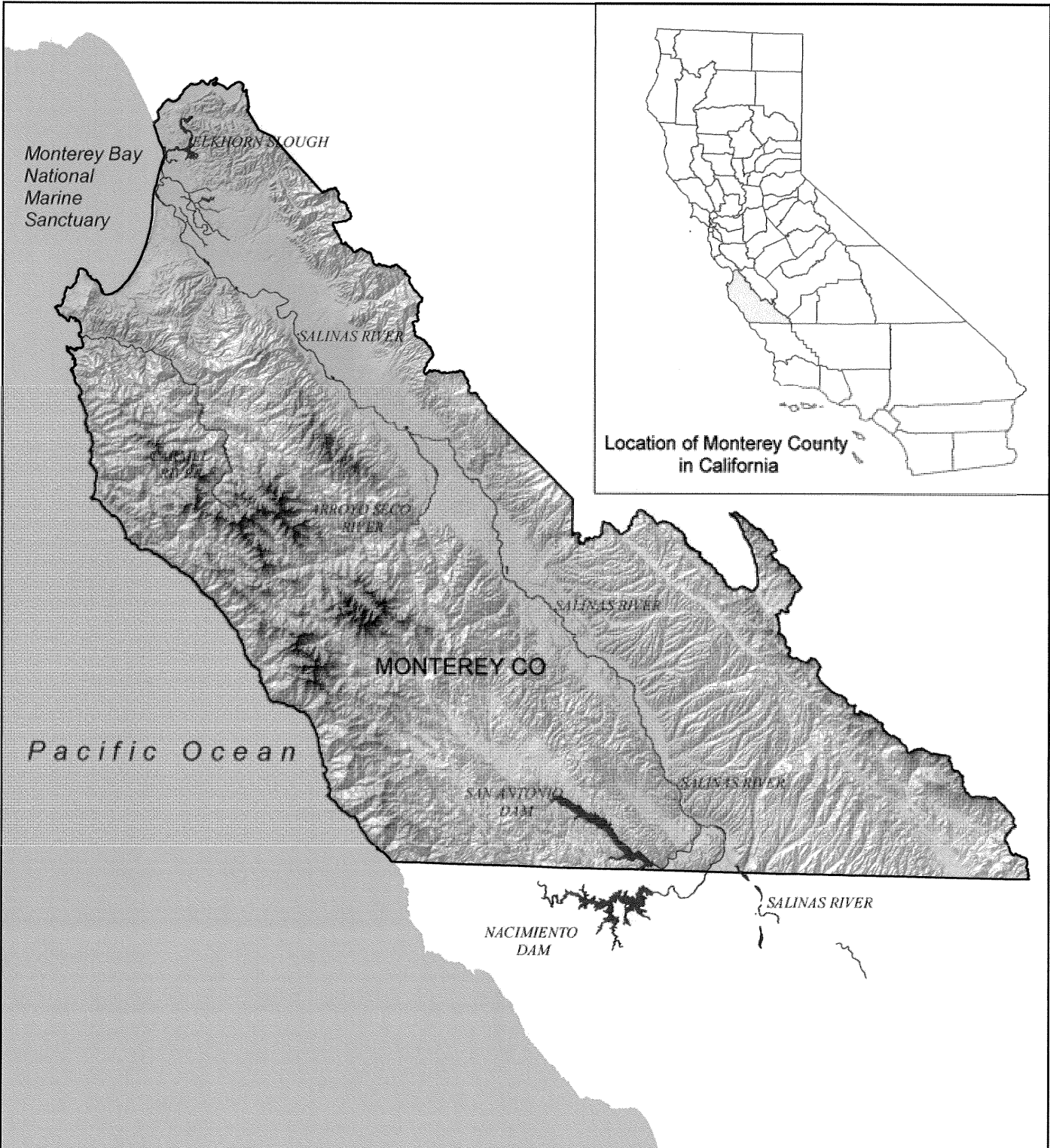
4.2 RECONCILIATION WITH USER REQUIREMENTS

The purpose of the continued ambient monitoring of the Salinas Valley Basin Ground Water is to assess the water quality to manage and protect ground water resources. For data to be useful in developing the overarching Salinas Valley Integrated Water Management Plan, it must first meet the requirement of this QA project Plan. The Project QA Manager will be responsible for making the final evaluation of the data's usability in meeting the Project objectives. All data passing this final evaluation will then be used to establish a cohesive and succinct Water Quality Management Plan in accordance to the work begun under EPA-I and continued under EPA-II. Additionally, the Agency will integrate these ground water quality data with previously collected data for use in trend analysis.

5.0 REFERENCES

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FIGURES

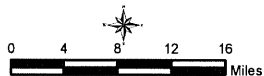


Legend

■ Water Bodies/ Channels

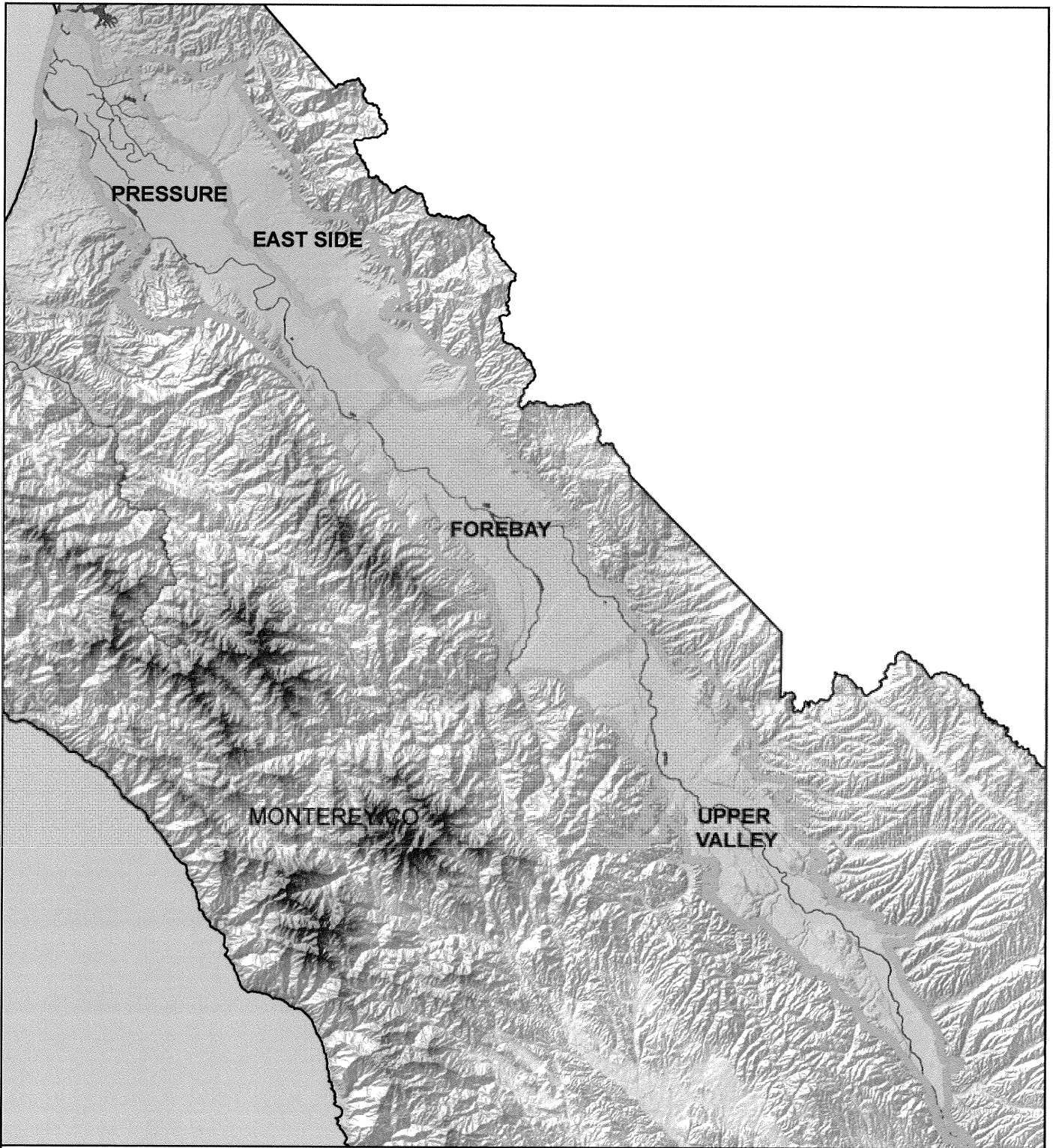
Monterey County, California

Figure 1



Note: The scale and configuration of all information shown hereon are approximate and are not intended as a guide for survey or design work.

Map Date: July 5, 2007

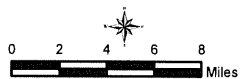


Legend

■ Water Bodies/ Channels

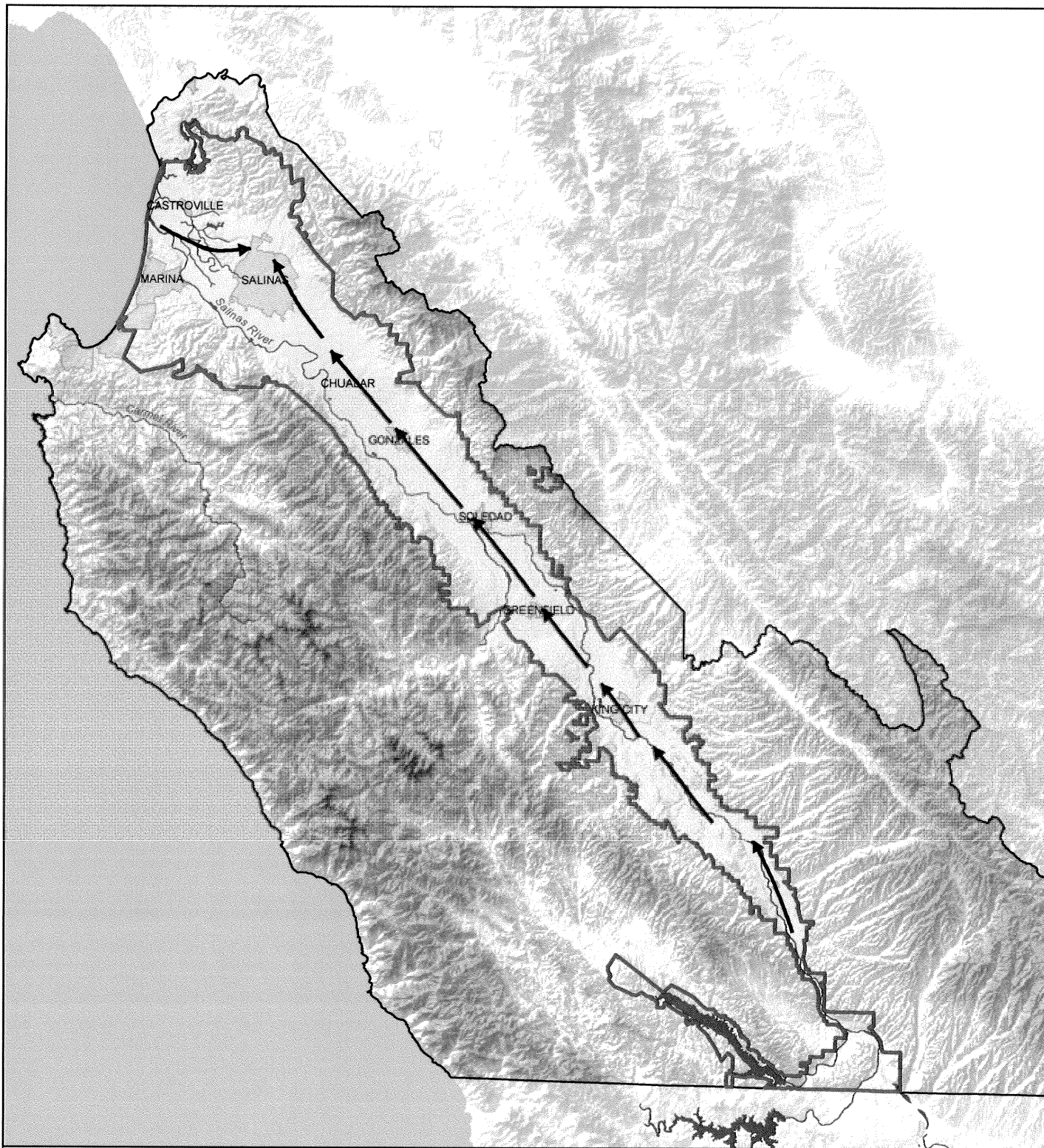
Salinas Valley Aquifers

Figure 2



Note: The scale and configuration of all information shown hereon are approximates and are not intended as a guide for survey or design work.

Map Date: July 5, 2007

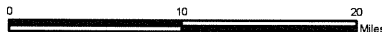


Ground Water Flow Direction in the Salinas Valley

Figure 3

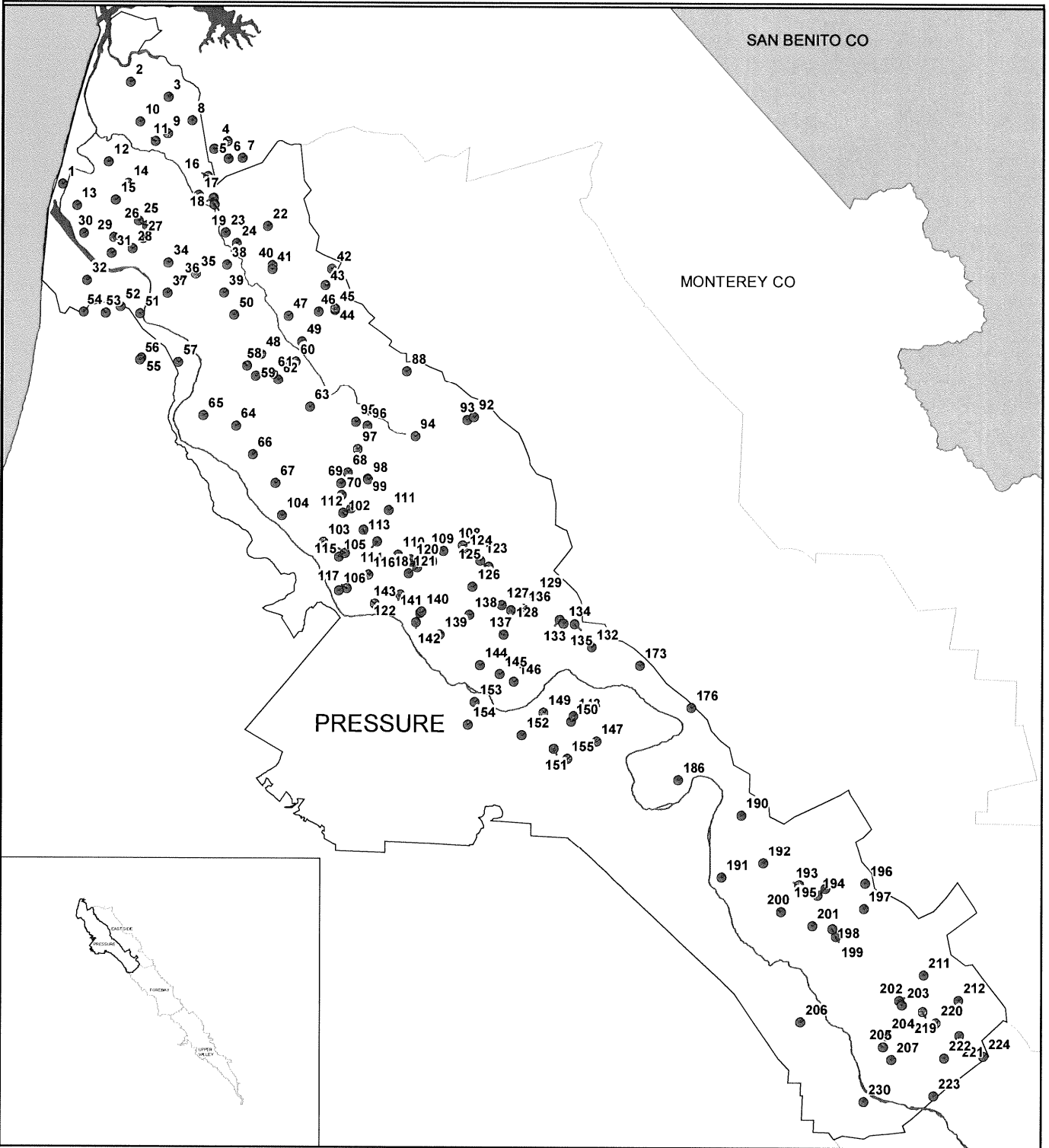
Legend

- Ground Water Flow Direction
- Assessment Zone 2C
- Monterey County
- Rivers and Other Bodies of Water



Note: The scale and configuration of all information shown herein are approximate and are not intended as a guide for survey or design work.

Map Date: July 6, 2007

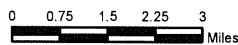


Salinas Valley Wells in the Pressure Subarea

Figure 4

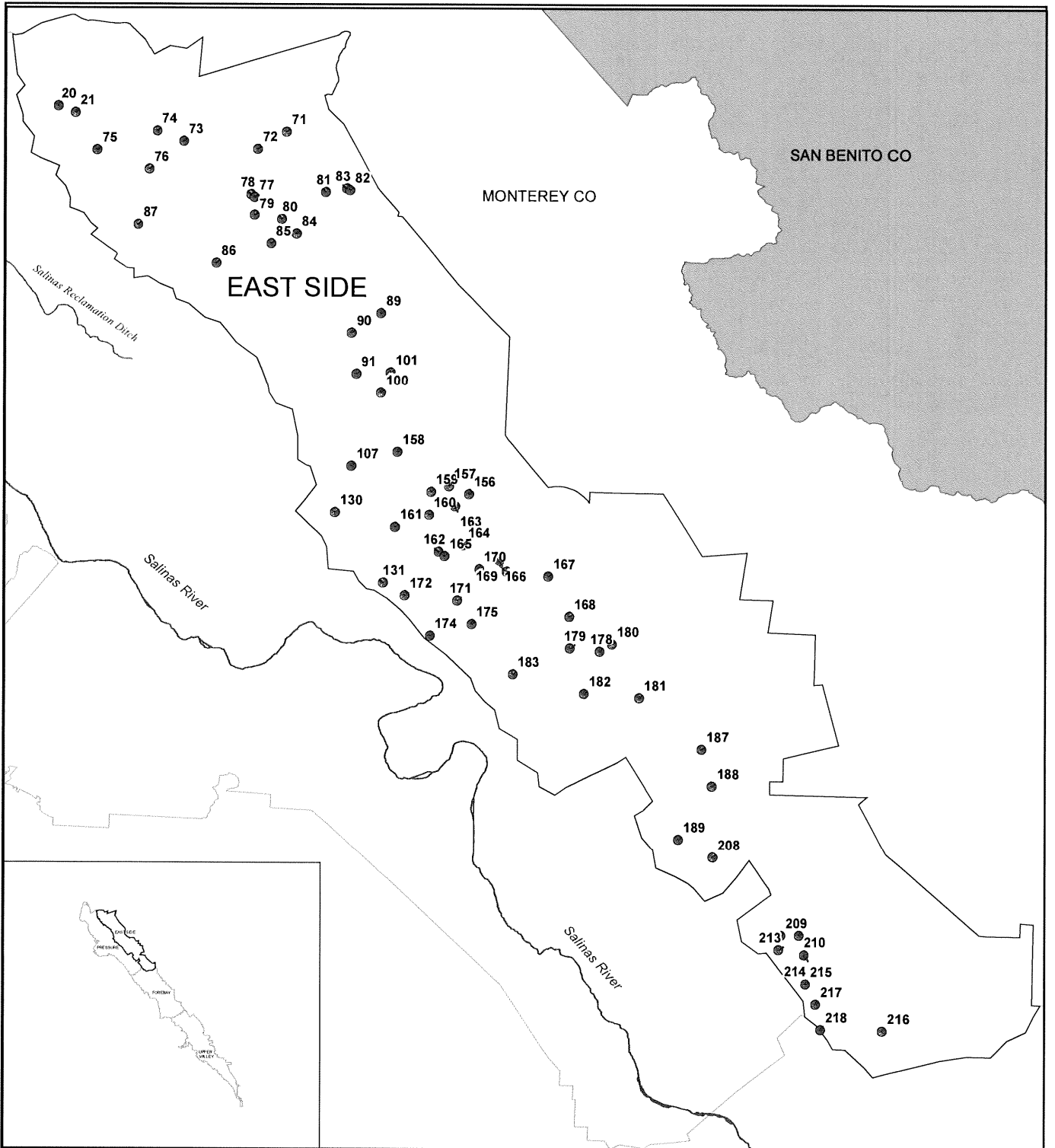
Legend:

- Study Well
- ▬ Rivers
- SUBAREA**
- SUBAREA
- PRESSURE



Note: The scale and configuration of all information shown herein are approximate and are not intended as a guide for survey or design work.

Map Date: July 5, 2007



Salinas Valley Wells in the East Side Subarea

Figure 5

Legend:

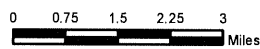
● Study Well

▬ Rivers

SUBAREA

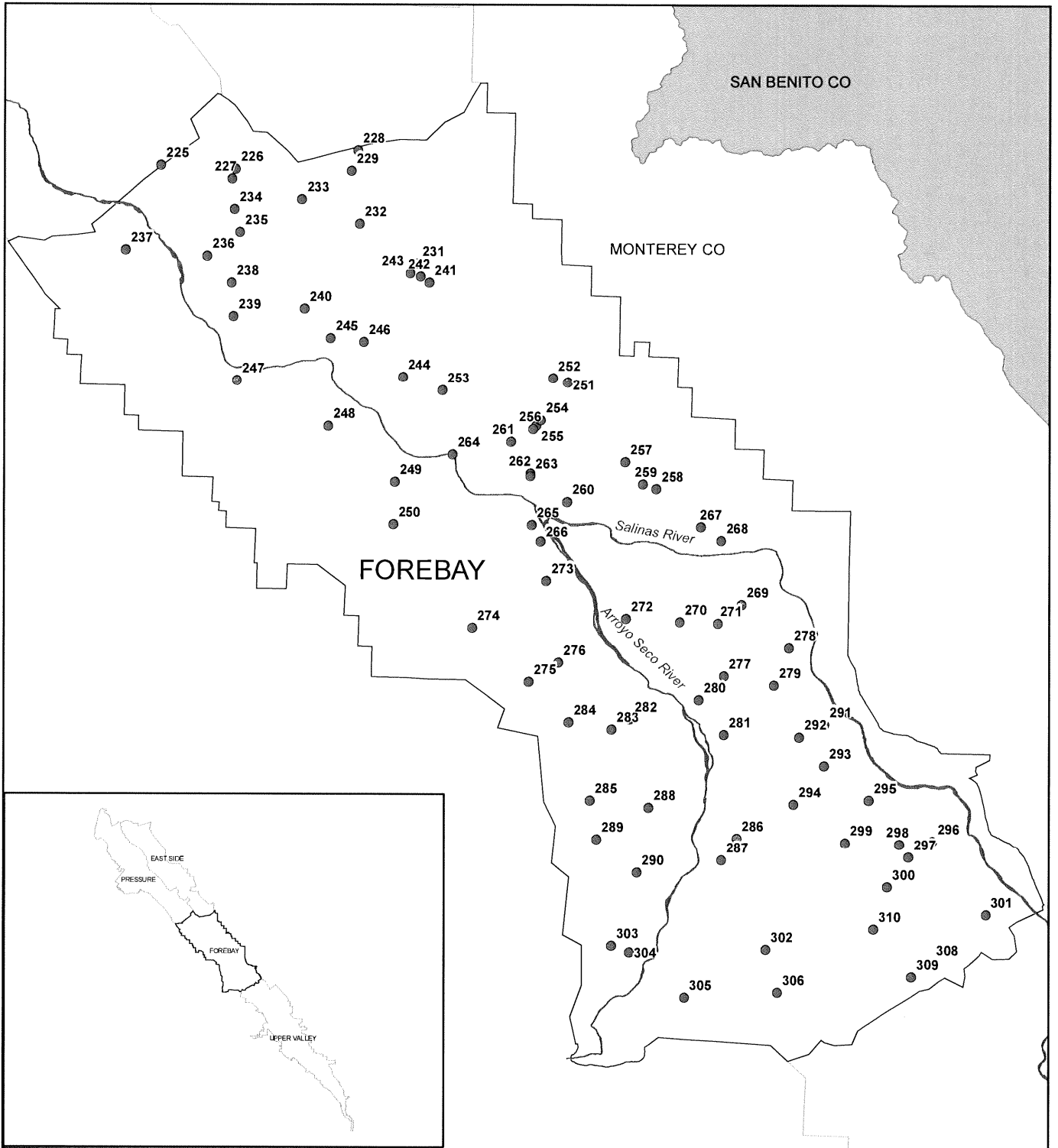
□ SUBAREA

□ EAST SIDE



Note: The scale and configuration of all information shown herein are approximate and are not intended as a guide for survey or design work.

Map Date: July 5, 2007

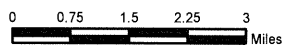


Salinas Valley Wells in the Forebay Subarea

Figure 6

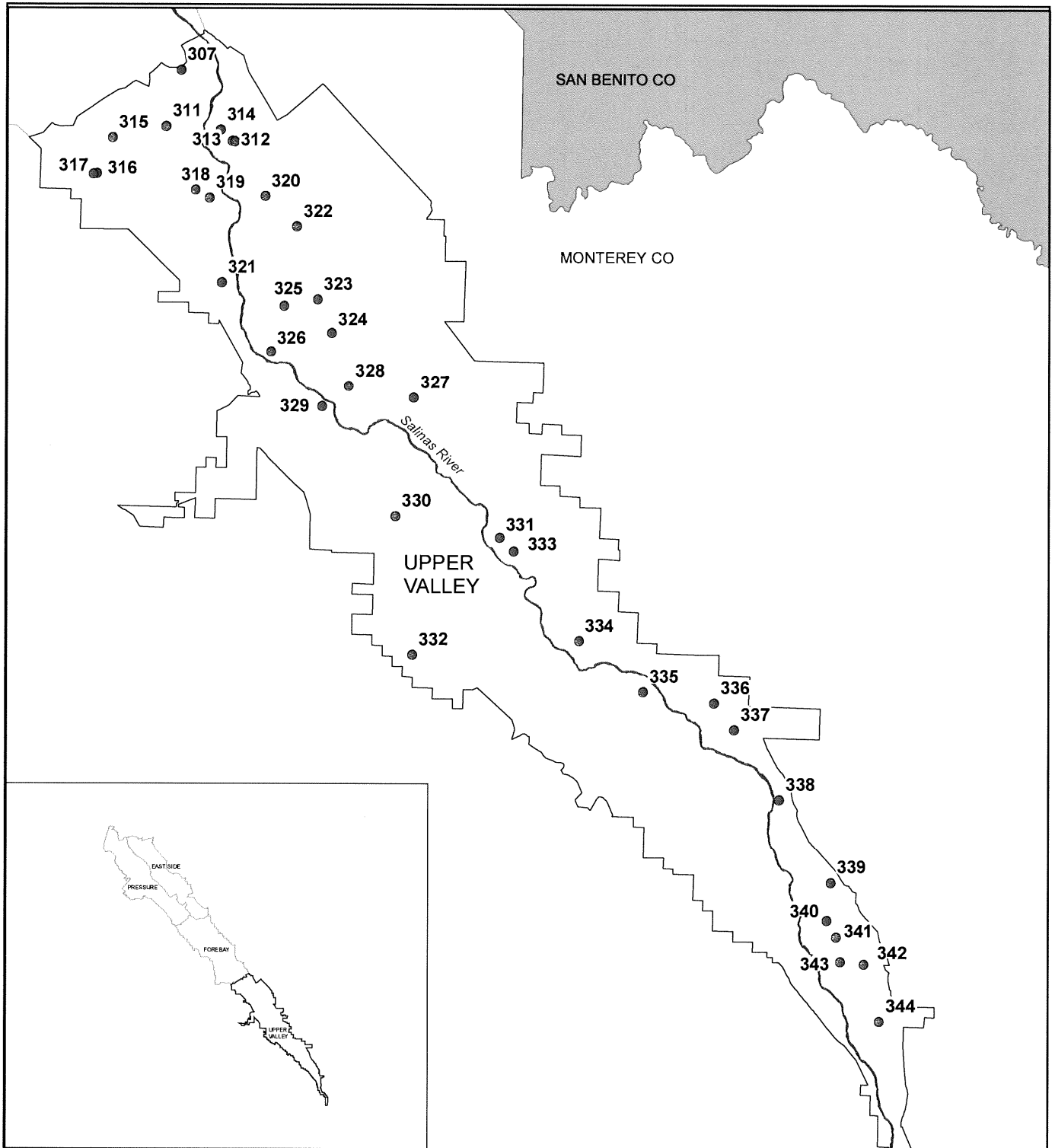
Legend:

- Study Well
- ▬ Rivers
- SUBAREA**
- SUBAREA
- FOREBAY



Note: The scale and configuration of all information shown herein are approximate and are not intended as a guide for survey or design work.

Map Date: July 5, 2007



Salinas Valley Wells in the Upper Valley Subarea

Figure 7

Legend:

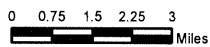
● Study Well

▬ Rivers

SUBAREA

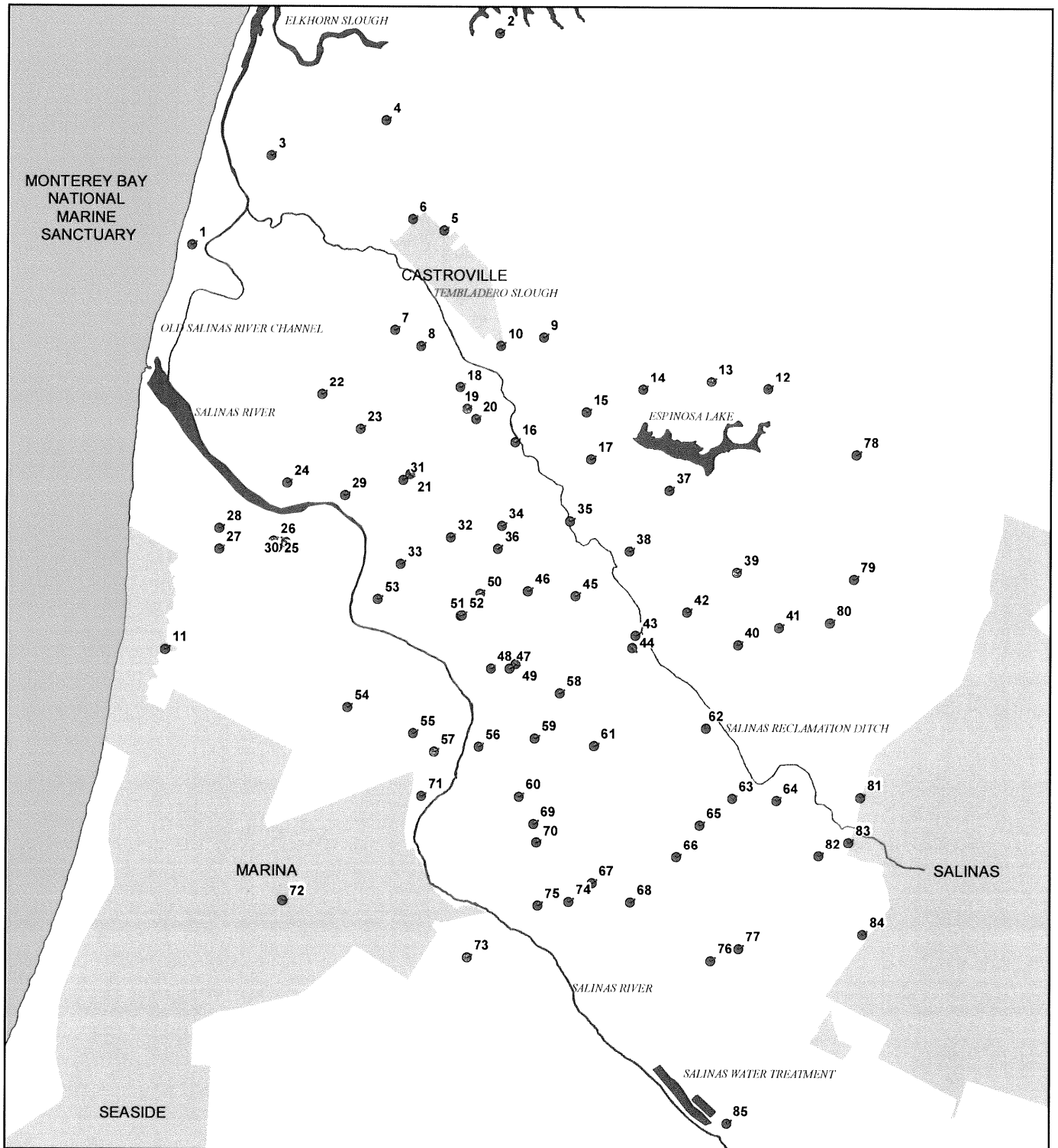
□ SUBAREA

□ UPPER VALLEY



Note: The scale and configuration of all information shown herein are approximate and are not intended as a guide for survey or design work.

Map Date: July 5, 2007

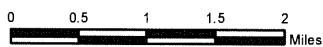


Coastal Ground Water Monitoring Program Wells

Figure 8

Legend:

- Study Well
- Cities
- Water Bodies/ Channels



Note: The scale and configuration of all information shown herein are approximate and are not intended as a guide for survey or design work.

Map Date: July 02, 2007

TABLES

Table 1 COMPLETE MINERAL PANEL ANALYTES

ANALYTE	METHOD	LABORATORY MDL **	LABORATORY PQL	LOWEST CALIB. STD.	PAL
Calcium (Ca)	SM 3111 B ¹	0.02 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L
CATION ANION BALANCE	Calculated	--	--	--	--
*Chloride (Cl)	EPA 300.0 ²	0.01 mg/L	1.0 mg/L	0.1 mg/L	1.0 mg/L
*Conductivity (SEC)	SM 2510 B	1 umho/cm @ 25 C	1 umho/cm @ 25 C	N/A	1 umho/cm @ 25 C
Magnesium (Mg)	SM 3111 B	0.005 mg/L ¹	1.0 mg/L	0.1 mg/L	1.0 mg/L
*Nitrate (NO3)	EPA 300.0	0.002 mg/L ²	1.0 mg/L	0.1 mg/L	1.0 mg/L
pH (Laboratory)	SM 4500-H B	pH Units (2 sig figs)	pH Units (2 sig figs)	N/A	pH Units (2 sig figs)
Potassium (K)	SM 3111 B	0.025 mg/L ¹	0.1 mg/L	0.1 mg/L	0.1 mg/L
Sodium (Na)	SM 3111 B	0.03 mg/L ¹	1.0 mg/L	0.1 mg/L	1.0 mg/L
Sulfate (SO4)	EPA 300.0	0.03 mg/L ²	1.0 mg/L	0.1 mg/L	1.0 mg/L
Total Alkalinity (as CaCO3)	SM 2320 B	1.0 mg/L	1.0 mg/L	N/A	1.0 mg/L

¹ = MDL study completed February 2007

² = MDL study completed May 2007

* = Partial Mineral Panel analytes

** = These are the laboratory's latest MDLs and supersede the MDLs listed in Appendix D-1.

MDL = method detection limit; PQL = practical quantitative limit; PAL = project action level

All laboratory results are bracketed by calibration standards. No "estimated" results (below the lowest calib std and above the MDL) are given to the Agency.

Table 2 QUALITY CONTROL REQUIREMENTS FOR LABORATORY ANALYSES

QA PROCEDURE	QA PARAMETER	FREQUENCY	CRITERION	CORRECTIVE ACTION
Field Blank	Field Contamination	1/20 field samples; 5% frequency	<MDL	Recollect sampling event or flag data if unable recollect
Field Duplicate	Field Precision	1/10 field samples for first two events; if criterion is met, then 1/20 field samples	RPD < 25%	Recollect sampling event or flag data if unable recollect
Method Blank	Analytical Contamination	3 per analytical batch	< RL	Reanalyze analytical batch
LCS (CRM)	Accuracy	1 per analytical batch	80-120% REC	Reanalyze analytical batch
Analytical Duplicate	Analytical Precision	1 per analytical batch	RPD < 25%	Reanalyze analytical batch
Matrix Spike	Matrix Interference and Accuracy	1 per analytical batch; at 3-10x the native conc.	75-125% REC	Reanalyze analytical batch
Matrix Spike Duplicate	Precision and Accuracy	1 per analytical batch; at 3-10x the native conc.	RPD <25%	Reanalyze analytical batch
Continuing Calibration	Analytical Control	1 per 10 sample runs	80-120% of initial slope	Reanalyze analytical batch
Assess percent of data successfully collected	Data Completeness	N/A	90%	N/A

MDL=Method Detection Limit; RPD=Relative Percent Difference; RL=Report Limit;
 REC=Recovery; LCS=Laboratory Control Sample; CRM=Certified Reference Material
 An analytical batch is defined as 20 or fewer samples.

Table 3 LABORATORY DATA QUALITY OBJECTIVES (DQOs)

<i>ANALYTE</i>	<i>METHOD BLANK</i>	<i>LCS (CRM)</i>	<i>ANALYTICAL DUPLICATE</i>	<i>MATRIX SPIKE</i>	<i>MATRIX SPIKE DUPLICATE</i>	<i>CONTINUING CALIBRATION</i>
Calcium (Ca)	yes	yes	yes	yes	yes	yes
Chloride (Cl)	yes	yes	yes	yes	yes	yes
Conductivity (SEC)	yes	yes	yes	no	no	yes
Magnesium (Mg)	yes	yes	yes	yes	yes	yes
Nitrate (NO ₃)	yes	yes	yes	yes	yes	yes
pH (Laboratory)	no	yes	yes	no	no	yes
Potassium (K)	yes	yes	yes	yes	yes	yes
Sodium (Na)	yes	yes	yes	yes	yes	yes
Sulfate (SO ₄)	yes	yes	yes	yes	yes	yes
Total Alkalinity (as CaCO ₃)	yes	yes	yes	no	no	yes

Table 4 SALINAS VALLEY WELLS AND LOCATIONS

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
13S/01E-36J01	PRESSURE 900	1	5741483.0	2170847.00002
13S/02E-20M02	PRESSURE 400	2	5748878.5	2182094.25003
13S/02E-21N01	PRESSURE 400	3	5753018.5	2180456.75002
13S/02E-27L01	PRESSURE 180	4	5759500.0	2175572.50002
13S/02E-27M01	PRESSURE 400	5	5758010.0	2174784.50002
13S/02E-27P01	PRESSURE 400	6	5759593.5	2173660.50002
13S/02E-27Q02	PRESSURE 400	7	5761129.5	2173768.75002
13S/02E-28B01	PRESSURE 400	8	5755624.0	2177900.75002
13S/02E-28E01	PRESSURE 400	9	5752984.0	2176434.75002
13S/02E-29F02	PRESSURE 400	10	5749961.0	2177732.25002
13S/02E-29J01	PRESSURE 400	11	5751657.5	2175604.25002
13S/02E-31A02	PRESSURE 900	12	5746516.5	2173308.00002
13S/02E-31N02	PRESSURE 400	13	5743060.5	2168496.25002
13S/02E-32M02	PRESSURE 900	14	5748673.0	2170965.00002
13S/02E-32N01	PRESSURE 400	15	5747285.0	2169132.75003
13S/02E-33H03	PRESSURE 180	16	5757325.5	2171726.00002
13S/02E-33R01	PRESSURE 180	17	5756359.5	2169699.75003
13S/02E-34M02	PRESSURE 180	18	5757952.0	2169365.25003
13S/02E-34N01	PRESSURE 180	19	5758043.5	2168657.25003
13S/02E-36J01	EAST SIDE BOTH	20	5772057.0	2168257.00002
14S/02E-01A01	EAST SIDE	21	5773736.0	2167596.00002
14S/02E-02E02	PRESSURE 400	22	5763989.0	2166284.00003
14S/02E-03F02	PRESSURE 180	23	5759284.0	2165549.00003
14S/02E-03K02	PRESSURE 400	24	5760546.0	2164390.00002
14S/02E-05F04	PRESSURE 400	25	5749784.5	2166850.50002
14S/02E-05G03	PRESSURE 400	26	5750701.5	2166258.50002
14S/02E-05K01	PRESSURE 400	27	5750303.5	2164892.00002
14S/02E-05P02	PRESSURE 400	28	5749120.0	2163754.25002
14S/02E-06J03	PRESSURE 400	29	5747119.5	2164986.75002
14S/02E-06L01	PRESSURE 900	30	5743826.5	2165438.75002
14S/02E-06R02	PRESSURE 400	31	5746852.5	2163229.50003
14S/02E-07K01	PRESSURE 400	32	5744199.0	2160286.75002
14S/02E-08A01	PRESSURE 400	33	5751818.0	2162226.75002
14S/02E-09D03	PRESSURE 400	34	5753098.5	2162246.50002
14S/02E-09H03	PRESSURE 400	35	5756070.0	2161048.75002

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
14S/02E-09L02	PRESSURE 400	36	5754291.5	2160250.25002
14S/02E-09N01	PRESSURE 400	37	5752950.5	2158867.00003
14S/02E-10C01	PRESSURE 400	38	5759437.0	2162015.75002
14S/02E-10P02	PRESSURE 400	39	5759125.0	2158942.75002
14S/02E-11C01	PRESSURE 180	40	5764471.5	2161959.50002
14S/02E-11D01	PRESSURE 180	41	5764508.5	2161568.25002
14S/02E-12B01	PRESSURE 400	42	5771184.5	2161614.00002
14S/02E-12L02	PRESSURE 400	43	5770434.5	2159815.50002
14S/02E-12Q01	PRESSURE 400	44	5771537.0	2157088.75002
14S/02E-13B02	PRESSURE 180	45	5771526.0	2157219.75003
14S/02E-13D01	PRESSURE 180	46	5769699.5	2156883.75002
14S/02E-14B01	PRESSURE 180	47	5766275.0	2156434.00002
14S/02E-14N03	PRESSURE 400	48	5763230.0	2152205.50003
14S/02E-14R01	PRESSURE 180	49	5767842.5	2153580.50002
14S/02E-15B01	PRESSURE 400	50	5760275.5	2156533.25002
14S/02E-17B02	PRESSURE 400	51	5749990.5	2156598.25002
14S/02E-17C01	PRESSURE 180	52	5747844.0	2157381.75003
14S/02E-18A01	PRESSURE 400	53	5746233.0	2156686.25002
14S/02E-18C01	PRESSURE 400	54	5743827.5	2156787.25002
14S/02E-20B01	PRESSURE 180	55	5750165.5	2151711.75003
14S/02E-20B02	PRESSURE 180	56	5750001.0	2151554.75003
14S/02E-21F02	PRESSURE 180	57	5754169.5	2151251.50002
14S/02E-22H01	PRESSURE 400	58	5761690.5	2150902.75002
14S/02E-22H02	PRESSURE 180	59	5762674.0	2149777.00002
14S/02E-23A01	PRESSURE 180	60	5767130.0	2151399.50002
14S/02E-23F01	PRESSURE 180	61	5764570.5	2149971.00002
14S/02E-23L03	PRESSURE 400	62	5765164.5	2149382.00002
14S/02E-25D03	PRESSURE 400	63	5768753.5	2146325.50002
14S/02E-27K01	PRESSURE 180	64	5760536.0	2144212.25002
14S/02E-28H02	PRESSURE 180	65	5756940.5	2145354.75002
14S/02E-34A03	PRESSURE 400	66	5762394.5	2141097.75002
14S/02E-35L02	PRESSURE 400	67	5764879.0	2137944.25002
14S/02E-36H01	PRESSURE 180	68	5773015.5	2139158.50003
14S/02E-36J02	PRESSURE 400	69	5772268.5	2137939.00002
14S/02E-36R02	PRESSURE 400	70	5772326.5	2136698.50002
14S/03E-02E03	EAST SIDE BOTH	71	5794727.5	2165742.50002
14S/03E-03K01	EAST SIDE BOTH	72	5791884.0	2164011.25002

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
14S/03E-04E01	EAST SIDE BOTH	73	5784479.5	2164809.75002
14S/03E-05B02	EAST SIDE BOTH	74	5781839.5	2165837.25002
14S/03E-06L01	EAST SIDE SHALLOW	75	5775895.0	2163924.50003
14S/03E-08C01	EAST SIDE BOTH	76	5781050.5	2162072.25002
14S/03E-10F02	EAST SIDE	77	5791569.0	2159330.50002
14S/03E-10F03	EAST SIDE BOTH	78	5791236.5	2159578.00002
14S/03E-10P01	EAST SIDE	79	5791544.0	2157558.25002
14S/03E-10R02	EAST SIDE BOTH	80	5794251.5	2157151.00002
14S/03E-11H01	EAST SIDE SHALLOW	81	5798504.0	2159823.00002
14S/03E-12E01	EAST SIDE SHALLOW	82	5800865.5	2160009.25003
14S/03E-12E02	EAST SIDE	83	5800608.5	2160173.25003
14S/03E-14D01	EAST SIDE SHALLOW	84	5795697.5	2155748.25003
14S/03E-15H03	EAST SIDE BOTH	85	5793222.5	2154777.00002
14S/03E-16K03	EAST SIDE	86	5787748.0	2152845.50003
14S/03E-17D01	EAST SIDE	87	5779979.0	2156594.00002
14S/03E-20D01	PRESSURE 400	88	5779540.0	2150357.75002
14S/03E-24H01	EAST SIDE SHALLOW	89	5803951.0	2147934.50002
14S/03E-24N01	EAST SIDE	90	5801060.0	2146002.50002
14S/03E-25L02	EAST SIDE BOTH	91	5801508.5	2141975.75002
14S/03E-28B02	PRESSURE 400	92	5786919.0	2145249.50002
14S/03E-28F02	PRESSURE 400	93	5786200.6	2144963.98574
14S/03E-29L04	PRESSURE 180	94	5780547.4	2143125.21920
14S/03E-30E01	PRESSURE 180	95	5773899.5	2144670.25003
14S/03E-30F02	PRESSURE 180	96	5775180.5	2144268.50002
14S/03E-30N01	PRESSURE 180	97	5774083.5	2141696.50002
14S/03E-31F01	PRESSURE 180	98	5775271.5	2138346.50003
14S/03E-31F02	PRESSURE 400	99	5775228.5	2138492.00002
14S/03E-36A01	EAST SIDE SHALLOW	100	5803921.0	2140085.50002
14S/04E-30N01	EAST SIDE BOTH	101	5804847.5	2142132.00001
15S/02E-01A03	PRESSURE 400	102	5772482.0	2134724.00002
15S/02E-01K01	PRESSURE 180	103	5770291.5	2131514.75002
15S/02E-02G01	PRESSURE 400	104	5765615.0	2134401.50002
15S/02E-12A01	PRESSURE 400	105	5772051.5	2129878.50002
15S/02E-12R01	PRESSURE 400	106	5772057.5	2126203.25003
15S/03E-01L01	EAST SIDE	107	5801038.5	2132896.75002
15S/03E-04K03	PRESSURE 400	108	5785732.5	2131172.00002
15S/03E-04N03	PRESSURE 400	109	5783621.0	2130577.75002

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
15S/03E-05N01	PRESSURE 180	110	5778619.0	2130164.00003
15S/03E-06A03	PRESSURE 180	111	5777613.0	2135010.00002
15S/03E-06D02	PRESSURE 400	112	5773392.0	2135175.75002
15S/03E-06F02	PRESSURE 400	113	5774781.5	2132857.75002
15S/03E-06K01	PRESSURE 400	114	5776302.5	2131605.50002
15S/03E-07D02	PRESSURE 400	115	5772729.0	2130304.25002
15S/03E-07G01	PRESSURE 400	116	5775356.0	2127909.75002
15S/03E-07N01	PRESSURE 180	117	5772911.5	2126430.50002
15S/03E-08B04	PRESSURE 400	118	5780790.5	2128738.25002
15S/03E-08C06	PRESSURE 180	119	5780025.5	2129640.75003
15S/03E-08C07	PRESSURE 400	120	5780124.5	2129385.50002
15S/03E-08F07	PRESSURE 400	121	5779786.0	2128096.50002
15S/03E-08N03	PRESSURE 400	122	5778859.5	2125760.50002
15S/03E-09B01	PRESSURE 180	123	5787613.5	2129526.50003
15S/03E-09C01	PRESSURE 180	124	5785912.0	2130387.75002
15S/03E-09H02	PRESSURE 180	125	5788543.5	2128841.50003
15S/03E-09K04	PRESSURE 400	126	5786815.0	2126625.50003
15S/03E-10P01	PRESSURE 180	127	5789973.0	2124641.25002
15S/03E-10P03	PRESSURE 180	128	5790992.5	2124075.25002
15S/03E-10R02	PRESSURE 180	129	5793537.5	2125764.25002
15S/03E-12E02	EAST SIDE BOTH	130	5799472.0	2128349.25000
15S/03E-13J02	EAST SIDE	131	5804170.5	2121482.50002
15S/03E-13N01	PRESSURE 180	132	5799834.5	2120075.00003
15S/03E-14C01	PRESSURE 180	133	5796323.5	2123063.75002
15S/03E-14G01	PRESSURE 180	134	5796738.0	2122656.50003
15S/03E-14H01	PRESSURE 180	135	5797941.0	2122606.00002
15S/03E-15B01	PRESSURE 400	136	5792336.0	2124219.00002
15S/03E-15L02	PRESSURE 180	137	5790177.0	2121393.00002
15S/03E-16B03	PRESSURE 400	138	5786481.0	2123545.50002
15S/03E-16M01	PRESSURE 180	139	5783233.5	2121388.25002
15S/03E-17B01	PRESSURE 180	140	5781259.5	2123911.75003
15S/03E-17B02	PRESSURE 180	141	5781099.5	2123757.50002
15S/03E-17G01	PRESSURE 180	142	5780630.0	2122750.25002
15S/03E-18B01	PRESSURE 180	143	5776074.5	2124737.50002
15S/03E-21A01	PRESSURE 180	144	5787617.0	2118056.00002
15S/03E-22F02	PRESSURE 180	145	5789756.5	2117099.00002
15S/03E-22G01	PRESSURE 180	146	5791343.0	2116241.25002

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
15S/03E-25L01	PRESSURE 180	147	5800408.5	2109728.50003
15S/03E-26A01	PRESSURE 400	148	5797857.5	2112518.00002
15S/03E-26D01	PRESSURE 180	149	5794548.5	2112893.75003
15S/03E-26H02	PRESSURE 180	150	5797573.5	2111904.75002
15S/03E-26P01	PRESSURE 400	151	5795686.5	2108925.25002
15S/03E-27J01	PRESSURE 400	152	5792207.5	2110413.00002
15S/03E-28B02	PRESSURE 400	153	5787075.5	2113993.25002
15S/03E-28G01	PRESSURE 180	154	5786358.0	2111546.50003
15S/03E-35B05	PRESSURE 180	155	5797153.0	2107813.50003
15S/04E-05K01	EAST SIDE	156	5812585.0	2130171.00001
15S/04E-05M01	EAST SIDE BOTH	157	5810608.5	2130920.50001
15S/04E-06D04	EAST SIDE BOTH	158	5805535.0	2134296.75001
15S/04E-06R01	EAST SIDE BOTH	159	5808832.0	2130397.50001
15S/04E-07A01	EAST SIDE BOTH	160	5808667.0	2128112.25001
15S/04E-07E02	EAST SIDE	161	5805290.0	2126918.25001
15S/04E-07R01	EAST SIDE SHALLOW	162	5809617.5	2124497.75001
15S/04E-08C01	EAST SIDE SHALLOW	163	5811226.0	2128961.75001
15S/04E-08L01	EAST SIDE BOTH	164	5812038.0	2125163.50001
15S/04E-08N01	EAST SIDE BOTH	165	5810237.5	2124086.00001
15S/04E-09N01	EAST SIDE	166	5815679.0	2123673.25001
15S/04E-15D02	EAST SIDE SHALLOW	167	5820525.5	2122131.50001
15S/04E-15P02	EAST SIDE BOTH	168	5822591.0	2118164.75001
15S/04E-16D01	EAST SIDE BOTH	169	5816370.5	2122604.00001
15S/04E-17B01	EAST SIDE	170	5813674.5	2122802.00001
15S/04E-17P02	EAST SIDE SHALLOW	171	5811444.0	2119748.75001
15S/04E-18L01	EAST SIDE	172	5806258.0	2120249.25001
15S/04E-19D02	PRESSURE 400	173	5805231.0	2118084.25001
15S/04E-19H03	EAST SIDE	174	5808765.0	2116311.75003
15S/04E-20B02	EAST SIDE SHALLOW	175	5812893.0	2117437.00001
15S/04E-20N01	PRESSURE 400	176	5810999.0	2113437.25001
15S/04E-20Q01	EAST SIDE	177	5813019.5	2113916.75003
15S/04E-22J01	EAST SIDE	178	5825620.5	2114797.50001
15S/04E-22L02	EAST SIDE BOTH	179	5822626.0	2115130.25001
15S/04E-23M01	EAST SIDE	180	5826800.0	2115510.00001
15S/04E-26G01	EAST SIDE	181	5829452.0	2110273.75001
15S/04E-27G01	EAST SIDE BOTH	182	5824082.0	2110658.00001
15S/04E-28C01	EAST SIDE	183	5817013.0	2112539.50001

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
15S/04E-28C01	EAST SIDE	184*	*	*
15S/04E-29K03	EAST SIDE	185*	*	*
15S/04E-32E01	PRESSURE 180	186	5809573.0	2105524.75003
15S/04E-36H01	EAST SIDE BOTH	187	5835591.5	2105235.00001
15S/04E-36R02	EAST SIDE BOTH	188	5836592.5	2101652.75001
16S/04E-01L02	EAST SIDE	189	5833261.5	2096387.25003
16S/04E-04C01	PRESSURE 400	190	5816563.5	2101653.00001
16S/04E-08J01	PRESSURE 180	191	5814399.5	2094772.87501
16S/04E-09A01	PRESSURE 180	192	5818962.5	2096385.75001
16S/04E-10K01	PRESSURE 400	193	5822871.5	2093933.87501
16S/04E-10R02	PRESSURE 400	194	5824891.5	2092808.00001
16S/04E-11E02	PRESSURE 400	195	5825734.0	2093587.12501
16S/04E-12M01	PRESSURE 400	196	5830110.0	2094179.62501
16S/04E-13D01	PRESSURE 400	197	5829977.5	2091400.75001
16S/04E-14M01	PRESSURE 400	198	5826507.0	2089158.00001
16S/04E-14M02	PRESSURE 400	199	5826934.0	2088314.12501
16S/04E-15D01	PRESSURE 180	200	5820915.5	2091029.00003
16S/04E-15H02	PRESSURE 400	201	5824314.0	2089470.00001
16S/04E-24R01	PRESSURE 400	202	5833826.5	2081330.00003
16S/04E-25A01	PRESSURE 400	203	5834115.0	2080854.00001
16S/04E-25K01	PRESSURE 180	204	5832503.0	2077482.12501
16S/04E-25Q01	PRESSURE 400	205	5832125.5	2076199.75001
16S/04E-27G01	PRESSURE 180	206	5823057.0	2078926.75001
16S/04E-36B01	PRESSURE 180	207	5833029.5	2074811.87501
16S/05E-07G01	EAST SIDE BOTH	208	5836648.0	2094674.00003
16S/05E-17P01	EAST SIDE BOTH	209	5843361.0	2086999.12503
16S/05E-17R01	EAST SIDE SHALLOW	210	5845212.0	2087024.25003
16S/05E-19F01	PRESSURE 180	211	5836477.0	2084158.37503
16S/05E-19R01	PRESSURE 180	212	5840423.0	2081360.37503
16S/05E-20C01	EAST SIDE	213	5843125.0	2085585.12503
16S/05E-20H01	EAST SIDE	214	5845691.0	2085074.25003
16S/05E-20R01	EAST SIDE BOTH	215	5845834.0	2082220.00003
16S/05E-27G01	EAST SIDE	216	5853466.8	2077678.05320
16S/05E-28D01	EAST SIDE BOTH	217	5846865.0	2080272.25003
16S/05E-28P01	EAST SIDE BOTH	218	5847355.5	2077784.37503
16S/05E-30C01	PRESSURE 180	219	5836401.5	2080129.50003
16S/05E-30G01	PRESSURE 180	220	5837912.0	2078876.87503

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
16S/05E-30J02	PRESSURE 400	221	5840526.5	2077512.50003
16S/05E-31A01	PRESSURE 180	222	5838804.0	2075067.12503
16S/05E-31Q01	PRESSURE 180	223	5837656.0	2070857.75003
16S/05E-32C01	PRESSURE 180	224	5843159.0	2075228.62503
16S/05E-32M01	FOREBAY	225	5840439.0	2072879.00003
16S/05E-33F01	FOREBAY	226	5847064.0	2072544.75003
16S/05E-33Q01	FOREBAY	227	5846731.0	2071679.00003
16S/05E-35C01	FOREBAY	228	5857923.0	2074215.75003
16S/05E-35L01	FOREBAY	229	5857341.0	2072381.25003
17S/04E-01D01	PRESSURE 180	230	5829970.4	2070190.88233
17S/05E-01R01	FOREBAY	231	5863270.5	2064114.75003
17S/05E-02G01	FOREBAY	232	5858061.5	2067655.75001
17S/05E-03B01	FOREBAY	233	5852910.5	2069821.37503
17S/05E-04C01	FOREBAY	234	5846947.5	2068985.25003
17S/05E-04K01	FOREBAY	235	5847433.5	2066928.37503
17S/05E-04N01	FOREBAY	236	5844523.0	2064819.50003
17S/05E-06Q01	FOREBAY	237	5837274.0	2065350.12503
17S/05E-09G01	FOREBAY	238	5846689.0	2062431.75003
17S/05E-09Q01	FOREBAY	239	5846868.5	2059437.25003
17S/05E-10Q01	FOREBAY	240	5853142.5	2060133.00003
17S/05E-12B01	FOREBAY	241	5864362.0	2062470.37503
17S/05E-12B02	FOREBAY	242	5863570.5	2063023.50003
17S/05E-12B03	FOREBAY	243	5862636.0	2063300.00003
17S/05E-13L02	FOREBAY	244	5861995.0	2054065.12503
17S/05E-14D01	FOREBAY	245	5855476.7	2057512.98904
17S/05E-14G01	FOREBAY	246	5858431.5	2057156.87503
17S/05E-21A01	FOREBAY	247	5847203.9	2053734.78530
17S/05E-23L01	FOREBAY	248	5855276.5	2049667.00003
17S/05E-25L01	FOREBAY	249	5861282.5	2044709.87503
17S/05E-36F02	FOREBAY	250	5861156.5	2040988.13679
17S/06E-16N01	FOREBAY	251	5876658.0	2053579.37503
17S/06E-17R01	FOREBAY	252	5875370.0	2053960.00003
17S/06E-19D01	FOREBAY	253	5865512.0	2052870.75003
17S/06E-20K01	FOREBAY	254	5874270.5	2050202.50003
17S/06E-20Q02	FOREBAY	255	5873861.0	2049734.12503
17S/06E-20Q03	FOREBAY	256	5873624.0	2049413.37503
17S/06E-27E03	FOREBAY	257	5881725.5	2046512.12503

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING¹	FALSE NORTHING¹
17S/06E-27K01	FOREBAY	258	5884526.5	2044144.50003
17S/06E-27L01	FOREBAY	259	5883319.0	2044534.62503
17S/06E-28N01	FOREBAY	260	5876603.5	2042971.37503
17S/06E-29C01	FOREBAY	261	5871659.0	2048323.00003
17S/06E-29K01	FOREBAY	262	5873377.5	2045490.50003
17S/06E-29Q01	FOREBAY	263	5873361.0	2045274.25003
17S/06E-30F01	FOREBAY	264	5866434.0	2047190.00003
17S/06E-32G01	FOREBAY	265	5873481.5	2040947.12503
17S/06E-32J02	FOREBAY	266	5874264.0	2039466.50003
17S/06E-35F01	FOREBAY	267	5888535.0	2040776.00003
17S/06E-35J01	FOREBAY	268	5890370.5	2039573.75003
18S/06E-01E01	FOREBAY	269	5892201.0	2033873.12503
18S/06E-02N01	FOREBAY	270	5886656.0	2032336.12503
18S/06E-02R01	FOREBAY	271	5890070.0	2032210.75003
18S/06E-03P01	FOREBAY	272	5881836.0	2032629.37503
18S/06E-05H01	FOREBAY	273	5874765.0	2035980.12503
18S/06E-07A01	FOREBAY	274	5868250.5	2031805.25003
18S/06E-08R01	FOREBAY	275	5873246.0	2027074.87503
18S/06E-09M02	FOREBAY	276	5875856.5	2028751.00003
18S/06E-11J01	FOREBAY	277	5890622.5	2027590.87503
18S/06E-12A01	FOREBAY	278	5896424.0	2030093.87503
18S/06E-12R02	FOREBAY	279	5895096.5	2026768.25003
18S/06E-14B01	FOREBAY	280	5888379.5	2025469.87503
18S/06E-14R01	FOREBAY	281	5890625.0	2022391.37503
18S/06E-15F01	FOREBAY	282	5882187.0	2023781.12503
18S/06E-15M01	FOREBAY	283	5880584.0	2022838.50003
18S/06E-16L01	FOREBAY	284	5876773.5	2023478.50003
18S/06E-21Q01	FOREBAY	285	5878665.0	2016542.37503
18S/06E-25F01	FOREBAY	286	5891762.0	2013188.12503
18S/06E-26R01	FOREBAY	287	5890408.5	2011271.25003
18S/06E-27A01	FOREBAY	288	5883864.0	2015914.75003
18S/06E-28J01	FOREBAY	289	5879251.0	2013091.87503
18S/06E-34B01	FOREBAY	290	5882838.0	2010128.37503
18S/07E-18K01	FOREBAY	291	5899619.5	2023322.62503
18S/07E-18P01	FOREBAY	292	5897367.5	2022162.75003
18S/07E-19G02	FOREBAY	293	5899561.5	2019657.12503
18S/07E-19N01	FOREBAY	294	5896875.0	2016213.75002

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
18S/07E-20K01	FOREBAY	295	5903526.5	2016596.50003
18S/07E-28K01	FOREBAY	296	5909064.5	2012996.12503
18S/07E-28N02	FOREBAY	297	5906995.5	2011573.25003
18S/07E-29J01	FOREBAY	298	5906172.5	2012704.50003
18S/07E-29M01	FOREBAY	299	5901432.0	2012790.87503
18S/07E-32G02	FOREBAY	300	5905129.0	2008896.37503
18S/07E-34P02	FOREBAY	301	5913853.5	2006429.50003
19S/06E-01H01	FOREBAY	302	5894418.0	2003322.50003
19S/06E-03E02	FOREBAY	303	5880577.0	2003637.62503
19S/06E-03K01	FOREBAY	304	5882172.5	2003068.00003
19S/06E-11C01	FOREBAY	305	5887118.5	1999053.25003
19S/06E-12A01	FOREBAY	306	5895441.5	1999532.50003
19S/07E-03H02	UPPER VALLEY	307	5916058.0	2002263.25003
19S/07E-04G01	FOREBAY	308	5908976.0	2002192.50003
19S/07E-04Q01	FOREBAY	309	5907241.5	2000938.12503
19S/07E-05B02	FOREBAY	310	5903922.5	2005128.00003
19S/07E-10P02	UPPER VALLEY	311	5914112.0	1994937.37503
19S/07E-13D01	UPPER VALLEY	312	5923060.5	1993005.87503
19S/07E-13D02	UPPER VALLEY	313	5922703.0	1993016.87503
19S/07E-13D03	UPPER VALLEY	314	5921177.5	1994464.25003
19S/07E-16D01	UPPER VALLEY	315	5907215.0	1993447.25003
19S/07E-20A01	UPPER VALLEY	316	5904728.0	1988737.75003
19S/07E-20A02	UPPER VALLEY	317	5905140.0	1988780.50003
19S/07E-23F01	UPPER VALLEY	318	5917918.5	1986682.87503
19S/07E-23G01	UPPER VALLEY	319	5919819.5	1985678.50003
19S/07E-24H02	UPPER VALLEY	320	5927076.5	1985899.12503
19S/07E-36N01	UPPER VALLEY	321	5921376.0	1974705.75003
19S/08E-30A01	UPPER VALLEY	322	5931268.5	1981945.62503
20S/08E-05C02	UPPER VALLEY	323	5933968.0	1972500.37503
20S/08E-05R03	UPPER VALLEY	324	5935855.5	1968133.00003
20S/08E-06B01	UPPER VALLEY	325	5929631.0	1971657.50003
20S/08E-07E01	UPPER VALLEY	326	5927847.5	1965744.25003
20S/08E-15H03	UPPER VALLEY	327	5946414.0	1959720.37503
20S/08E-16C01	UPPER VALLEY	328	5938055.0	1961243.37501
20S/08E-17K03	UPPER VALLEY	329	5934573.0	1958618.62503
20S/08E-34G01	UPPER VALLEY	330	5944061.5	1944379.50003
20S/08E-36R01	UPPER VALLEY	331	5957517.0	1941628.62503

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING¹	FALSE NORTHING¹
21S/08E-15J01	UPPER VALLEY	332	5946267.0	1926489.62503
21S/09E-06C01	UPPER VALLEY	333	5959365.5	1939884.62503
21S/09E-16E02	UPPER VALLEY	334	5967913.5	1928310.37503
21S/09E-22J01	UPPER VALLEY	335	5976378.5	1921774.75003
21S/09E-24Q01	UPPER VALLEY	336	5985537.5	1920320.00003
21S/10E-30E02	UPPER VALLEY	337	5988110.5	1916891.25003
21S/10E-32N01	UPPER VALLEY	338	5993930.5	1907839.00003
22S/10E-09P01	UPPER VALLEY	339	6000619.0	1897117.87503
22S/10E-16P01	UPPER VALLEY	340	6000072.0	1892154.87503
22S/10E-21C01	UPPER VALLEY	341	6001268.5	1890089.75003
22S/10E-22N01	UPPER VALLEY	342	6004921.0	1886561.87503
22S/10E-28B01	UPPER VALLEY	343	6001816.0	1886849.25003
22S/10E-34G01	UPPER VALLEY	344	6007012.0	1879185.87503

¹ State Plane Coordinate System, California Zone IV, Feet, North American Datum 1983

*Coordinates to be collected

Table 5 COASTAL WELLS AND LOCATIONS

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
13S/01E-25R01	PRESSURE 900	1	5742345.5	2174687.00002
13S/02E-15M01	PRUNEDALE	2	5757881.5	2185405.50002
13S/02E-19Q03	PRESSURE 900	3	5746313.5	2179184.50002
13S/02E-20J01	PRESSURE 400	4	5752096.0	2180981.25002
13S/02E-28L02	PRESSURE BOTH	5	5755055.5	2175441.75002
13S/02E-28M02	PRESSURE 400	6	5753447.0	2175997.50002
13S/02E-32J03	PRESSURE 400	7	5752560.0	2170401.75002
13S/02E-33N04	PRESSURE 400	8	5753898.0	2169605.00002
13S/02E-34G01	PRESSURE 400	9	5760129.5	2170052.25002
13S/02E-34M01	PRESSURE 400	10	5757997.5	2169621.75002
14S/01E-13J02	PRESSURE 400	11	5741048.0	2154289.50002
14S/02E-01C01	EASTSIDE DEEP	12	5771477.5	2167454.25002
14S/02E-02A02	EASTSIDE DEEP	13	5768561.0	2167823.50002
14S/02E-02C03	PRESSURE 400	14	5765109.0	2167416.00002
14S/02E-03H01	PRESSURE 400	15	5762283.0	2166255.50002
14S/02E-03M02	PRESSURE 400	16	5758710.5	2164740.50002
14S/02E-03R02	PRESSURE 400	17	5762517.0	2163892.75002
14S/02E-04B01	PRESSURE 400	18	5755909.0	2167499.00002
14S/02E-04G02	PRESSURE 400	19	5756262.0	2166403.75002
14S/02E-04H01	PRESSURE 400	20	5756715.0	2165886.25002
14S/02E-04N03	PRESSURE 400	21	5753365.0	2163112.75002
14S/02E-05C03	PRESSURE 400	22	5748893.5	2167132.50002
14S/02E-05K02	PRESSURE 400	23	5750829.0	2165370.75002
14S/02E-07A01	PRESSURE 400	24	5747142.5	2162655.25002
14S/02E-07J02	PRESSURE 400	25	5746655.0	2159408.25002
14S/02E-07J03	PRESSURE DEEP ZONE	26	5746476.9	2159735.06998
14S/02E-07L04	PRESSURE 400	27	5743780.0	2159328.00002
14S/02E-07L05	PRESSURE 400	28	5743784.5	2160380.50002
14S/02E-08C03	PRESSURE 400	29	5750055.0	2162036.75002
14S/02E-08M02	PRESSURE 400	30	5747103.0	2159672.50002
14S/02E-09D04	PRESSURE 400	31	5753016.5	2162818.75002
14S/02E-09K02	PRESSURE 400	32	5755450.0	2159946.25002
14S/02E-09N02	PRESSURE 400	33	5752897.5	2158609.50002
14S/02E-10E02	PRESSURE 400	34	5758062.0	2160525.75002
14S/02E-10H01	PRESSURE 400	35	5761492.0	2160761.75002

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING ¹	FALSE NORTHING ¹
14S/02E-10M02	PRESSURE 400	36	5757853.5	2159387.75002
14S/02E-11B01	PRESSURE 400	37	5766446.0	2162325.25002
14S/02E-11M03	PRESSURE 400	38	5764448.5	2159266.75002
14S/02E-12N02	PRESSURE 180	39	5769893.5	2158219.50002
14S/02E-13F01	PRESSURE 180	40	5769952.5	2154587.75002
14S/02E-13G01	PRESSURE 400	41	5772057.5	2155470.50002
14S/02E-14A01	PRESSURE 400	42	5767367.0	2156210.25002
14S/02E-14L02	PRESSURE 180	43	5764775.5	2155024.75003
14S/02E-14L03	PRESSURE 400	44	5764610.5	2154419.75002
14S/02E-15A01	PRESSURE 400	45	5761774.5	2157015.50002
14S/02E-15C02	PRESSURE 400	46	5759385.5	2157259.00002
14S/02E-15L02	PRESSURE 180	47	5758452.0	2153366.00003
14S/02E-15N01	PRESSURE 400	48	5757522.5	2153353.25002
14S/02E-15P01	PRESSURE 400	49	5758767.5	2153584.50002
14S/02E-16A02	PRESSURE 400	50	5756957.5	2157123.50002
14S/02E-16G01	PRESSURE 400	51	5755957.0	2155999.50002
14S/02E-16H01	PRESSURE 400	52	5756041.0	2156035.25002
14S/02E-17A02	PRESSURE 400	53	5751744.5	2156837.50002
14S/02E-20B03	PRESSURE 900	54	5750210.5	2151407.25003
14S/02E-21E01	PRESSURE 400	55	5753561.0	2150101.50003
14S/02E-21J01	PRESSURE 180	56	5756896.0	2149447.75002
14S/02E-21L01	PRESSURE 180	57	5754605.0	2149175.75002
14S/02E-22B01	PRESSURE 400	58	5760986.0	2152124.75002
14S/02E-22L01	PRESSURE 400	59	5759725.0	2149855.00002
14S/02E-22P02	PRESSURE 180	60	5758952.5	2146937.25002
14S/02E-23M01	PRESSURE 180	61	5762708.0	2149478.75002
14S/02E-24E01	PRESSURE 180	62	5768326.5	2150393.25002
14S/02E-24P02	PRESSURE 400	63	5769670.0	2146858.75002
14S/02E-24Q01	PRESSURE 180	64	5771942.5	2146772.50003
14S/02E-25D04	PRESSURE 180	65	5768019.0	2145519.50003
14S/02E-26J03	PRESSURE 400	66	5766847.5	2143883.00002
14S/02E-26N03	PRESSURE 180	67	5762617.0	2142567.75002
14S/02E-26P01	PRESSURE 180	68	5764519.0	2141615.00003
14S/02E-27C02	PRESSURE 400	69	5759686.0	2145562.00002
14S/02E-27F02	PRESSURE 180	70	5759825.0	2144647.75002
14S/02E-28C01	PRESSURE 400	71	5753983.5	2146953.50002
14S/02E-32D06	PRESSURE 180	72	5746981.0	2141653.75003

STATE WELL NUMBER	AQUIFER	MAP ID	FALSE EASTING¹	FALSE NORTHING¹
14S/02E-33P01	PRESSURE BOTH	73	5756348.0	2138806.75003
14S/02E-34A04	PRESSURE 180	74	5761465.0	2141623.00002
14S/02E-34B03	PRESSURE 180	75	5759909.5	2141431.00002
14S/02E-36E01	PRESSURE 180	76	5768600.0	2138685.00002
14S/02E-36G01	PRESSURE 400	77	5770039.0	2139297.50002
14S/03E-06L02	EASTSIDE DEEP	78	5775957.0	2164155.50002
14S/03E-07P02	EASTSIDE SHALLOW	79	5775832.0	2157899.00003
14S/03E-18E02	PRESSURE 400	80	5774633.5	2155704.50003
14S/03E-19Q02	PRESSURE 180	81	5776192.0	2146948.50002
14S/03E-30E03	PRESSURE 400	82	5774081.0	2143975.75002
14S/03E-30F01	PRESSURE 180	83	5775609.5	2144673.00002
14S/03E-31B01	PRESSURE 180	84	5776312.0	2140030.50002
15S/02E-12C01	PRESSURE 180	85	5769441.0	2130513.75002

¹ State Plane Coordinate System, California Zone IV, Feet, North American Datum 1983

Table 6 REQUIREMENTS FOR SAMPLE COLLECTION¹

ANALYTE	CONTAINER TYPE	SAMPLE VOLUME	PRESERVATIVE	HOLDING TIME
Calcium (Ca)	polyethylene (HDPE ²)	200 mL ³	HNO ₃ pH<2	3 days w/o pres. 6 months w/ pres.
CATION ANION BALANCE ⁴	N/A Calculation	N/A Calculation	N/A Calculation	N/A Calculation
Chloride (Cl) ⁵	polyethylene (HDPE ¹)	100 mL ²	4±2°C	28 days
Conductivity (SEC) ⁵	polyethylene (HDPE ¹)	100 mL ²	4±2°C	28 days
Magnesium (Mg)	polyethylene (HDPE ¹)	200 mL ²	HNO ₃ pH<2	3 days w/o pres. 6 months w/ pres.
Nitrate (NO ₃) ⁵	polyethylene (HDPE ¹)	100 mL ²	none HSO ₄ ; pH<2	48 hours at 4° C 28 days
pH (Laboratory)	polyethylene (HDPE ¹)	30 mL ²	none	48 hours at 4° C
Potassium (K)	polyethylene (HDPE ¹)	200 mL ²	HNO ₃ pH<2	3 days w/o pres. 6 months w/ pres.
Sodium (Na)	polyethylene (HDPE ¹)	200 mL ²	HNO ₃ pH<2	3 days w/o pres. 6 months w/ pres.
Sulfate (SO ₄)	polyethylene (HDPE ¹)	100 mL ²	4±2°C	28 days
Total Alkalinity (as CaCO ₃)	polyethylene (HDPE ¹)	100 mL ²	4±2°C	14 days

¹ = CCL QA Manual and SOPs

² = High Density Polyethylene

³ = only one 0.5 gal (~2L) container is needed for all analyses

⁴ = Cation anion balance is a calculation

⁵ = Analytes in partial mineral panel, one pint (~500 mL) container is need for analyses

APPENDICES

APPENDIX A

GLOBAL POSITIONING SYSTEM (GPS) TRAINING

Appendix A-1: GPS Training Record

Appendix A-2: TSC1 Asset Surveyor Manual

Appendix A-3: Pro XR/XRS Receiver Manual

Geographic Positioning System (GPS) Training Record

Name of Trainee
Name of Trainer
Date of Training

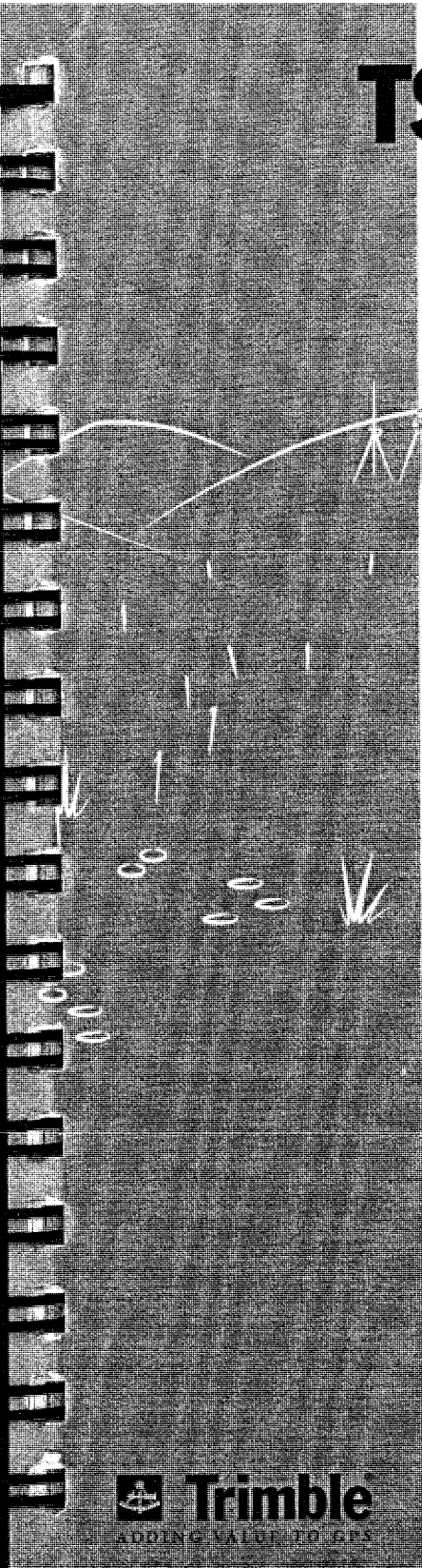
	Satisfactory Completion / Understanding
Verification of access to Pathfinder Office software	
Preparation of data dictionary	
Set-up of equipment	
Trimble® TSC1 Asset Surveyor ¹	
Trimble® Pro XR Receiver ¹	
Connector cables	
Batteries (Asset Surveyor and Receiver)	
Confirmation of communication between Asset Surveyor and Receiver	
Acquiring satellites	
Setting up and checking critical settings	
-logging intervals	
-PDOP mask ²	
Proper packing and unpacking of equipment	
Transferring data files from Asset Surveyor to the computer	

¹ The Agency uses Trimble® products, the GPS industry standard.

² PDOP = Position Dilution Of Precision

TSC1 Asset Surveyor

Operation Manual



 **Trimble**
ADDING VALUE TO GPS



TSC1 Asset Surveyor

Operation Manual

Part Number 34182-05-ENG

Version 5.00

October 1999

Revision A

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1 Quick Setup

The instructions in this chapter are a simplified version of the various steps found in Chapters 4, 5, and 6 of this manual. The purpose of the simplified version is to provide quick setup guides with reasonable default values that can be distributed to field crews to ensure proper setup of rover or base station receivers.

Data is logged to the TSC1 with the Asset Surveyor software. For full details on configuration and data collection, refer to the *TSC1 Asset Surveyor Software User Guide*.



Note – The steps outlined in this chapter do not include steps required to collect data using carrier phase information. For instructions on how to collect high accuracy features, see Chapter 7, Carrier Phase Data Collection.

1.1 Before Leaving the Office

1. Install the Pathfinder Office software on your office computer (refer to the *Pathfinder Office Getting Started Guide*).
2. Using the Pathfinder Office software, prepare any data files or data dictionaries you require, and transfer them to the TSC1. If you want to update GPS or attribute information on features stored in a GIS, import the data files and data dictionary into Pathfinder Office and then transfer them to the TSC1. You may also want to transfer any waypoint and coordinate system files to the datalogger.

3. Check that you have all the required equipment, and that it is operational. Set up and connect your GPS system (the appendix for your GPS receiver lists the equipment and shows you how to connect it).
4. If the GPS receiver has an On/Off switch, turn it on (the Series 4000, GPS Total Station 4700, GPS Total Station 4800, Site Surveyor 4400 and 4600LS receivers have an On/Off switch).

Start the Asset Surveyor software to check that it and the GPS receiver are communicating correctly. If communication is established, the GPS status line appears. If communication fails, an error message pops up on the screen.

5. Check all critical settings in the Asset Surveyor software.
You should also check non-critical and display settings, especially if the system has been used by someone else recently. For details of how to configure Asset Surveyor, refer to the *TSC1 Asset Surveyor Software User Guide*.
6. Turn everything off and pack it into carrying cases if you have to travel a significant distance to the survey site. Pack spare sets of batteries if you expect to operate the receiver for any length of time.

1.2 In the Field

1. Travel to the survey site, remembering to carry all the required equipment with you.
2. Reassemble the system.
3. If the GPS receiver has an On/Off switch, turn it on. Then start the Asset Surveyor software, if it is not already on.



Wait until the GPS receiver acquires enough satellites to start computing GPS positions, before beginning to work. The number of satellites being tracked displays on the status line.

You should now change some of the configuration settings as follows:


Main menu

1. *Configuration* Highlight *Configuration* then press the  key


Configuration menu

2. *GPS rover options* Press 
3. *Logging options* Press 

Logging options screen

4. *Point feature* Synchronized with the base station
5. *Line/area* Synchronized with the base station
6. *Not in feature* Synchronized with the base station
7. *Minimum positions* 3
8. *Allow GPS update* 'Warn first'
9. *Warning distance* 'Any'
10. To accept Press 

Position filters screen

11. *Position mode* 'Manual 3D' or 'Overdet. 3D' depending on canopy density
12. *PDOP mask* 4 or 6 (depending on receiver)
13. To accept Press 

4. Create a new data file, associating the correct data dictionary with it. Alternatively, re-open an existing data file.
5. Begin collecting data. Collect, review and update all the features necessary.
6. Close the data file.
7. Disconnect and repack the components of the system. Remember to turn off the GPS receiver, if it has an On/Off switch. Return to your office.

1.3 Back in the Office


1. Transfer the data files from the TSC1 to the PC using the Pathfinder Office software.
2. Use the Pathfinder Office software for differential correction, plotting, and exporting the data file(s) to a GIS.
3. Recharge the TSC1 datalogger and GPS receiver batteries.

1.4 Rover Configuration


Use the following procedure to set up your system in a rover configuration.

From the *Utilities* menu, select *Factory defaults*. This resets the Asset Surveyor software to its default configuration and then restarts the datalogger.



Antenna options screen

14. *Height* Height to antenna's phase center
15. *Measure* 'Vertical'
16. *Type* For a list of antenna types, see the *TSC1 Asset Surveyor Software User Guide*
17. *Confirm* Select 'Per feature', 'Per file', or 'Never'
18. To accept Press 



GPS rover options menu

19. To return to the *Configuration* menu Press 


Configuration menu

20. *Communication options* Press 
21. *Real-time input options* Press 

Real-time input options screen

22. RTCM age limit 5 or 10 (depending on your radio)
23. To accept Press 
24. To return to the *Configuration* menu Press 


Configuration menu

25. To exit the *Configuration* menu Press 







1.4.1 Data Collection

Use the following procedure to set up your system for rover data collection.

Main menu

1. Select *Data collection* and press 

Data collection menu

2. Create a data file
-or-
Open an existing data file
Select *Create new file*:
Press  and then press 
-or-
Select *Open existing file*.
Press 
Select an existing file to append to or update, and press 
3. To exit *Data collection* Press  and press  to confirm exit



1.5 Base Station Configuration

Use the following procedure to set up your system in a base station configuration.



Main menu

1. *Configuration* Highlight *Configuration* then press the  key


Configuration menu

2. *GPS base station options* Press 
3. *Logging options* Press 

Logging options screen

4. *Measurements* One to five seconds (depending on rover interval and free space)
5. To accept Press 
6. To return to the *Configuration* menu Press 


Configuration menu

7. To exit the *Configuration* menu Press 


1.5.1 Base Station Data Collection

Use the following procedure to set up your system for base station data collection.

Main menu

1. *Data collection* Press 


Data collection menu

2. *Create base file* Press 







Create File screen

3. *Create file* Press 



Antenna options screen

4. *Height* Height to antenna's phase center
5. *Measure* 'Vertical'
6. *Type* For a list of antenna types, see the *TSC1 Asset Surveyor Software User Guide*
7. *To accept* Press 

Reference Position screen

8. Enter reference position Type lat/lon (or north/east) and altitude, and press 
- or-
Use an existing waypoint Press , select the waypoint and press 
- or-
Use an approximate position Press  and press 
- or-
Leave as is and set in the Pathfinder Office software Press 




Base Station screen

9. To exit *Base station* Press  and press  to confirm exit.


Key Symbols



The Asset Surveyor software uses both *hard* (that is, physical) keys on a keypad and *soft* (that is, visual) keys on the datalogger's screen.

Hard (physical) keys on the TSC1 keypad are indicated as follows:

, , , and so on.

Softkeys on the TSC1 screen are indicated as follows:

, , , and so on.

A softkey is activated by pressing the corresponding function key (...) on the TSC1 keypad.

Warnings, Cautions, Notes, and Tips

Warnings, cautions, notes, and tips draw attention to important information, and indicate its nature and purpose.



Warning – Warnings alert you to situations that could cause personal injury or unrecoverable data loss.



Caution – Cautions alert you to situations that could cause hardware damage or software error.



Note – Notes give additional significant information about the subject to increase your knowledge, or guide your actions.



Tip – Tips indicate a shortcut or other time- or labor-saving hint that can help you make better use of the product.

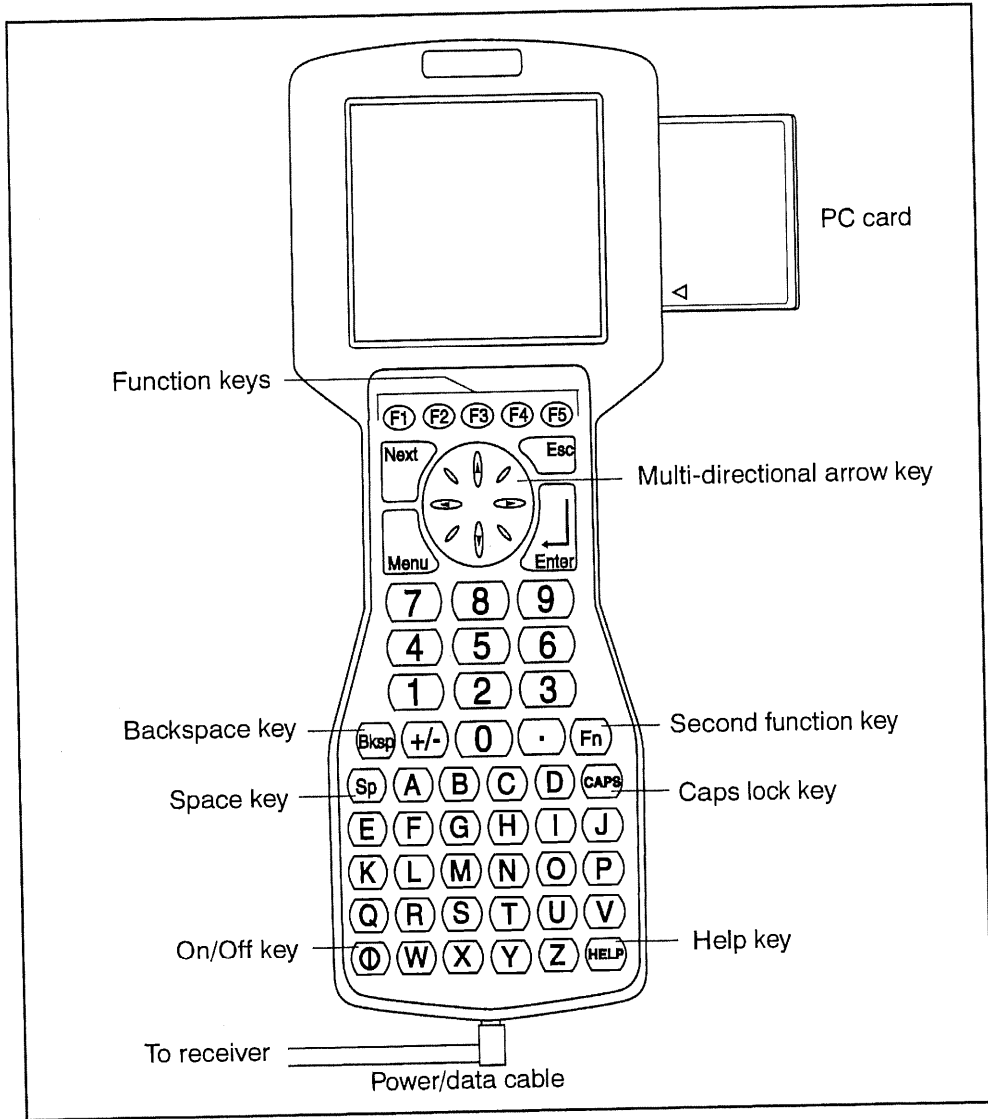


Figure 3-1 Front View of the TSC1 Datalogger

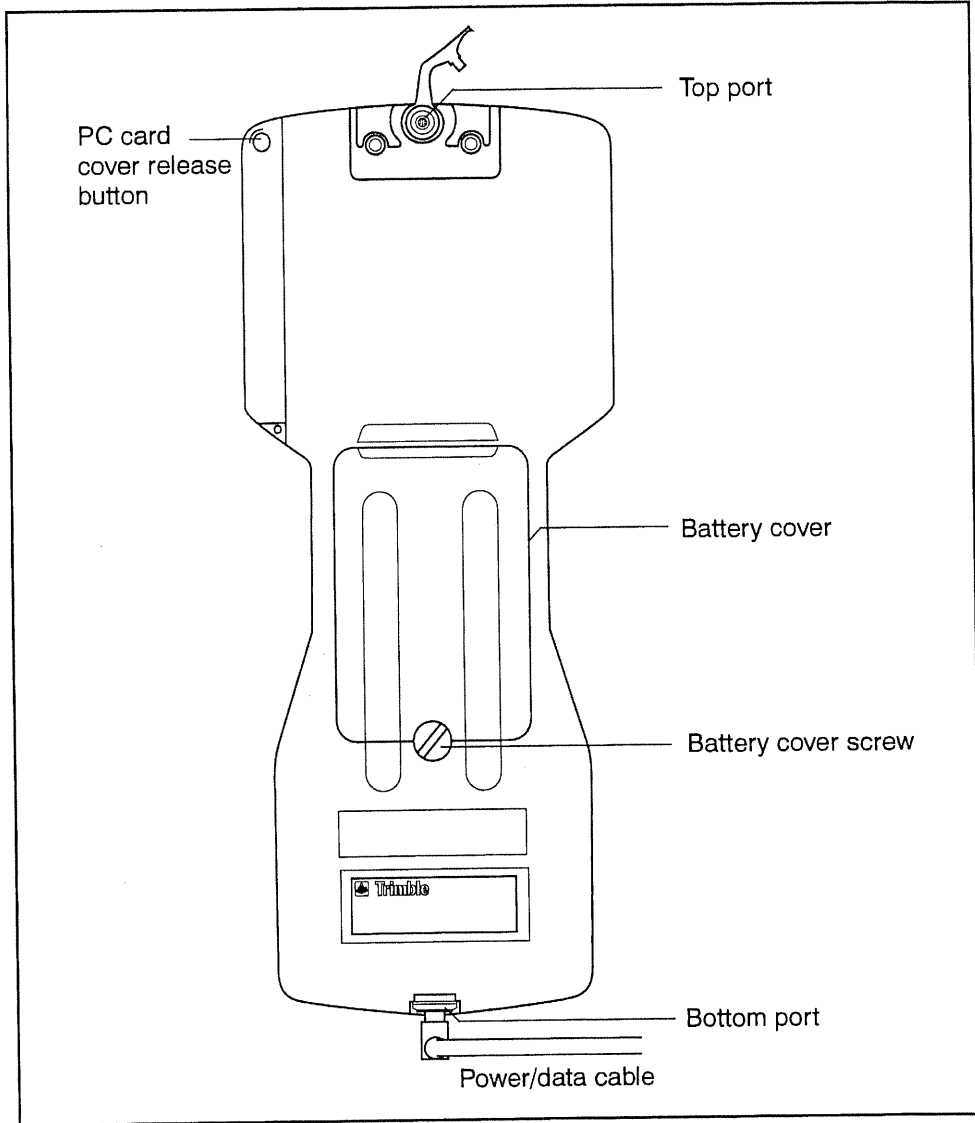





Figure 3-2 Back View of the TSC1 Datalogger

3.2 Turning the TSC1 Datalogger On and Off







To turn on the TSC1 datalogger, make sure that power is supplied (see Power Sources, page 3-11). Then press the green on/off key marked .

To turn off the TSC1, hold down  for one second.



Tip – For the location of the  key and other keys on the TSC1 datalogger's keypad, refer to Figure 3-1.

3.2.1 Hard Keys

Hard keys are the physical keys on the TSC1 keypad, such as , , , , , and . Use these keys to enter data and to access different screens.

3.2.2 Alternate Keys

















Alternate keys give some hard keys a second function. Some of the second functions are displayed on the hard keys in small yellow lettering. To use a second function, press the  hard key and then press the alternate hard key.

Table 3-1 shows some of the functions that you can access using alternate keys.

Table 3-1 Useful Second Functions

Keys	Function
 	Page down
 	Page up
 	Home
 	End
 	Previous screen
 	Contrast up
 	Contrast down

3.2.3 Softkeys

Softkeys are displayed on the bottom line of the TSC1 screen. A softkey corresponds to the adjacent hard key: (F1), (F2), (F3), (F4), (F5). Press the hard key to activate the softkey on the screen. To activate the  softkey, for example, press (F1). See Figure 3-3.

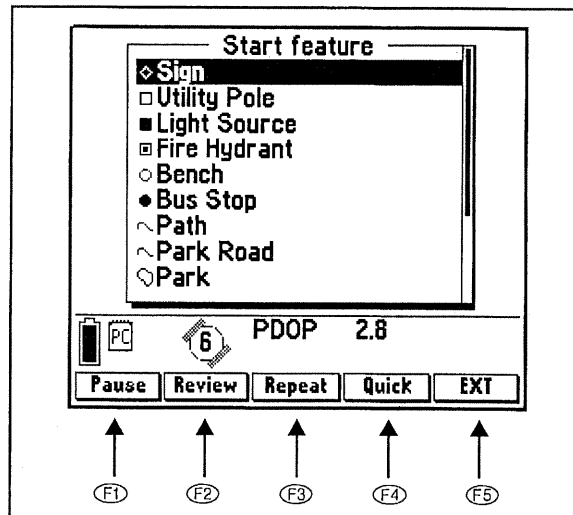






Figure 3-3 How Function Keys Correspond to Softkeys

Softkeys relate to particular forms or fields and only appear when these forms or fields are accessed. For example, the  softkey only appears when a line feature is opened for data collection, as this functionality applies to line features only.



3.2.4 Menu Key

To return to the *Main menu* at any time, press the  hard key. Use this key in conjunction with the  key to move around the Asset Surveyor screens quickly.

3.2.5 Next Key

To simplify the task of moving around menus, the  hard key offers quick access to open screens (windows).

3.2.6 Help Key

Press the  hard key at any time to obtain further information about a topic. When you press it, the *Help* menu appears. To exit *Help*, press  from the *Help* menu.



3.3 Screen



The TSC1 has an LCD screen. This screen responds to heat, and prolonged exposure to full sunlight can cause it to darken. If the screen does darken, turn it away from direct sunlight until it returns to normal.





Caution – Repeated exposure to direct sunlight can cause the screen to degrade.

3.3.1 Contrast

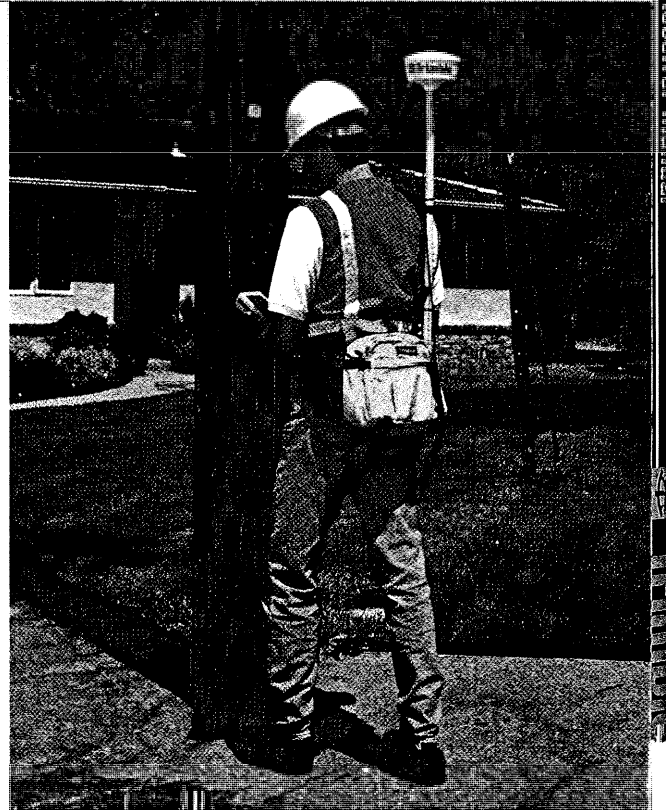
To increase the screen contrast, press  .

To decrease the screen contrast, press  .

3.3.2 Backlight

To toggle the screen backlight on and off, press  .

Pro XR/XRS Receiver Manual



 **Trimble**

Pro XR/XRS

Receiver Manual

Part Number 31172-20-ENG

Revision A

May 1998

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4 Pro XR/XRS System Equipment

This chapter provides details of the equipment associated with the Pro XR and Pro XRS receivers and shows how to assemble the equipment.

4.1 Pro XR Receiver Front Panel

The Pro XR receiver, shown in Figure 4-1, is mounted in a weatherproof housing.

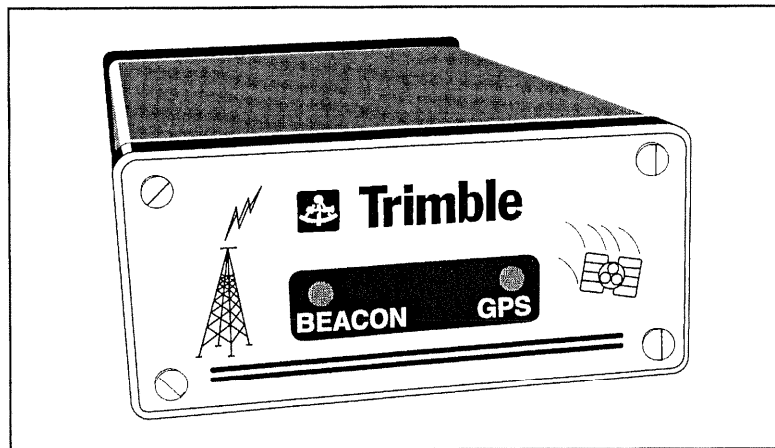


Figure 4-1 Pro XR Receiver Front Panel

4.2.1 Pro XR Status Lights

The two status lights on the front panel of the Pro XR receiver provide the status information listed in Table 4-1.

Table 4-1 Pro XR Status Lights

	GPS	Beacon
OFF	Unit not powered up	Unit not powered up or beacon function is disabled
FAST FLASH	Searching for satellites	Searching for MSK signals
SLOW FLASH	Found one or more satellites. Not enough for a position fix.	Found MSK signal. RTCM data has not been sent to GPS receiver.
ON	Performing position fixes	Good RTCM data is being provided to the GPS receiver

4.3 Back Panel

The Pro XR and Pro XRS receivers have two serial communications ports (RS232) and an antenna cable port. The serial communications ports, shown in Figure 4-3, are 12-pin(m) bulkhead connectors located on the back panel of the Pro XR and Pro XRS receivers.

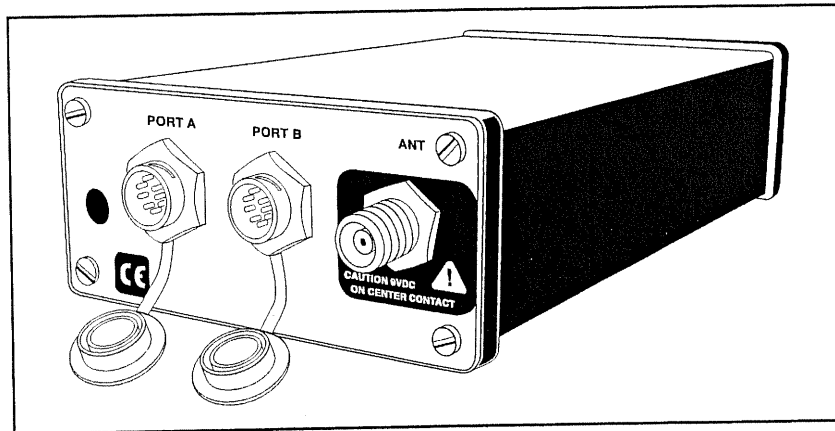


Figure 4-3 Pro XR/XRS Receiver Back Panel

4.3.1 Port A

Port A offers RS232 communication standards. It is designed for NMEA-0183 output and RTCM input.

4.3.2 Port B

Port B also offers RS232 communication standards. It is designed for two-way data flow, external sensor input and power.

4.3.3 Antenna Port

The antenna connector is a TNC(f) connector located on the far right on the back panel of the Pro XR or Pro XRS receiver.

4.4 GPS Pro XR Cabling

To use the TSC1 handheld with a GPS Pro XR receiver, connect the system as shown in Figure 4-4.

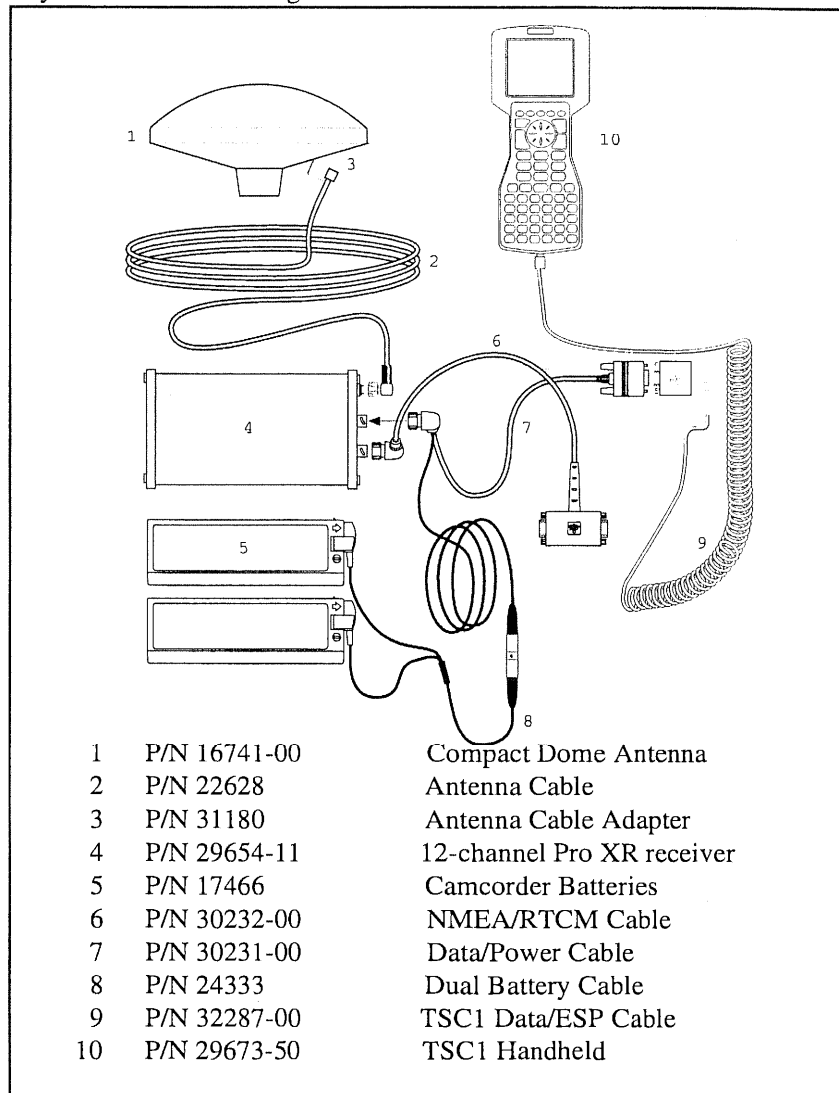


Figure 4-4 GPS Pro XR / TSC1 Connection Diagram

4.7 Pro XR/XRS System Hip Pack

The Pro XR and Pro XRS systems come equipped with an ergonomic hip pack carrying system, see Figure 4-18. The receiver, batteries and antenna are carried in the field using this hip pack/strapping system.

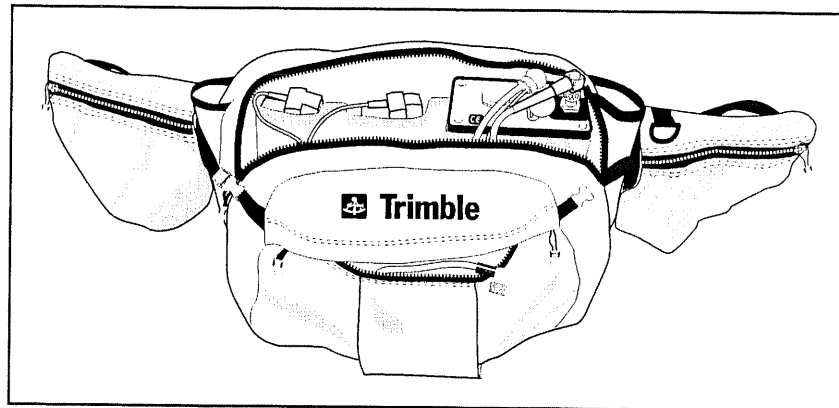


Figure 4-18 Pro XR/XRS System Hip Pack

4.7.1 Pro XR/XRS Hip Pack Contents

The Pro XR and Pro XRS systems are packed so that they are almost ready for use. The items not included in the hip pack are three 1-foot antenna poles, one 6-inch antenna pole and the data collector cable (P/N 30233-00 for TDC1, P/N 30234 for TDC2, or P/N 30236 for Field Computer/MC-V). These are located inside the shipping case.

The large interior of the hip pack contains: the Pro XR or Pro XRS receiver, two camcorder batteries, the power/data cable, and the camcorder power cable. All of these are set up inside the pack and ready for use. The exterior pocket of the hip pack contains a 3-meter antenna cable attached to the receiver and routed through a passage between the large interior pocket and exterior pocket. Both the data collector cable and antenna are routed out of the exterior pocket through the double zipper.

To route the data collector cable:

1. Locate the data collector cable and connect it to the data power cable, DE-9 connector labeled TO RECEIVER.
2. Once connected, feed the coiled cable through the passage and into the exterior pocket.

4.7.2 Wearing and Adjusting the Hip Pack

The Pro XR/XRS hip pack, once adjusted to suit, is comfortable and easy to use. See Figure 4-19.

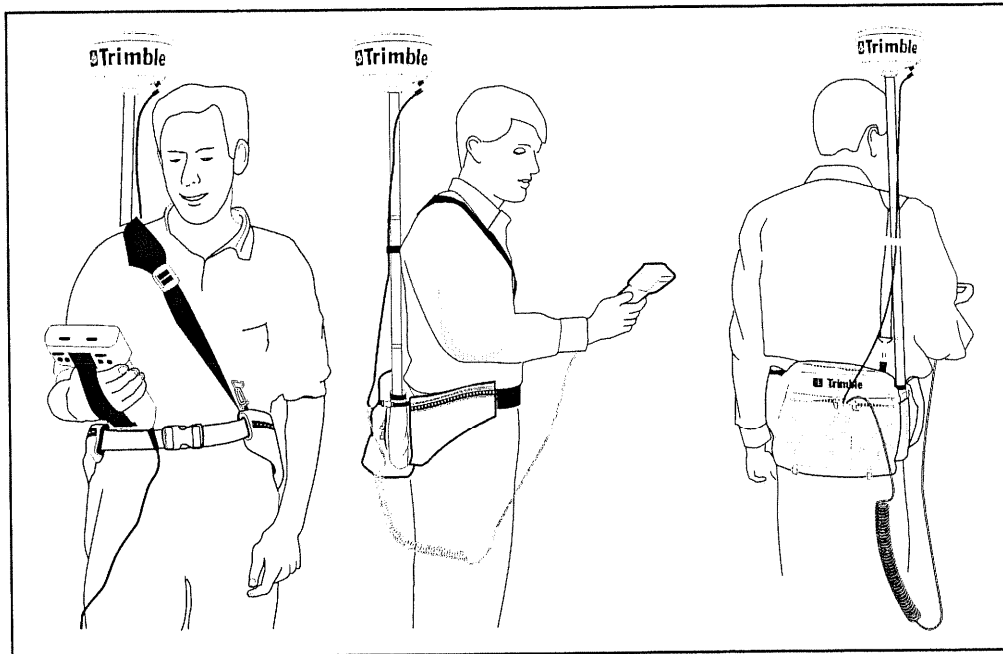


Figure 4-19 View of Hip Pack Setup

Antenna

When wearing the hip pack, the antenna height should be 3-4 inches above your head. The number of antenna pole sections required varies depending on your height. For example, if you are 5'5" tall, you may need two 1-foot and one 6-inch pole sections. If you are 6'2" tall, you may need three 1-foot poles. Try out different pole heights.

To set up the antenna with the hip pack:

1. Attach the pole sections together and connect the antenna onto the top of the pole sections.
2. Attach the pole/antenna to the hip pack.
3. Choose the side of your body that you prefer the antenna to be on and slide the pole sections into the small sleeve on that side of the hip pack.

Hip Pack and Strap

To adjust the hip pack and strap:

1. Connect the strap to the rear D-ring on the side of the pack on which the antenna is located.
2. Connect the other end of the strap to the D-ring on the belt on the opposite of the bag.
3. Slide the antenna pole through the velcro connection on the strap.
4. Put the strap over your head and across your opposite shoulder.

At this point, the shoulder strap should lead naturally from the antenna pole across your chest to the belt.

5. Buckle the hip pack around your waist/hip area so that the belt buckle is centered in the middle of your body.

The pack should adjust to fit close to the small of your back.

6. Adjust the front and back straps so the shoulder strap is situated squarely on your shoulder.
7. Put the pack on by slipping the strap over your head and across your body and then buckling the belt of the hip pack.

The hip pack includes side compression straps that can be pulled towards you to hold the pack firmly and comfortably against your back.

Remove the hip pack/strap by unbuckling the belt and slipping the strap over your head.

The hip pack and strap can also double as a shoulder bag. Tuck the belt portion of the pack into the webbing material on the back of the pack and hook the strap on the large D-rings of the pack. The unit can now be carried on your shoulder instead of around your waist.

The pack has extra room in the interior and exterior pockets for additional items you may need in the field. The hip pack also includes straps on the bottom of the pack to secure an extra sweater or coat while in the field.

4.8 Optional Range Poles and Tripods

Range poles and tripods are very useful when collecting carrier phase data. The height of the antenna can be accurately measured, and the antenna can be held still easily, compared to an antenna mounted from the hip pack.

APPENDIX B

FIELD DOCUMENTATION

Appendix B-1: Example of Field Sheet

Appendix B-2: Example of Chain of Custody Form (COC)

Appendix B-3: Example of Photo-Log

Appendix B-4: Example of Sample Labels

MONTEREY COUNTY WATER RESOURCES AGENCY - COASTAL GROUND WATER MONITORING PROGRAM June 2007

F CODE	SWID	STATUS	AQUIFER	USE	WELL NAME	METER No	PLANT No	SAMPLE PT	VISIT DATE	APPT. DATE	SAMPLE DATE	SAMPLE TIME	REMARKS
886	14S/02E-24E01	ACTIVE	P400	AG	R3P1	4571R8	92205	DL					D'Arigo Bros. RSP1. Tag #1164. Well is at corner of San Jon Rd and Hwy 183. Go twice then call Ed Mora 206-9164 or Jesse Aragon 909-9073. See photo
331	14S/02E-36E01	ACTIVE	P180	AG	BARDIN 12	0R1749	92428	faucet on booster.					T & A. Bardin #12. Tag #1037. Well on Hitchcock Rd. off Blanco office. Go twice, then call Dennis. See photo
673	14S/02E-13F01	ACTIVE	P180	AG	SANJONB	R39873	95522	DL					Sea Mist. San Jon well B. Tag #1186. Call Chris. Three day notice. See photo
975	14S/02E-12N02	CSIP-SBI	P180	AG		92593R	91785	DL					Schneider. Domestic well. Tag #2960. Run for 30 min. to stabilize conductivity. EC = 2920 (Jul '04). Call Tim Schneider 449-0874. Two week notice. Take EC meter, a bucket and last years results. See photo
1055	14S/02E-15A01	CSIP-SUPP	P400	AG	15A01	R69587	94951	DL			6/12/2007	9:05:00 AM	CSIP-SUPP. Well 15A1. PCA site #17. Go twice, then call Bill or Jesse. See photo
1324	14S/02E-15C02	CSIP-SUPP	P400	AG	15C02	42542R		DL			6/12/2007	8:55:00 AM	CSIP-SUPP. Well 15C2. Tag #2838. PCA site #19. Go twice, then call Bill or Jesse. See photo
861	14S/02E-15P01	CSIP-SBA	P400	AG	MORO COJO#1 (YARD)	31535R	95209	DL					Higashi Farms. Moro Cojo #1. By house and shed. Call Peter. 2 day notice. See photo
279	14S/02E-16H01	CSIP-SBA	P400	AG	CONLEY	91R418		DL					Higashi Farms. Connelly Ranch well. Tag #2856. Call Peter Odello 57926 or Charlie 578-7416. See photo. INACTIVE
2779	14S/02E-21E01	ABAN	P400	AG	MARINA-ARMSTRONGWELL	02384R		DL					Armstrong. Marina-Armstrong well. Tag #2962. SW of MRWPCA, sample from ball valve on pressure/flow control valve. Jack Armstrong 455-1901. See photo. INACTIVE
766	14S/02E-22P02	ACTIVE	P180	AG	VIERRA#1	1843T	95485	truck fill valve.					Crown Packing. Vierra #1. Tag #1095. Call Bill or Jose. Two day notice. See photo
859	14S/02E-15N01	CSIP-SBA	P400	AG	MORO COJO#2	3538R4	95037	DL					Higashi Farms. Moro Cojo #2. Big yellow truck-fill. Call Peter. 2 day notice. See photo
1282	14S/02E-24P02	ACTIVE	P400	AG	BORONDA SCHOOLHOUSE#1	93258T		DL					Crown Packing. Boronda Schoolhouse well. Tag #1099. Call Bill Sullivan 214-4650 or Jose Luis Lepe 970-6889. Well next to house/metal shed on McFadden Road, close to elem. school. Two day notice. See photo
22929	14S/02E-28H04	ACTIVE	PDEEP	AG	JACKS YARD								New Deep aquifer well located 54 mi W of Cooper Rd & 27 mi S of McFadden Rd on the Nissen Ranch

ENVIRONMENTAL ANALYSIS REQUEST FORM

MONTEREY COUNTY CONSOLIDATED CHEMISTRY LABORATORY
1270 NATIVIDAD ROAD, SALINAS, CALIFORNIA 93906 Phone (831) 755-4516

Shaded areas for laboratory use only

Chain of Custody:

Collected by (Print & sign):	Received by:
Relinquished by:	Received for Laboratory:
	Date & Time:
	Date & Time:

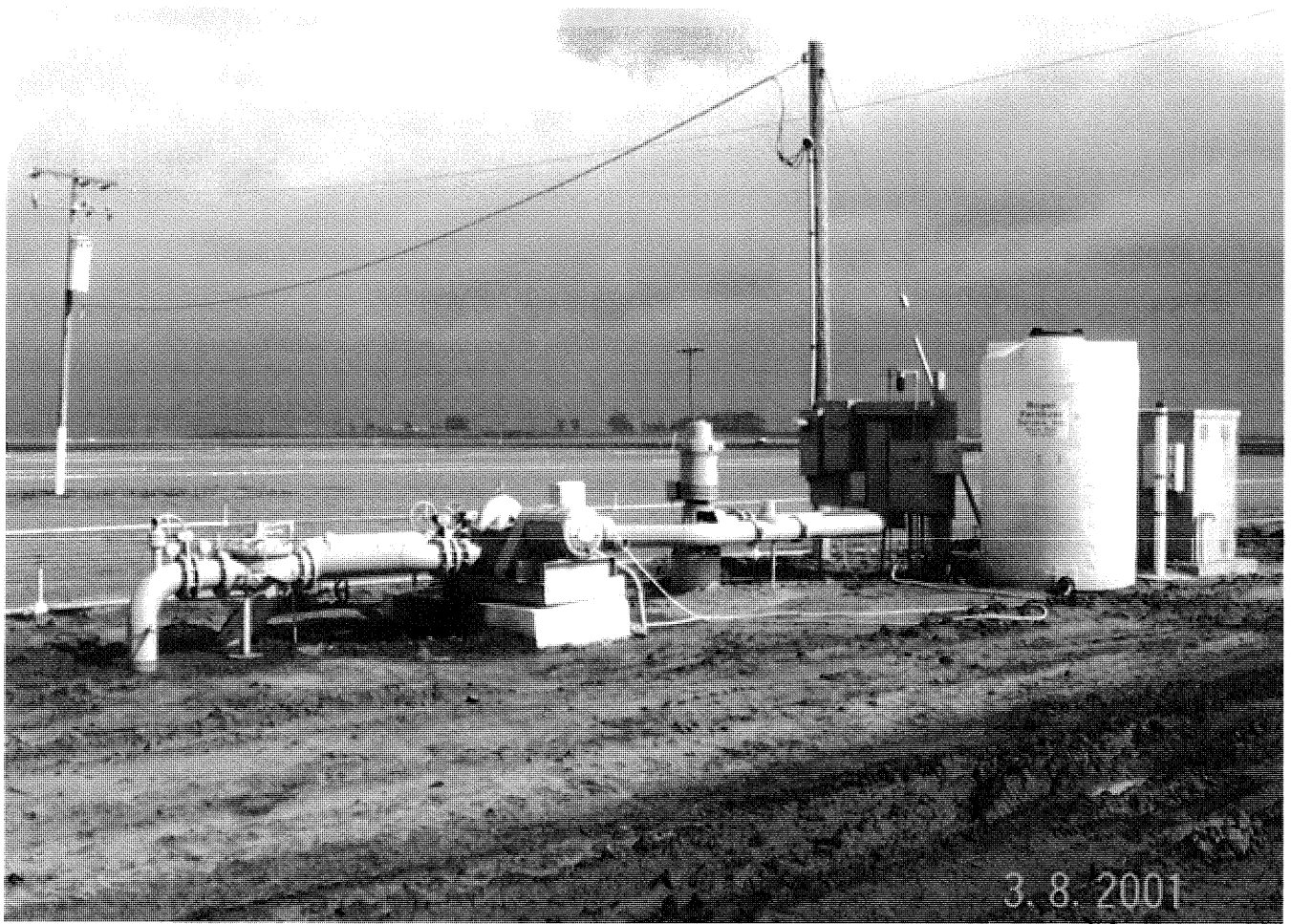
Client Name:		Report Attention:		ANALYSES REQUESTED												
Address:		Copy to:														
City, State, Zip:		Phone:														
		Fax:														
Laboratory Number	Sample ID or System #	Sample Site or Description	Collection Date & Time	Matrix ⁽¹⁾ 1-Routine 2-Repeat 3-Replacement	No. of Containers	Coliform	MMO	Quant.	Low-D	Nitrate						

(1) **D**=Drinking Water (Specify as routine, repeat or replacement) **W**=Wastewater (Specify as grab or composite) **O**=Other (identify)

Payment received with delivery Amount: _____ Initials: _____ Date: _____

Check: _____ Receipt #: _____

Sample comments (irregularities/preservation, billing information if different than reporting): _____



15S/04E-07A01

Sampling Date:

Sampler:

Sampling Time:

Comments:

Complete General Mineral Analyses

15S/04E-08M04

Sampling Date:

Sampler:

Sampling Time:

Comments:

Complete General Mineral Analyses

15S/04E-15D02

Sampling Date:

Sampler:

Sampling Time:

Comments:

Complete General Mineral Analyses

15S/04E-17P02

Sampling Date:

Sampler:

Sampling Time:

Comments:

Complete General Mineral Analyses

15S/04E-19H03

Sampling Date:

Sampler:

Sampling Time:

Comments:

Complete General Mineral Analyses

15S/04E-20B02

Sampling Date:

Sampler:

Sampling Time:

Comments:

Complete General Mineral Analyses

15S/04E-26G01

Sampling Date:

Sampler:

Sampling Time:

Comments:

Complete General Mineral Analyses

15S/04E-36H01

Sampling Date:

Sampler:

Sampling Time:

Comments:

Complete General Mineral Analyses

APPENDIX C
REVIEW CHECKLISTS

Appendix C-1: Field Activities Review Checklist

Appendix C-2: Laboratory Data Review Checklist

Field Activities Review Checklist

Sampling Location(s):

Sampling Date:

Item	Yes	No	NA	Comment
All required information was entered into field sheets in ink, and sheets were signed and dated by the field sampler.				
Deviations from SOPs, along with any pertinent verbal approval authorizations and dates, were documented on the field sheets.				
Samples were collected at the correct sites.				
The correct number of samples for each type of analysis and the correct volume was collected (0.5 gal/ ~2L for complete mineral panel OR one pint/ ~0.5L for partial mineral panel).				
Acceptable sample containers, appropriate for the intended analysis, were used.				
Field blanks were collected, and at the correct frequency (one every 25 samples).				
Field duplicates were collected, and at the correct frequency (one every 25 samples).				
Samples were packed with double-bagged ice and transported at the proper temperature ($4\pm 2^{\circ}\text{C}$).				
Chain of custody (COC) documents were completed properly.				
Sample holding times were not exceeded during field operations. See Table 6 (QAPP).				

Reviewer's Name (print):

Reviewer's Signature:

Reviewer's Title:

Date of Review:

Laboratory Data Review Checklist

Sampling Location(s):
_____Sampling Date:

Item	Yes	No	NA	Comment
Samples arrived at the laboratory at the proper temperature (4±2°C).				
All requested analyses were performed and were documented in the analytical report.				
Analyses were performed according to the methods specified in the approved QA Project Plan.				
Holding times for extraction and analysis were not exceeded. See Table 6 (QAPP).				
Field Blanks results were below MDLs and were analyzed at a frequency of one every 25 samples.				
Field Duplicate results were ≤ 25% RPD and were analyzed at a frequency of one every 25 samples.				
Method detection limits were included in the report.				
A narrative summarizing the analyses and describing any analysis problems was included in the data report.				
Data qualifiers and flags were explained in the data report.				
Initial calibration data were within laboratory SOP defined acceptance criteria ($r^2 \geq 0.995$) for all analyses.				
Method blanks were performed at 3 per analytical batch, and were below MDL.				
Laboratory Control Sample (LCS) data were included for all analyses for every analytical batch.				
Laboratory Control Sample Results were within 80-120% recovery.				

Item	Yes	No	NA	Comment
Analytical Duplicate data were included for all analyses for every analytical batch.				
Analytical Duplicate results were < 25% RPD.				
Matrix spike data were included for all pertinent analyses for every analytical batch, and recoveries were within 75-125%.				
Matrix spike additions were at 3-10x the native.				
Matrix spike duplicates were ≤ 25% RPD.				
Continuing calibration data were within QAPP defined acceptance criteria (80-120% of initial slope) for all analyses.				

Reviewer's Name (print): _____

Reviewer's Signature: _____

Reviewer's Title: _____

Date of Review: _____

APPENDIX D

MONTEREY COUNTY CONSOLIDATED CHEMISTRY LABORATORY

QA MANUAL AND STANDARD OPERATING PROCEDURES

Appendix D-1: QA Manual

Appendix D-2: Specific Conductance, based on SM 2510 B

Appendix D-3: pH, based on SM 4500-H B

Appendix D-4: Total Alkalinity, based on SM 2320 B

Appendix D-5: Metals, based on SM 3111 B

Appendix D-6: Anions, based on EPA 300.0

TABLE OF CONTENTS

ORGANIZATION AND RESPONSIBILITY	2
QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT OF DATA.....	4
CUSTODY, HOLDING AND DISPOSAL OF SAMPLES.....	5
CALIBRATION PROCEDURES AND FREQUENCY	8
ANALYTICAL PROCEDURES	10
ACQUISITION, REDUCTION AND VALIDATION OF REPORTING DATA.....	11
INTERNAL QUALITY CONTROL CHECKS	12
PREVENTIVE MAINTENANCE	14
PERFORMANCE AND SYSTEM AUDITS	16
REFERENCES	19
APPENDICES	

ORGANIZATION AND RESPONSIBILITY

On October 11, 1988, the Monterey County Board of Supervisors, in Resolution No. 88-508, authorized the Director of the County Health Department and the General Manager of Monterey County Flood Control and Water Conservation District (MCFC&WCD) to consolidate laboratory services for their respective programs into one facility. A Laboratory Steering Committee, comprised of representatives from both agencies, was established for the purpose of providing the planning, operation, and future development of the Consolidated Environmental Laboratory.

Each year the Steering Committee develops a Memorandum of Agreement (MOA) that describes and confirms the services to be provided by the Health Department to the Water Resources Agency (formerly the Flood Control and Water Conservation District) and defines the responsibilities of each party. In addition to providing laboratory support for the Health Department and the Water Resources Agency, the Consolidated Chemistry Laboratory provides analytical services to the Monterey Regional Water Pollution Control District, the County Department of Public Works and numerous water supply systems and wastewater treatment facilities.

The Consolidated Environmental Laboratory is accredited by the State Department of to perform tests in the following fields: 1) microbiology of drinking water and waste water; 2) inorganic chemistry and physical properties of drinking water; 3) analysis of toxic chemical elements in drinking water; 4) wastewater inorganic chemistry, nutrients and demand; and 5) toxic chemical elements in wastewater. A list of analyses and methods used in the laboratory is included in Appendix A.

The following is a brief description of the staff support for the Consolidated Chemistry Laboratory:

1. Director - Plans, organizes and controls laboratory operations. Coordinates laboratory interactions with other programs in the Health Department. Administers laboratory budget, billing and purchasing. Develops laboratory policy and procedures and supervises staff.
2. Public Health Chemist – Principal analyst. Performs complex organic and inorganic chemical analysis, evaluates and implements laboratory methods, develops and maintains quality assurance, reports results and maintains records, purchases equipment and supplies, provides technical consultation to Environmental Health and Water Resources Agency. Trains analysts and documents competency
3. Water Quality Specialist- Performs broad range of professional scientific work related to water quality and environmental issues; is proficient in

performing water quality analyses and managing the laboratory water quality database. Interpret and explain regulatory guidelines to clients.

4. Public Health Microbiologists - Assist Public Health Chemist in performing microbiological analyses and performing quality control.
5. Laboratory Assistant - Prepares culture media and reagents, assists in the processing of specimens, performs low to moderately complex environmental analyses and clinical analyses where interpretation or medical judgement is not required.
5. Laboratory Helper - Washes and sterilizes glassware and supplies. Prepares and labels mailing containers and specimen collection kits. Accession laboratory specimens. Sterilizes and disposes infectious waste. Maintains stockroom.
6. Typist-Clerk II - Enters clients and laboratory results into computer. Prints reports/forms. Prepares billing statements; receives and accounts for payments. Distributes laboratory results, and maintains laboratory files.

QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT OF DATA

Quality Assurance (QA) includes all aspects of laboratory operation that affect the accuracy and reliability of sample test results. In addition to quality control of the analytical test process, quality assurance practices include: 1) proper sample collection, receiving and holding, 2) proper maintenance of equipment, 3) accurate data reduction, validation and reporting; and, 4) periodic performance and systems audits.

CUSTODY, HOLDING AND DISPOSAL OF SAMPLES

Quality assurance includes proper labeling of samples, proper completion of the chain of custody/analysis request form, proper collection, preservation and storage of samples, proper accessioning of samples, and proper disposal of the sample.

- 1) Sample Collection/Labeling. Sample collection is a coordinated effort between the client and the laboratory. The laboratory will provide clients with appropriate sample containers and sample collection/preservation instructions. The laboratory will also request duplicates and blanks according to client's sample plan requirements. All samples submitted for testing should be appropriately labeled. Sample containers provided by our laboratory have a suitable label which should be filled out at the time of sampling by the sample collector. The following information must be provided with all samples:
 - a) Sample identification - submitters identification of sample (e.g. well number)
 - b) Location - an address or brief description of the place the sample was taken.
 - c) Time and date taken.
 - d) Name of sample collector.
 - e) Any preservatives
- 2) Chain of Custody/Analysis Request Form. A Chain of Custody/Analysis Request form should accompany all samples (see Appendix B). The Chain of Custody/Analysis Request form must include the following information: submitter name and address; sample identification; location of sample collection; date & time of collection; sample type; analysis to be performed; signatures of persons involved in the collection and chain of possession; and inclusive dates of possession.
- 3) Sample Receiving. Laboratory personnel receiving samples should assure that samples are properly collected, labeled, and the Custody/Analysis Request form has been completed:
 - a) The laboratory assistant receiving the specimen must sign and date the Custody/Analysis Request form. Make sure that any special requests made by the client are recorded under the comments section of the form
 - b) Assign each sample a unique laboratory identification number. Place

preprinted lab number on analysis request form and sample container. When a sample is collected in multiple containers for different analyses, each container should receive the same laboratory number. (Exception: sample containers for analytes requiring a rapid turnaround time (e.g. coliforms) may receive separate number to expedite reporting).

- c) Check that the samples meet the criteria described in Table 1006:I Summary of Special Sampling or Handling Requirements in 18th ed. of *Standard Methods for the Examination of Water and Wastewater* (Appendix C)
 - i) Samples should be collected in a suitable container; samples collected in bottles of unknown origin or questionable cleanliness should be brought to the attention of the Water Quality Specialist or the Public Health Chemist.
 - ii) Samples should be adequately labeled
 - iii) Samples should be checked for proper preservative, holding time, and holding temperature.
 - iv) Samples should be adequately sealed. Notify public health chemist if there is evidence of leakage. Verify that adequate sample volume exists to perform requested analysis.
 - d) NOTE: Samples that are not properly identified or are otherwise unsuitable for testing (e.g. improperly preserved or exceeding holding/transport time) are recorded on the "Sample Invalidation Log" and the Water Quality Specialist or Public Health Chemist notifies the client. Samples not meeting collection/preservation criteria may be tested only if resampling is impossible; results from such samples must be qualified on the laboratory report by comments describing sample deficiency.
- 4) When the sample meets criteria for acceptance by the laboratory, required preservatives are added immediately and the sample is stored under conditions specified by the analytical method to be used. For samples requiring thermal preservation, a laboratory refrigerator and freezer is available. The temperature is maintained at 4 degrees and below -10°C respectively. Temperatures are monitored each day.
 - 5) Chain of Custody/Analysis Request forms are given to the clerk to enter into a password protected computer laboratory information management system. Refer to "Water Sample Entry" in Clerical Manual for instructions on sample log-in.
 - 6) Disposal of samples: Upon completion of all analyses, any remaining

sample will be stored for at least one month prior to disposal. Chain-of-Custody form, worksheets and lab reports are retained for three years.

NOTE: Longer retention of samples or data may be required when legal action is probable. The samples and any associated extracts or digests are disposed of following recommendations found in the book, *Prudent Practices for Disposal of Chemicals from Laboratories*, National Academy Press, Washington, D.C. 1983.

CALIBRATION PROCEDURES AND FREQUENCY

Calibration is the process for determining the correctness of the assigned values of the physical standards used or the scales of the measuring instruments. Calibration accuracy is critically dependent on the reliability of the standards used for the required comparisons. Only the highest quality chemicals are used to provide necessary standard solutions, and due care is exercised in their preparation. The concentrations of the calibration standards bracket the expected concentration of the analyte in the samples. No data is reported beyond the range of calibration of the methodology. The calibration data, when plotted graphically, is referred to as a calibration curve. The calibration must be done under the same instrumental and chemical conditions as those that will exist during the measurement process. The frequency of calibration depends on the accuracy requirements of the investigation and the stability of the instrument used for the measurements:

At a minimum, three different dilutions of the standard will be measured when an analysis is initiated. Correlation coefficient must be > 0.995 . Reportable analytical results are those within the range of the standard dilutions used. Do not report values above the highest standard. The lowest reportable value is the Method Detection Limit (MDL), providing that the lowest calibration standard is less than 10 times the MDL.

- 1) Atomic Absorption Spectrophotometers - Two approaches are used to calibrate atomic absorption spectrophotometers. These methods are direct comparison and standard additions.
 - a) Direct comparison is the simple approach, and can be used with many instruments to give a direct readout of the concentration of an element in an unknown sample. To obtain good precision (e.g., 1-2% coefficient of variation), the absorbance levels measured must be about 0.1 to 0.6 units. Standard and sample solutions should be similar in bulk matrix constituents, particularly acid and salt content. Interference suppressants are used in all solutions when required. A number of standards (usually three to five in increasing concentration) as well as a blank, are prepared to cover the concentration range. A volume of type II reagent water with the same amounts of acids as the samples and standards) will be used for calibration blank. These solutions are run in absorbance to check linearity of the calibration curve.
 - b) The method of standard additions is used when samples contains severe matrix interference. In this case it is possible to add small amounts of conventional standard solutions, in increasing amounts, to aliquots of each sample. A calibration graph can then be constructed. This method will often be used in work with the graphite furnace.

- 2) UV-VIS Spectrophotometer - The calibration procedure for the UV-VIS spectrophotometer is similar to that for the A.A. spectrophotometers. An integration interval is not required as the signal is very stable. It is important to use blanks and allow at least 1/2 hour warm up time.
- 3) PH Meters - The proper calibration of pH meters requires the use of two buffer solutions and a thermometer. The two buffer solutions must cover the expected range of samples to be tested. A third buffer is used to confirm calibration. The pH meter should be calibrated each day. The temperature of the buffers must be entered into the meter.
- 4) Conductivity Meter - The conductivity meter does not require frequent calibration but should be checked against a known standard each day of use. Recalibrate when there is significant deviation with the value of the standard.
- 5) Ion Chromatograph- Calibration of the Ion Chromatograph is performed at least once each year and whenever: 1) Controls are out of range; or, 2) the column, suppressor or detector is changed.
- 6) Inductively Coupled Plasma/Mass Spectrometer – Calibration of the ICP-MS is performed every day of analysis and whenever controls are out of range. See the SOP for more information.

ANALYTICAL PROCEDURES

The laboratory employs only methods approved by Environmental Laboratory Accreditation Program. Analysts must conduct sufficient preliminary tests using the methodology and typical samples to demonstrate competence in the use of the measurement procedure.

Each time an analytical procedure is performed controls are included and duplicate samples and known additions are tested to insure accuracy and precision. Results are not reported unless all controls are within acceptance limits referenced in Standard Methods 18th Edition, 1992.

To monitor reliability of analytical measurements, data is periodically obtained on detection limits, accuracy, precision and recovery.

ACQUISITION, REDUCTION, VALIDATION OF REPORTING DATA

The analytical chemist is responsible for describing and reporting the data in an appropriate manner. In order to insure the accurate transcription, calculation and reporting of analytical data, the chemist will adhere to the following quality assurance procedures.

- 1) Use documented procedures and record all significant experimental details in such a way that the measurements could be reproduced by a competent analyst at a later date.
- 2) All measurements are made so that results are representative of the matrix (soil, water, etc.) and conditions being measured.
- 3) Report data only to the number of significant figures consistent with their limits of uncertainty.
- 4) Report data with the proper units of concentration. Units should be chosen which clearly indicate whether the concentration is in terms of weight by weight, weight by volume or volume by volume. Unless otherwise specified, all data are calculated and reported in standard units to allow comparison with data reported by other laboratories.
- 5) The analytical methodology used will be cited. The raw data for each sample, along with reagent blanks, control, and spiked samples will be suitably identified if included in the report. If average values are reported, an expression of the precision, including the number of measurements, must be included.
- 6) The report should include date and place of sampling, sampling point, the name of the sample collector, identification as to type of sample, date and time of submittal to the lab, date of analysis, name of the analyst, and the result. Any conditions which may effect the interpretation of the data should be noted in the report.. All results will be reviewed by a Water Quality Specialist or Public Health Chemist before a final report is released.
- 7) Laboratory records will be retained in a permanent file for three years.
- 8) Retain samples for one month after issuing final report and retain data and documentary evidence for three years.

INTERNAL QUALITY CONTROL

Quality Control (QC) may be defined as those measures undertaken in the laboratory to maintain the analytical testing process within acceptable limits of accuracy and precision.

The Quality Control Program consists of the following elements: documentation of operator competence, recovery of known additions, analysis of externally supplied standards, analysis of method blanks, and testing of replicate samples:

- 1) Operator competence The principal analyst is responsible for: 1) developing a standardized training syllabus for the methods employed in the laboratory; 2) assuring that test personnel are adequately trained; 3) assessing the competency of test personnel, and 4) maintaining documentation of training and competency of all test personnel.
 - a) Before test personnel are permitted to do reportable work , competency in performing the analysis is to be demonstrated. Commonly, the analyst performs replicate analysis under the supervision of the principal analyst. General limits for acceptable work are found in Standard Methods 18th Edition, 1992 in Table 1020 :I.
 - b) After initial demonstration of competency, the principal analyst will assure test personnel maintain competency through testing internal or external proficiency test samples at least once each year.
- 2) With each batch of samples tested, controls will be tested to verify the accuracy of results as described below. Controls used with each method are outlined in Appendix D.
 - a) Recovery of known additions as part of all regular analytical protocols except titrimetric and gravimetric methods. Use known additions to verify the absence of matrix effects. Spiked samples shall be analyzed with a minimum frequency of ten percent of the samples per matrix per batch of samples. Spike recovery must be between 80-120% for potable water (75-125% for waste water). When a spike sample fails to meet this criteria, retest all samples following the last acceptable spike sample. Spike recovery calculated as % of the known addition recovered.
 - b) Analyze control standards with a minimum frequency of ten percent of the samples per matrix, per batch of samples. If there are less than 10 samples in a batch, at least one per matrix per batch must be analyzed. The concentration of the sample shall be within the working range of the method. Sources of these samples include but are not limited to: performance evaluation samples from the EPA, commercially available standards, or standards prepared in-house but from sources different

from calibration standard. Control standards must be within the published acceptance range (for external controls). If the control standard does not have a published acceptance range, recovery of the control should be within 10% of the known value. When a control standard fails to meet this criteria, retest all samples following the last acceptable control.

- c) Method blanks will be analyzed with each batch of samples. The use of method blanks provides a measurement of laboratory contamination. Blanks cannot exceed the minimum detection level. See Appendix A.
- d) Replicate samples will be analyzed with a minimum frequency of ten percent of samples per matrix, per batch of samples for drinking water. For wastewater the requirement is 5%. If there are less than ten samples per batch, at least one sample per matrix per batch must be analyzed. If the analyte is not detected, replicate matrix spike samples will be analyzed. The percent difference between replicate samples must be within 20% for potable water (25% for wastewater). When a replicate sample fails to meet this criteria, retest all samples following the last acceptable replicates. Duplicate % difference calculated as the difference as a percent of the mean. $[100(X1-X2)/avg]$.
- e) In addition to the control standards tested with each run, an external reference standard for each analyte will be tested at least once each quarter.

All of the quality assurance control procedures will be followed in the laboratory. All documentation for these checks should be available for inspection by laboratory management.

PREVENTIVE MAINTENANCE

As part of the QA plan, the laboratory has a comprehensive preventive maintenance program. Balances, spectrophotometers, and other instruments undergo routine maintenance and accuracy checks by a manufacturer's representative or by laboratory personnel as described below. All preventive maintenance performed in-house is documented on preventive maintenance forms. Instruments which undergo routine professional maintenance have labels affixed to indicate date of last servicing. Manufacturer's instructions and service manuals are readily accessible.

Adequate spare parts are kept on hand to perform routine maintenance and minimize downtime. The spectrophotometers have maintenance contracts that provide for immediate servicing in the event of malfunction. Equipment records documenting preventive maintenance and emergency servicing/repairs are kept for a minimum of three years.

- 1) Thermometer/temperature-reading instruments: Accuracy of thermometers or recording instruments are checked annually against a certified National Bureau of Standards (NBS) thermometer or one traceable to NBS and conforming to NBS specifications. All thermometers are relabeled with date calibrated and correction factor.
- 2) Balance: Balance accuracy is verified each week using ASTM type 1 reference weights. Accuracy checks are documented on preventive maintenance chart. Balances are serviced and certified annually through a maintenance contract. Type 1 weights are re-certified at least every five years.
- 3) pH meter: pH meters are standardized with at least two NIST traceable standard buffers (pH 4.0, 7.0, or 10.0) and compensated for temperature before each series of tests. A third buffer is used to confirm calibration. Date buffer solutions when opened and discard buffer after expiration date on bottle. Buffers prepared from powders are replaced after four weeks.
- 4) Water deionization unit: Conductivity of the RO and Nanopure water is checked each month. A heterotrophic plate count on Nanopure water is also performed monthly. Filters are changed as indicated by conductivity readings and heterotrophic plate count. Records are maintained on preventive maintenance chart. Water is tested annually for bacteriologic quality and heavy metals.
- 5) Autoclave: Autoclave charts are used to document date, time, temperature and contents of each load. Chem-di indicators and heat sensitive tape are used with each load to identify materials that have been autoclaved; results are recorded on autoclave chart. Autoclave performance is

checked each month with biological indicator (e.g. spore suspension). Autoclaves are serviced quarterly under maintenance contract. The accuracy of autoclave recording thermometer is checked annually. The autoclave operating temperature is monitored on a weekly basis.

- 6) Refrigerator: Temperatures are recorded daily and units defrosted and cleaned as needed. All media and reagents stored in the refrigerator are labeled.
- 7) Freezer: Temperatures are recorded daily. Identify and date materials stored. Defrost and clean semiannually; discard outdated materials.
- 8) Ultraviolet sterilization lamps: Unit is cleaned monthly by wiping lamps with a soft cloth moistened with ethanol. Test lamps quarterly with UV light meter and replace if they emit less than 70 % of initial output or if agar spread plates containing 200 to 250 microorganisms, exposed to the light for 2 minutes, do not show a count reduction of 99%.
- 9) Water bath: Fecal coliform water bath is checked twice daily. All other water baths are checked each day of use.
- 10) Incubator: Check and record temperature twice daily (morning and afternoon) on the shelf areas in use. Locate incubator where room temperature is in the range of 16 to 27°C.
- 11) Fume hoods/Biological Safety Cabinets: Fume hoods are checked once each month using a velometer; readings are recorded on preventive maintenance chart. Hoods and safety cabinets are certified annually through service contract.

PERFORMANCE AND SYSTEMS AUDITS

Corrective action is required when data is outside of predetermined limits for acceptability. The corrective actions can be triggered by the following quality assessment activities: Control Chart analysis; proficiency evaluation testing; and QA audits.

1) CONTROL CHART ANALYSIS:

The laboratory's quality assessment techniques will be used to maintain the precision and accuracy of all laboratory analyses within a state of statistical control. Precision and accuracy measurements are the best way to assess analytical performance. Precision is the degree of reproducibility of a particular analytical procedure. Accuracy is a measure of the agreement between an experimental determination and the true value.

- a) **PRECISION** - Assess precision by replicate analysis, by repeated analysis of a stable standard, or by analysis of known additions to samples. Precision is specified by the standard deviation of the results. The formula for determining standard deviation (SD) is:

$$SD = \sqrt{\sum (X1-X)^2 / (N-1)}$$

X1 is the value of the individual measurements; X is the mean of all measurements for a given sample and N is the number of measurements.

The purpose of determining precision is to establish the typical variance of the method in the absence of any matrix influence. In the course of determining precision, there are two cases that indicate there is a problem with the precision data:

- i) The measured values show wide variation from one to another for a given day.
- ii) The measured values show little variance from one to another for a given day, but the mean and standard deviation show wide variation from one day to another.

If either of the above occurs, factors such as sample homogeneity, instrument calibration, or analyst error should be checked, documented, and corrected. The precision measurements should then be repeated.

- b) **ACCURACY** - The best method to determine accuracy is to spike an aliquot of reagent water with a known amount of the constituent being measured and analyze the sample. The amount spiked should be at least five to ten times greater than the analytical detection limit.

To evaluate the data accuracy, the percent recovery of the spike must be determined. The formula for determining percent recovery is:

$$\% \text{ recovery} = [100(S - S1) \div S2]$$

Where S is the concentration of the spiked sample; S1 is the concentration of the unspiked sample; S2 is the concentration of the spike added to the sample.

If the percent recovery deviates significantly from 100% and the method has not demonstrated significant bias, the problem must be detected and corrected prior to continuing the analysis. Sources of this problem include incorrect standard or spike solution concentration or a problem in the procedural detection system.

Precision, accuracy, and detection limits for all methods used in the laboratory is comparable to values referenced in Standard Methods 18th Edition, 1992 and EPA Methods for Chemical Analysis of Water and Wastes, March 1983.

- 2) PERFORMANCE EVALUATION SAMPLES: The laboratory director is responsible for enrolling the laboratory in ELAP approved proficiency testing program(s) and assuring that proficiency testing is performed for all regulated tests. The principal analyst (Public Health Chemist) will conduct and document internal proficiency testing at least once a year for tests where proficiency testing is not available. Proficiency test samples are treated in the same manner as routine samples (ie. tested the same number of times, tested using personnel who routinely perform testing, tested using routine methods and tested during patient testing).
- 3) QUALITY ASSURANCE AUDIT: The quality assurance program will be audited quarterly and any deviations from the program will signal corrective action to be taken. Quality assurance audit will be documented in a written report. The audit will include the following aspect:
 - a) Competency of test personnel must be evaluated annually and be documented
 - b) Evidence of the systematic use of control samples, replicate measurements and reference materials all in conjunction with control charts.
 - c) Proper labeling of reagents and samples.
 - d) Use of approved methods.

- e) Results on blind samples.
- f) Acceptable safety equipment and procedures.
- g) Quality assurance reports generated on a regular basis.
- h) Documentation on equipment performance and maintenance.
- i) Training records.
- j) All relevant files accessible and organized.
- k) Laboratory personnel following good laboratory practices.
- l) Laboratory personnel following good measurement practices

The Public Health Chemist will be responsible for initiating and documenting any corrective action necessary. Corrective action will be documented on the appropriate control chart, performance evaluation report, or QA audit report. No data shall be reported until the cause of the problem is located and corrected or the laboratory demonstrates the cause was a random event and no longer affects data. Although the elimination of events requiring corrective action may not be achieved, a reduction in the repetition of these events is the objective of this program.

REFERENCES FOR QUALITY ASSURANCE DOCUMENT

- 1) Standard Method for the Examination of Water and Wastewater, 18th edition, 1992.
- 2) Handbook for Analytical Quality Control in Water and Wastewater Laboratories. EPA-600/4-79-019, March 1979, USEPA.
- 3) Manuals for the Certification of Laboratories Analyzing Drinking Water Criteria and Procedures/Quality Assurance. EPA QAMS-005/80, Interim Guidelines, EPA-570/9-82-009, USEPA.
- 4) Methods for Chemical Analysis for Water and Waste. EPA-600/4-79-020, March 1983.

Written by: Gerry Guibert & David Holland

Date: May 1993

Revised: January 1999

Revised: September 21, 2004

Approved by: _____

(Laboratory Director's Signature)

Monterey County
Consolidated Chemistry Laboratory

ANALYTICAL METHODS FOR WATER ANALYSIS

PARAMETER	HOLD TIMES	METHOD REFERENCE	MDL	UNITS
Free Chlorine	.25 h; ASAP	SM 4500-Cl G	0.02	mg/L
Total Chlorine	.25 h; ASAP	SM 4500-Cl G	0.05	mg/L
Enterococcus	8 h	IDEXX	1/100 ml	
Heterotrophic Plate Count	8 h	SM 9215 B	1	CFU
E. coli – MPN	6 h waste 8 h source 30 h potable	SM 9221 B	2/100 ml	
Fecal Coliform – MPN	6 h waste 8 h source 30 h potable	SM 9221 B	1/100 ml	
Total Coliform – MPN	6 h waste 8 h source 30 h potable	SM 9221 B	2/100 ml	
Total Coliform – Quantitray	6 h waste 8 h source 30 h potable	SM 9223	1/100 ml	
E. coli – Presence/Absence	30 h potable	SM 9223	1/100 ml	
Total Coliform – P/A	30 h potable	SM 9223	1/100 ml	
pH	.25 h; ASAP	SM4500H B		pH units
Bicarbonate	ASAP (with pH)	SM 2320 B	10	mg/L
Calcium Carbonate	ASAP (with pH)	SM 2320 B	1	mg/L
Carbonate	ASAP (with pH)	SM 2320 B	1	mg/L
Solids	24 h	SM 2540 F	0.1	mL/L
Color Determination	48 h	SM 2120 B	2	CU
Odor	NS; 48 h (rec 6h)	SM 2150 B	1	TON
Turbidity	48 h	SM 2130 B	0.05	NTU
Nitrate	48 h	EPA 300.0	1	mg/L
Nitrite as (N)	48 h	SM 4500 NO2-B	10	ug/L
Total Dissolved Solids	7 d	SM 2540 C	5	mg/L
Total Suspended Solids	7 d	SM 2540 D	5	mg/L
Alkalinity	14 d	SM 2320 B	1.0	mg/L, CaCO ₃
Bromide	28 d	EPA 300.0	1	mg/L
Chloride	28 d	EPA 300.0	1	mg/L
Fluoride	28 d	EPA 300.0	0.02	mg/L
Sulfate	28 d	EPA 300.0	1	mg/L
Conductivity	28 d	SM 2510 B	1	umhos at 25C
Ammonia (N)	28 d	SM 4500 NH ₃ F	0.05	mg/L
Orthophosphate	NS; 28 d	SM 4500 P E	0.03	mg/L
Total Phosphorus	28 d	SM 4500 P E	0.03	mg/L

Monterey County
Consolidated Chemistry Laboratory

PARAMETER	HOLD TIMES	METHOD REFERENCE	MDL	UNITS
Aluminum	6 months	EPA 200.8	5	ug/L
Antimony	6 months	EPA 200.8	0.5	ug/L
Arsenic	6 months	EPA 200.8	1	ug/L
Barium	6 months	EPA 200.8	0.5	ug/L
Beryllium	6 months	EPA 200.8	0.5	ug/L
Cadmium	6 months	EPA 200.8	0.5	ug/L
Chromium	6 months	EPA 200.8	5	ug/L
Copper	6 months	EPA 200.8	0.5	ug/L
Iron	6 months	SM 3111B	100	ug/L
Lead	6 months	EPA 200.8	0.5	ug/L
Manganese	6 months	EPA 200.8	0.5	ug/L
Mercury	6 months	EPA 200.8	0.25	ug/L
Nickel	6 months	EPA 200.8	0.5	ug/L
Selenium	6 months	EPA 200.8	5	ug/L
Silver	6 months	EPA 200.8	5	ug/L
Thallium	6 months	EPA 200.8	0.5	ug/L
Zinc	6 months	EPA 200.8	5	ug/L
Calcium	6 months	SM 3111B	1.0	mg/L
Magnesium	6 months	SM 3111B	0.1	mg/L
Potassium	6 months	SM 3111B	0.1	mg/L
Sodium	6 months	SM 3111B	0.1	mg/L
Hardness as CaCO ₃	6 months	SM 2340 B	1.0	mg/L
Boron	6 months	SM 4500 B B	0.1	mg/L

SPECIFIC CONDUCTANCE
EPA 120.1/SM 2510 B
umhos at 25°C

Scope and Application:

This method is applicable to drinking, surface and saline waters, domestic and industrial wastes and acid rain.

Summary of Method:

The specific conductance of a sample is measured by use of a self-contained conductivity meter, the YSI Model 32. The conductivity meter is used in the temperature compensated mode.

Sample Criteria & Acceptability:

A minimum of 100 ml sample should be submitted in a clean container provided by the laboratory. Samples can be stored for up to 28 days at 4°C. The samples must be brought to room temperature before testing. If the sample does not meet the above criteria, document it on the worksheet but perform the test.

Reagents:

0.02 Molar Standard Potassium Chloride Solution:

1. Dry 0.85 g of Reagent Grade Potassium Chloride (KCl) for 4 hours at 105°C. Use immediately or store in a desiccator until use.
2. Dissolve 0.7456g of pre-dried potassium chloride in a 1 liter Class A volumetric flask using deionized water.
3. Label the flask with Potassium Standard Solution, 0.7456 g KCl/L, date made, outdate of 3 months, and initial.
4. Alternately, order two 500 ml containers of the Traceable Conductivity Calibration Standard near the 1414 micromho/cm range; from Fisher Scientific, Cat No. 09-328-11.

Control

1. Check deionized water. It should read less than 1 umho. If the reading is higher, clean cell and repeat reading of deionized water. If reading is still high, notify the Chemist.
2. Use current Quality Control sample with each run. The control must be in range before proceeding with specimens. The 0.01 M KCl can be used as control.

Conductance Meter Maintenance:

1. Store cell in deionized water. If the cell has been stored dry, soak in deionized water for 24 hours.
2. Check the platinum black coating on the electrode. If the coating appears thin or if it is flaking off the electrode, the cell should be cleaned and the electrodes replatinized. See "Instruction Manual YSI Model 32 Conductance Meter" pages 11 and 12 for instructions.
3. The electrode should be cleaned and replatinized every four months. Record the preventative maintenance on the "PM Worksheet".

Conductance Meter Calibration Check:

Instrument must be standardized with KCl solution before daily use.

1. Pour 50 ml of the standard potassium chloride solution into a 250 ml beaker. Alternately, immerse the conductivity cell and thermometer in the Rinse Bottle, then transfer to the Read Bottle for actual reading
2. Immerse conductivity cell in sample. The electrodes must be submerged and the electrode chamber must be free of trapped air. Tap the cell to remove any bubbles, and dip it two or three times to assure proper wetting.
3. Rotate the Range Switch to the lowest range position that gives a reading (within range) on the display. An over-range value is indicated by a "1" followed by blanks. An under-range value is indicated by a reading followed by a small letter "u". Readings may be in error when operating in the under range conditions. On the 0.1 – 2 micromho range; allow extra time to stabilize.
4. The conductance value of the solution is displayed on the meter. The units in which it is to be read are determined by the Range Switch, either in mU or in uU (or milli and micro siemens).

$$2 \text{ uU}, 20 \text{ uU}, 200 \text{ uU reading} = \text{final result}$$
$$2 \text{ mU}, 20 \text{ mU}, 200 \text{ mU readings} \times 1000 = \text{final result}$$

5. Use the table below to check accuracy of cell constant:

Conductivity of 0.01 M KCl	
Temperature in Centigrade	Micro-ohms/cm
21	1305
22	1332
23	1359
24	1386
25	1413
26	1441
27	1468
28	1496

6. If the standard is within range, rinse the cell three times with deionized water, and start testing unknowns as described in steps 2-4.

Reporting:

Report results to three significant figures. Report in units of micromhos per centimeter at 25 °C

References:

1. Instruction Manual YSI Model 32 Conductance Meter", Item 060818, PN A32018 R, October 88 EP
2. Methods for Chemical Analysis of Water and Wastes", EPA- 600: 4-79-020, March 1983, pages 120.1-1 to 120.1-3.
3. "Standard Methods for the Examination of Water and Wastewater", 18th Edition, 1992.

Written by: David Perez, Date: February 1993

Revised: January 12, 2007

Approved by: _____

Chemist

pH

SM 4500-H B

Electrometric

Scope and Application

Application to drinking, surface, ground and saline waters as well as acid rain, and wastewater (domestic and industrial).

Principle of Operation

pH is defined as the negative logarithm of the hydrogen ion concentration in moles per liter. The pH scale goes from zero to fourteen with a value of seven units to be considered neutral. Values below seven are acid; values above seven are basic. It is important to note that a one-unit change in pH represents a ten-fold change in the concentration of the hydrogen ion.

pH has a great impact on almost all biological and chemical processes used for water and wastewater treatment, and proper measurement of this value is critical. pH is measured using a pH meter consisting of a potentiometer, glass pH electrode, reference electrode and temperature compensating device. When calibrating the instrument, use two buffers that bracket the expected pH value for greatest accuracy.

Specimen collection and Handling

Collect sample in plastic or glass container. Test sample immediately upon receiving and/or within two hours after collection.

Instrument Calibration:

Two buffer calibration:

1. Fill a 50 ml beaker with up to 30 ml of pH 7 buffer. Add a stir bar and set the knob on the magnetic stirrer to the second line on the dial (slow spin). Place the electrode in the pH 7 buffer; make sure that the reference electrode is filled with KCl and is open. Allow the electrode to equilibrate for 5 minutes.
2. Release Standby button and press the pH button. Measure the temperature of the buffer solution and set the temperature control. Turn the large slope knob to 100 and the inner knob fully clockwise.
3. Adjust the calibration control until the readout displays 7.00. Press the mv button and record the mv reading on the worksheet. Remove electrodes from the buffer and rinse with deionized water.
4. Fill a 50 ml beaker with up to 30 ml of pH 4 buffer. Add a stir bar and set the knob on the magnetic stirrer to the second line on the dial (slow spin). Place the electrode in the pH 4 buffer and allow the electrode to equilibrate for 5 minutes. Press the pH button.
5. Adjust the slope knob until the readout displays 4.00. Press the mv button and record the mv reading on the worksheet. Remove electrodes from the buffer and rinse with deionized water.
6. Fill a 50 ml beaker with up to 30 ml of pH 6.86 buffer. Add a stir bar and set the knob on the magnetic stirrer to the second line on the dial (slow spin). Place the electrode in the pH 6.86 buffer and allow the electrode to equilibrate for 5 minutes. Press the pH button and record the result on the worksheet and quality control graph. PH should be 6.86 ± 0.1 ; notify chemist if out of range.
7. Rinse the electrodes with deionized water.

8. Record mv readings of calibration buffers. Calculate change in millivolts and divide by 3. The result should be 58 ± 2 mv.
9. If the slope is within limits, begin testing unknowns. If the slope is out of range, re-calibrate the pH meter. If the second calibration slope is out of range, notify the chemist.

Controls

1. Run every tenth specimen in duplicate. The duplicates should be within 20% of each other.
2. Check the 6.86 control buffer after every tenth specimen. Record the results on the worksheet and quality control chart.

Procedure

Once the pH meter has been calibrated, the unknown samples can be tested.

1. Pour 30 ml of unknown (or 50 ml of unknown if also testing for alkalinity) into a 150 ml beaker containing a small stir bar. Start the stirrer. Keep the automatic stirrer at a constant moderate rate (The speed is marked on the dial by a pen marking).
2. Allow the display to stabilize, and record the results on the worksheet.
3. Rinse the electrode with deionized water between specimens. Blot dry with a 'kimwipe'. Do not rub the electrode; the static electricity can alter readings.

Reporting

Report the result to the nearest tenth (0.1).

References:

1. "Method for Chemical analysis of Water and Wastes", EPA 600/4-79-020, Revised March 1983.
2. Standard Methods for the Examination of Water and Wastewater 18th edition 1992

Written by: David Perez
Date: December 1994

Approved by: _____
Chemist

Total Alkalinity

SM 2320 B

Titration

Principle

Total alkalinity is defined as the acid-neutralizing capability of water. It is reported as due to bicarbonate (HCO_3), carbonate (CO_3), and hydroxide (OH). Unaltered sample is titrated potentiometrically to pH 8.3 endpoint for “carbonate” alkalinity and 4.5 endpoint for “bicarbonate” alkalinity.

Note: Samples with a pH less than 8.3 (i.e. most drinking water samples) are reported as having non-detectable hydroxide and carbonate alkalinity; for these samples total alkalinity is due entirely to the bicarbonate content of the water. Bicarbonate alkalinity (as HCO_3) can be calculated from total alkalinity (as CaCO_3) by multiplying by a factor of 1.22.

Applicable to drinking and surface waters, domestic and industrial wastes, and saline waters.

Sample Criteria & Acceptability

Samples should be submitted in clean containers provided by the laboratory. A minimum of 100ml of sample should be submitted for testing. Samples, which cannot be tested within 24 hours of collection, should be stored at 4°C and tested within 14 days. If any sample does not meet the above criteria, document it on the worksheet but perform the test.

Equipment

1. pH meter that can read to 0.05 pH units.
2. Two 1,000 ml Class A volumetric flasks.
3. Magnetic stirrer and magnetic stir bars.
4. Two 100 mL beakers.
5. One 250 mL flask
6. One 50 mL graduated cylinder

Reagents

The day before preparing standardize sulfuric acid, dry 0.1 g of Tris Buffer for at least 3 hours at 103 C (overnight is acceptable). After drying, immediately weigh out the Tris buffer. If that is not possible, store the reagent in the desiccators until used.

1. Standardized 0.02 N H_2SO_4 (sulfuric acid) + 0.004 units:

The concentrated H_2SO_4 and stock 1.0 N H_2SO_4 may be found in acid cabinet below hood.

- a. Prepare a 1.0 N H_2SO_4 Stock Solution: Fill a 1,000 ml Class A volumetric flask three quarters full with deionized water. Carefully add 28.0 mL of concentrated H_2SO_4 using a 25 mL and 3 mL Class A volumetric pipette. Fill to the mark with deionized water and mix. Transfer to plastic bottle and label as 1.0 N H_2SO_4 Stock Solution, date made, outdate of 1 year, and initial. Cap tightly.
- b. Prepare a standardized 0.02 N H_2SO_4 .
 1. Fill a 1,000 mL Class A volumetric flask three quarters full with deionized water. Carefully add 20.0 mL of the Stock H_2SO_4 using a 20 mL Class A pipette. Fill to mark and mix thoroughly.
 2. Weigh out between 0.0700 to 0.0800 g of Tris buffer using the analytical balance. Record the weight of the Tris Buffer to four places in the “Standard & Reagent Preparation” notebook. Add the buffer to 250 mL flask containing 25 mL of deionized water and stir bar; mix.

3. Add 3 drops of Hach Brom Cresol Green-Methyl Red indicator solution (Hach cat. number 451) to the Tris buffer solution.
 4. Fill the titrating buret with the 0.02 N H₂SO₄ solution. Titrate the solution until a stable pink color is reached. Record the volume of reagent used.
 5. Calculations:
Normality of H₂SO₄ = Wt of Tris Buffer (g) ÷ (0.121137 g/meq Tris X mL of 0.02 N H₂SO₄ used)
Example:
0.0879 g Tris Buffer ÷ (0.121137 g/meq Tris X 35.7 ml H₂SO₄) = 0.0203 N H₂SO₄
 6. Transfer the 0.02 N H₂SO₄ to a one liter plastic bottle. Record the normality on the bottle, date made, outdate of 3 months, and initial. Store at room temperature.
2. Alternatively, order 0.02 N H₂SO₄, already prepared and standardized from a vendor such as Fisher Scientific. Record lot on QC worksheet.

Controls

1. Run deionized water as blank. Value of blank should be less than 2 mg/L of calcium carbonate (approximately 0.1 mL of H₂SO₄).
2. Use one quality control standard. This is a solution of sodium bicarbonate (100 mg/l). Run once with each set of samples and record results on control chart. Consult chemist if out of control situation exists.
3. Run every 10th specimen in duplicate. Calculate the relative standard deviation (RSD) of the replicates using the following formula: $RSD = SD \div \text{mean} \times 100$. The RSD should be less than 10%. If the replicates are outside of this range, repeat the specimen a third time. Check with the chemist for instructions.
4. Each quarter an external reference sample is to be analyzed. In the case of results exceeding acceptance values, document corrective action. Place any corrective action records in proficiency file

Procedure:

If applicable, standardize the pH meter each day of use (see supplemental procedure). Record slope with offset on worksheet.

Run the blank and control first. If the control is within range (range found in the "QC Inorganic True Value" binder), run the samples. Repeat the control if it is out of range. Notify the chemist if the control is out of range a second time.

1. Add 50 mL of control or sample to a 100 ml beaker containing a magnetic stir bar. Set magnetic stirrer at low speed.
2. Carefully lower pH probe into the solution. **If the pH is above 8.3 consult principal analyst!**
3. Fill the titrating buret to the zero mark with the standardized H₂SO₄. Carefully add the H₂SO₄ to the sample until a pH of 4.5 ± 0.05 is reached.
4. Record the volume of H₂SO₄ added to the sample, to the nearest tenth, on the chemistry worksheet.

5. Rinse the pH electrode with deionized water. Measure out the next sample, refill the buret, and titrate the next specimen.

Calculations:

Use the following formula to calculate the alkalinity as mg/L of calcium carbonate.

Exception: For alkalinity below 20 mg/L use low alkalinity calculation procedure (refer to SM2320B part 5)

$$\text{mg/L} = (\text{mL of H}_2\text{SO}_4 - 0.1) \times \text{normality of H}_2\text{SO}_4 \times (50,000 \div \text{ml of sample})$$

Example (for 50 ml sample):

$$(28.6 \text{ mL} - 0.1) \times 0.02 \times (50,000 \div 50 \text{ ml}) = 570 \text{ mg/L of Calcium Carbonate}$$

or

$$(28.6 \text{ ml} - 0.1 \text{ ml}) \times (20) = 570 \text{ mg/L of Calcium Carbonate}$$

Reporting

Report in **whole** numbers; round off to 3 significant figures. Examples:

$$2,902.5 = 2,900; 1,125.9 = 1,130; 23.65 = 24$$

References

Standard Methods for the Examination of Water and Wastewater 18th edition 1992

Written by: David Perez

Date: January 1993

Revised by: G. R. Guibert

Date: August, 1998

Approved by: _____
Principal Analyst

Varian Flame AA Procedure

SM 3111B

For Ca, Mg, Na, K and Fe

Principle:

In flame atomic absorption spectrometry, a sample is aspirated into a flame and atomized. A light beam is directed through the flame, into a monochromator and into a detector that measures the amount of light absorbed. Because each metal has its own characteristic absorption wavelength, a source lamp composed of that element is used. The amount of energy absorbed in the flame is proportional to the concentration of the element in the sample.

Sample Collection/Handling:

Use metal free collection bottle to collect sample. Collect one liter of sample. Smaller volumes (not less than 200 ml) can be used if necessary. On collection, acidify samples to pH <2 with 1:1 nitric acid, usually 3ml per liter. If samples are not acidified at time of collection, add acid upon receipt in lab and hold for minimum of 16 hours before analysis.[40 CFR 141.23(K)].

Sample Preparation:

Samples containing particulate or organic material require pretreatment before analysis. Samples with a turbidity <1 NTU, no odor and single phase may be analyzed directly. Digest all other samples before determining total metals.

Digestion Procedure for total metals:

Drinking water samples with turbidity >1 NTU can be analyzed following digestion with nitric acid. See procedure SM 3030E (Nitric Acid Digestion). Wastewater samples are better digested using method SM 3030F part b (Nitric Acid-Hydrochloric Acid Digestion). Report as total recoverable metal.

Sample criteria:

Except as noted, specimens that do not meet the criteria below should be immediately reported as "no test" with an explanatory note:

1. Samples submitted in improper collection container.
2. Sample inadequately identified. (Sample has no identification, or cannot be matched to a laboratory request form).
3. Sample quantity insufficient
4. Sample container broken or leaked in transit.

Special Instructions:

All glassware and pipettes used in this procedure must be cleaned using glassware-cleaning procedure. See document in kitchen.

Reagents:

1. Nitric Acid (HNO₃). Use high purity nitric acid 1+1.
2. Lanthanum solution (1.11%): Dissolve 58.65 g lanthanum oxide in 250 ml of conc HCL. Add slowly with stirring until dissolved and dilute to about 900 ml. Allow to cool for a few hours then dilute to final 1000 ml volume. Used for Ca, Mg, Na, and K analysis.
3. Calcium solution: Dissolve 630 mg calcium carbonate, CaCO₃, in 50 ml of 1+5 HCL. If necessary, boil gently to obtain complete solution. Cool and dilute to 1000 mL with water. Used for Fe analysis.
4. Standard Metal solutions: Standard metal solutions are prepared from 1000 mg/l AA or ICP-MS standards purchased from Ricca Chemical company, Spex Certiprep, LabChem, Fisher Scientific or VWR. A standard from EM scientific (ICP Multi-element Standard) is very convenient for calibration standards.
5. Deionized Water from Millipore system – metal free water.

Instrument Set-up:

Use the Varian Spectra 300AA operating in the flame mode with Air Acetylene burner.

1. Turn on exhaust hood. Switch is located in the corner by the Chemistry room refrigerator. Note: Turn switch until it clicks on. If you continue turning the switch after it clicks, the airflow will be reduced.
2. Turn on "Acetylene" gas cylinder located outside in the "Safety Storage" shed. The correct door housing the tank is labeled "Acetylene". Pressure should be set at 8-9 PSI.
Note: The cylinder valve is opened by turning the handle only 1/4 turn counterclockwise. Replace cylinder when pressure in tank drops below 100 psi. This prevents acetone from entering instrument.
3. Check the Varian Spectra AA 300A unit to see if the burner is installed.
4. Check to see if the cathode lamp required is in the correct socket position, and it is lined up in the "Operating Lamp"
Note: Lamps are stored in the top drawer located directly across from the GTA 96 Graphite Tube Atomizer (next to hood).
5. Turn on the equipment in the following order (allow a 20 minute warm-up period):
Note: If the computer is already on, turn it off.
 - a. Spectra AA 300A: switch located on lower right front of instrument.
 - b. IBM PC and Printer: Turn surge suppressor on (power supply); hit reset button.

Once the unit has been set-up, program the machine for testing by:

1. Start at the "C:" prompt. Press "M" and "Enter".
2. Press "Spectra Flame"
3. Press "Index" (F10). Enter number 10, "Sequence Selection", press "Enter" key.
4. Select element to be tested
5. Press "Sequence Control" (F6). Enter number of samples to be tested.
6. Press "Index" (F10), enter number 6, "Optimization", press "Enter" key.
7. The Screen will display two signal bar graphs. Check the previous week worksheet for the "Photomultiplier voltage" reading.
8. Maximize the lamp signal of the Cathode tube using the two thumbscrews located on the back of the lamp socket (see figure 5.8).
 - a. Watch the bar graph as you turn one thumbscrew. Once the value reaches .9 or greater press "Rescale" (F1).
 - b. Check the Photomultiplier Voltage display on the screen, after rescaling. If the voltage is higher than the preceding week, continue adjusting and rescaling until the proper voltage is reached. If you are unable to reach the proper voltage, try adjusting the second screw.
 - c. Note: Normally the voltage stays the same from week to week, but as the lamp nears the end of its usefulness, the voltage reading will go up. If a new lamp is installed, the starting voltage may be different than the previous lamp. Record millivolt reading on worksheet.
9. After adjusting for maximum signal, hit "Rescale" (F1). The photomultiplier voltage will be displayed. If the reading matches the previous week, record the voltage on the new worksheet. If it is out of range, readjust lamps. If voltage is still out of range, notify Chemist.

10. Press "Index" (F10) key and select "Standards" (number 7). Verify that the values of the standards are correct (see previous worksheet for standard values). To select a value to change, use the up and down arrows. Enter the correct value with the keyboard.
11. Check to see that drain hose, located below the Spectra 300A, is inserted into the drain bottle. (empty after each use).
12. Press "Index" key, enter number 18 (Signal Graphics), and press "Enter".
13. Press "Shift" and "Instrument Zero" (F10).
14. Light burner by pressing ignite button. Aspirate DI water for about 10 minutes. This will allow burner temperature to stabilize.

Standard and Sample Preparation:

Required sample preparation depends on the metal form being measured.

Procedure for Ca, Mg, Na, and K

1. Label the 10 ml beakers with the standard value; label the sample beakers with the last three numbers of the tiny tab number. Using the adjustable pipette, pipette 1.0 ml of sample or standard into each disposable beakers.
2. Add 9.0 ml of 1.11% lanthanum to each sample or standard using the adjustable pipette.
3. Repeat the process once again by diluting 1 ml of the diluted sample to 10 ml with the 1.11% Lanthanum. The samples have now been diluted 1:10 and 1:100. Alternatively use proportionally smaller volumes (i.e. .5 ml sample and 4.5 ml of 1.11% lanthanum).
4. The standards are prepared from stock solutions that when diluted 1:10 will give the necessary concentrations for calibration. The stock solutions are prepared from 1000 ppm standard metal solutions purchased from Ricca Chemical Co. Record dates of preparation and expiration (3 months) in sample prep manual.
5. The final concentration of calibration standards will be,
 1. Ca: 1.00, 3.00, 5.00 and 10.00 mg/l
 2. Mg 0.10, 0.50, 1.00 and 1.50 mg/l
 3. Na 0.10, 0.50, 1.00, 1.50 and 2.50 mg/l
 4. K 0.10, 0.50, 1.00, 1.50 and 2.50 mg/l
6. Set report format: Go back to index by pressing the "Index" (F10) key, then select the "Report Format" (number 13). Here you can enter the name of the operator, batch name, and date. No other changes are usually necessary.
7. Start program: Press the "Start" (F11). The screen will show the message "Select Lamp 3"; press "Start" (F11). The program will now run to completion.
8. Calibration of other Metals besides Fe/Mn: The other metals tested by flame AA does not require an ionization suppressor and can be directly aspirated. See specific method on computer for required calibration standards.

Standard and Sample Preparation: Procedure for Fe:

1. Label the sample beakers with the last three numbers of the tiny tab number. Using the adjustable pipette, pipette 1.0 ml of Ca solution into each disposable beakers.
2. Add 4.0 ml of sample to each beaker using the adjustable pipette.
3. The standards are prepared from 1000 ppm standard metal solutions purchased from LabChem or Spex Certiprep. Add 20 ml Ca solution and 1 ml conc HNO₃ to each 100 ml of standard prepared. Record dates of preparation and expiration (3 months) in sample prep manual.
4. The final concentration of Fe calibration standards will be: 0.3, 0.5, 1.0, and 3.00 mg/l
5. Set report format: Go back to index by pressing the "Index" (F10) key, then select the "Report Format" (number 13). Here you can enter the name of the operator, batch name, and date. No other changes are usually necessary.
6. Start program: Press the "Start" (F11). The screen will show the message "Select Lamp 3"; press "Start" (F11). The program will now run to completion.

Quality Control:

1. Analyze a Blank after every 10 samples to verify baseline stability. Rezero when necessary.
2. Duplicate Spikes - replicate spikes are to be performed on 10% of samples. Recovery of spike in drinking water should be between 80% and 120% with a precision of 20%. Recovery of spike in wastewater should be between 75-125% with a precision of 25%. Spike level should not exceed MCL for analyte. Spiking solutions are available from Crescent Chemical Co. or SPEX.
3. External Reference Sample - Analyze a known reference sample after initial calibration and after every ten samples to confirm the test is in control.
4. See Table 3111:III in Standard Methods for recommended concentrations of standards to be run, limits of acceptability, and reported single operator precision data.
5. Analyze External Reference Sample on quarterly basis. Solutions available from APG, ERA or SPEX.

CRITERIA FOR ACCEPTABILITY OF RUN

1. Recoveries of spikes and controls are within acceptable range.
2. Blank values below detection levels.
3. Acceptable levels of precision.

NOTE: If any of the acceptance criteria are not met, the analyst must stop the run, correct the problem and retest the samples.

OUT OF CONTROL PLAN

No sample should be reported until the all acceptance criteria have met. Or the out-of-control condition has been corrected and any problems or departure from protocol identified.

Trouble Shooting:

1. PROBLEM - poor precision,
Check alignment of hollow cathode lamp. Check that capillary hose is not clogged. Make sure burner is clean and flame appears smooth and even. Replace pinched or crimped capillary tubing.
2. PROBLEM - error message
Refer to instrument service manual

3. PROBLEM - Contamination

Check supplies associated with sample collection for contamination. Check rinse water, sample diluent, pipettes, sample cups. Make sure work area is free from dust.

Shutdown Procedure:

Turn off acetylene, IBM PC, and AA300, and exhaust hood, in that order.

Calculations:

The results will be printed and should be recorded on a worksheet. The dilution factor must be shown and considered in the calculations.

Reporting:

1. The data from the printout should be transferred to the worksheet. Verify that controls were within acceptable range and that duplicates are within range.
2. The lab clerk enters the results into the computer. Results are reported in units and number of significant figures consistent with MDL of method.

References:

1. "Analytical Methods for Flame Atomic Absorption Spectrometry" Varian Techtron Pty, Limited, 1989.
2. "Standard Methods for the Examination of Water and Wastewater"
18th Edition 1992 by APHA, AWWA, and the WEF.

Written by: David Holland

Date: January 1999

Approved by: _____
Laboratory Director

DETERMINATION OF INORGANIC ANIONS
BY ION CHROMATOGRAPHY (EPA METHOD 300.0)
USING THE DIONEX DX-80 ION ANALYZER

PRINCIPLE

This method determines the following inorganic anions: fluoride, chloride, nitrite, bromide, nitrate, phosphate and sulfate.

A small volume of sample (approx. 1 ml) is loaded into the ion chromatograph. The injection valve injects 10 ul of the sample into the flow of eluent. The eluent (a NaHCO₃ - Na₂CO₃ solution) flows continuously through the IC and serves as a carrier for the 10 ul of sample and facilitates in the separation process.

The anions of interest are separated using suppressed conductivity detection, and are identified and quantified by comparing data to those obtain from a standard solution. The major parts of the system are the liquid eluent, high pressure pump, sample injector, guard column, the separator column, the chemical suppressor and the conductivity detector. The guard column protects the separator column, which separates the anions based on their size and charge. The function of the suppressor is to chemically reduce the background conductivity of the electrolytes in the eluent, and to convert the sample anions into a more conductive form. The detector then detects the conductivity of the solution, which varies depending on the concentrations of the anions (higher conductivity indicates a greater concentration of the anion).

SAMPLE CRITERIA

The holding times for drinking water samples are as follows:

Fl ⁻	28 days
Cl ⁻	28 days
NO ₂ ⁻	48 hours
NO ₃ ⁻	48 hours
SO ₄ ⁻	28 days
Br ⁻	28 days

Samples submitted for IC testing routinely should be run within 48 hours of collection, especially for nitrite and nitrate. If testing needs to be delayed, the sample can be preserved with sulfuric acid; preserved samples can be held for up to 28 days and the nitrate results reported as combined Nitrate/Nitrite. Any samples not tested within specified holding times should be identified on the worksheet.

Samples bottles dedicated for IC testing only are placed on the IC bench. As soon as a sample is setup, place it on the white tray for easier storage. After 6 weeks the containers should be emptied and discarded. Nondedicated samples (i.e. those also submitted for additional testing) should be returned to the designated cart after IC testing.

QUALITY ASSURANCE

Operator competency - Ion chromatography may be performed only by analysts who have been trained and who have demonstrated competency with the procedure. One check consists of preparing the calibration standards and calibrating the I.C. An r-value of 0.995 or higher (correlation coefficient of 99.95%) in the linear fit type must be attained for each analyte of interest. Another way to demonstrate competence is to run a minimum of four replicate analyses of an independently prepared sample. Each analyte of interest in the sample should have a known concentration between 5 and 50 times the MDL.

Blank - A blank consisting of nanopure water should be included at the beginning of each run. The results for the blank must be below the MDL for each analyte.

Control standard(s) - Controls representing two concentration levels for each analyte (ICMIX HIGH & ICMIX LOW) must be analyzed as described below. The source of the analytes used to prepare these controls must be different from the source used to prepare the calibration standards. An ICMIX HIGH stock solution of the 7 anions with the following final concentrations:

<i>Anion</i>	<i>Final Conc</i>	<i>Preparation in 500 ml volumetric flask</i>
Fl ⁻	20 ppm	10 ml of 1000 ppm Fl std
Cl ⁻	100 ppm	50 ml of 1000 ppm Cl std
NO ₂	65.5 ppm	10 ml of 1000 ppm NO ₂ -N std
Br ⁻	20 ppm	10 ml of 1000 ppm Br std
NO ₃	100 ppm	50 ml of 1000 ppm NO ₃ std
PO ₄	100 ppm	50 ml of 1000 ppm PO ₄ std
SO ₄	100 ppm	50 ml of 1000 ppm SO ₄ std

should be kept on hand. Use this undiluted at the beginning of the run and after every tenth sample. Each week, prepare an ICMIX LOW solution from the ICMIX HIGH solution as follows: Using a 100 ml volumetric flask add 1 ml of ICMIX HIGH using the 1 ml volumetric pipet and fill to mark with nanopure water. Record date made in the IC logbook under Quality Control. Run the IC LOW at the beginning of the days run and after every 10th sample after the IC HIGH. The percent recovery for each anion should be between 90 and 110%.

Duplicate spikes – Duplicate spikes should be run after every tenth sample. The spike should not be less than four times the MDL, and it should increase each anion concentration by more than 25% of the background value. A suitable spike can be prepared by adding one part ICMIX HIGH to three parts sample. The average percent recovery for each anion should be between 80 and 120%. The duplicate spikes should be within 10% of each other. Record average percent recovery of spikes and duplicate percent difference on worksheets. Note: if the concentration of the spike is less than 25% of the background concentration, the spike recovery should not be calculated.

If any of the above control criteria are not met, do not report sample results until the problem has been resolved.

External controls & chart analysis - In addition to the control standards tested with each batch of samples, an external reference standard (i.e. SPEX IC standard or WS proficiency sample) should be tested on a quarterly basis; however we like to run one at the end of each run.

CALIBRATION FOR GROUNDWATER (DRINKING WATER AND MONITORING WELLS):

Calibration for groundwater samples is described below. Calibration should be performed whenever: 1) controls are out of range; 2) a new batch/lot of eluent/regenerant is made or 3) when a column, suppressor or detector is changed.

1. Prepare 1/10, 1/100, 1/1000 dilutions of the calibration standard ordered from Dionex, which contains 20 mg/l fluoride, 100mg/l chloride, 100 mg/L nitrite, 100 mg/L bromide, 100 mg/l nitrate, 200 mg/L phosphate and 100 mg/l sulfate.
2. Run calibration standards beginning with the highest dilution (1/1000) first.
3. Create calibration sequence: File – New – Sequence – Standards – Next. Skip section on Choosing Timebase – name the sequence *calibMMDDYEAR* and initials – Next – Done.
4. Add sequence to batch file before starting
5. After all four calibration standards have been ran, check the calibration curve.
 - a) Double click on any of the calibration standards (Cal Std 1). You will get a chromatograph
 - b) Click on Calibration Plot icon, upper right corner or click on VIEW – Calibration Plot. You will see a graph of the first analyte along with the correlation coefficient percentage for each analyte. Only analytes with percentage of 99.5 or greater are acceptable. Generally try for a 99.98% for an average of all seven analytes to pass quality control checks. See the principle analyst if the result is a lesser value.
 - c) The mean retention times and detection range are automatic on the DX-80 Ion Analyzer and can not be changed or edited.

PREPARE MDL STUDY

The Method Detection Limit is the lowest concentration of a substance that can be identified with accuracy and confidence by a certain method or analysis.

- 1) Prepare a Cal Std 1 level each analyte separately using the secondary standards (not Dionex mix)
- 2) Make seven replicates of this dilution and run through the Ion Analyzer under the Unknown Method.
- 3) Collect data and calculate the standard deviation for the seven replicates. Multiply the standard deviation values by 3.143. This number will be the Method Detection Limit.

GENERATE BACKLOG REPORT:

- 1) On a network computer – not the Instrument computer. Double click on LABWORKS icon. Enter password. Click on OK. Click on backlog. Click on analysis code. Click on OK. Type in #ICANION. Click on OK. Click on display report. Click on print. Click on exit until you are out.
- 2) Check the clipboard to see if a worksheet has been initiated listing samples that need repeat testing; if so, append worksheet with samples on backlog report.
 - a) Account for all specimens on backlog report
 - i) Samples may have been tested in a previous run but not recorded. Record these results and give to the clerk.
 - ii) If a sample appears on the backlog but needs to be tested by a different method (i.e. wastewater), inform the clerk so that the analysis ordered can be modified.
 - b) Include any "new" samples on the I.C. bench that have not yet been entered into the computer.

SAMPLE PREPARATION

Groundwater (drinking water and monitoring wells) should be filtered through 0.45 um membrane filters before injection:

- 1) Rinse the syringe once with the sample water. Then fill syringe with about 10 ml of sample water.
- 2) Filter a minimum of 2 ml of sample through the 0.45 membrane into a labeled autosampler vial discarding the first few drops.
- 3) Place autosampler cap on vial and press down using the provided tool. Make sure the cap goes in straight and remove any air bubbles seen in the vial (invert or knock gently).
- 4) Place sample in autosampler rack. The order in the rack must match that on the schedule.
Note: If you suspect the result of a sample to be above that of the calibration standard for an analyte, make an appropriate dilution. Check by measuring conductivity – anything greater than 700 uS will need to be diluted.
- 5) Include duplicate spikes for every 10th sample. Add 1 part ICMIX high to 3 parts filtered sample. Then IC HIGH, LRB, IC LOW. The laboratory reagent blank (LRB) is necessary to minimize carry over as the IC low is 100 times less than the High. Double check any samples where analyte concentrations are low after a high sample to verify analyte is even detected.

Samples which may contain high concentrations of chloride or organic contaminants (Carmel Area Wastewater District and ESF), are run on the DX-100 and require additional filtering through Dionex OnGuard P, Dionex OnGuard Ag, and Dionex OnGuard H filters before injection. See supplemental procedures.

SYSTEM START-UP:

- 1) Ensure the **eluent** bottle is at least ¼ full. If it is less, depending on size of run, prepare new eluent (and regenerant):
 - a) Prepare 2 liters of a final eluent concentration of 8.0 mM Sodium Carbonate and 1.0 mM Sodium Bicarbonate by diluting one Dionex AS 14A Eluent Concentrate bottle (P/N 057060) into two 1L-volumetric flasks. Bring each to volume (1000 ml) with nanopure water. Makes 2 liters.
 - b) Use the designated filter/vacuum flask, a filter funnel, a clean 0.45um membrane filter, and a large magnetic stir bar to degas the eluent. Pour the eluent into the filter funnel and turn on the vacuum. Set the magnetic sticker at medium to high speed. Once all the eluent has been filtered, keep the vacuum and magnetic stirrer on for 15-20 minutes, allowing the eluent to degas.
 - c) Turn off the magnetic stirrer and the vacuum. Remove the filter funnel. Carefully decant the degassed eluent into the eluent bottle, without aerating. Make sure the cap is on tightly, and the tubes are securely attached.

- 2) Whenever new eluent is prepared, new **regenerant** must also be made.
 - a) Prepare 2 liters of a final anion regenerant concentration of 72 mN Sulfuric Acid by adding one Dionex Anion Regenerant Concentrate bottle (P/N 057559) to two liters of nanopure water.
 - b) Mix in the regenerant in the designated filter flask using the stir bar and degas for 15-20 minutes.
 - c) Turn off the magnetic stirrer and the vacuum. Remove the filter funnel. Carefully decant the degassed regenerant into the REGEN bottle, without aerating. Make sure the cap is on tightly, and the tubes are securely attached.

DX-80 OPERATION

- 1) Turn on nitrogen gas cylinder (main knob only), autosampler (rear right hand corner), ion analyzer (rear panel right hand side) and computer.
- 2) Double click on Peaknet to open computer program. **File – Panels\Dionex DX-80 System** for the Control Panel.
- 3) Under the DX-80 Status click on **CONNECT** to connect analyzer to computer
- 4) Turn on the pump by clicking the **ON** button on the DX-80 Control Panel. **Prime** the pump by turning the pump head waste valve knob counter clockwise and leaving it open for about 5 seconds. Close the pump valve knob by turning clockwise until secure. After changing to new eluent, it is a good idea to leave pump valve open until all air bubbles have been purged – look for the air bubbles coming out the eluent bottle until it reaches the waste line at the pump. This will allow any air bubbles to be pumped to waste instead of through the columns.
- 5) Allow the system to **equilibrate** for 30 minutes minimum, generally one hour if new eluent is used. Once ready, the **operating pressure** should be 2000+- 300 psi (usu 2100

psi); and the operating **total conductivity** background should be < 30 uS (usually 25.00uS). You can offset the background and zero the reading by clicking the Autozero button on the Control Panel.

- 6) To begin a run, create a sequence worksheet by clicking on **File – New – Sequence**. (May have to do this twice if worksheet is not already open.)
 - a. It will then prompt you to choose Standard or Unknowns. Choose **Unknowns - Next**
 - b. Skip **next** screen where it prompts you to specify timebase,
 - c. **Estimate** number of unknowns (you can always add or delete samples from sequence when done.
 - d. Fill out file name you wish to save the file We save under **MMDDYEAR** and **initials**: (05052002tl) and press **enter**.
 - e. Press **Done** when prompted to exit wizard.
 - f. A worksheet will appear where sample identifications can be added after the calibration data (line #5). Follow printed worksheet – first include a *blank, ic low, ic high, lrb*, then the samples. Note for the first set, the lrb is listed as a sample. *Duplicate spikes* are required for every 10th sample or a minimum of 10% of samples. Finish off sequence with a known quality control standard, usually a proficiency standard such as *WS 60* or Ultra QC and another blank (LRB).
 - g. Change *dilution factor* if sample was diluted; default is one. Save by pressing the SAVE icon (floppy disk).
- 7) To start the run – click on **Batch – Edit – Add** – double click on the newly created sequence, or the one you want run – then **Start** to begin.
- 8) Make sure autosampler vials are in order and the green light is on ‘Run’ not ‘Hold’.
- 9) Record date, total conductivity and pressure in the log notebook at which the run has started.
- 10) During or after the run, verify that the blank and QCs (IC HIGH, IC LOW, IC CHECK) are within range. If not stop the run by clicking on **Batch – Stop - after current sample**, and notify principal analyst to investigate and solve the problem before resuming the run.

REPORTING RESULTS

- 1) When run is complete the analyst performing the run is responsible for recording and reporting results. Review each chromatogram to verify that the peaks were properly identified. Retention times may shift if there was a sudden change in pressure. Changes to the peak name can be made by a right click on the peak and choosing the correct analyte then save.
- 2) The results are found on the worksheet next to the sample ID and can be exported to an excel file for accuracy calculation:
 - a) Click on any sample cell – i.e. ic low, cell will be outlined.

- b) Click on **File – Batch Report – Export** (unclick the Printout option- computer is not connected to any printer) – **Excel file format**
 - c) For sheets to be exported, choose only “ **Summary – INJ vs. Area, Ht, Amt.**” Unclick the Integration, Calibration, Peak analysis, Summary-INJ vs. Anion, and Audit Trail options as they are extra and rarely needed for our purpose.
 - d) Click on **Finish** then **OK** on batch menu. Status will appear and when transfer is complete, press **OK** to exit.
- 3) To copy exported file onto a floppy, right click on Start icon on lower left screen and choose EXPLORE for Windows Explorer. Under **C:\Chromel\Export** folders are the files just exported. Highlight the correct sequence and drag to **A:** drive to copy file. (Make sure you have a floppy disk inserted).
- 4) Open exported file under an EXCEL program – the instrument computer does not have one so use a network computer. You will see three types of charts: first- Sample vs. Area, second - Sample vs. Height, and third - Sample vs. Amount. Copy all of the **Sample vs. Amount** table to an old/previous excel file.
- 5) The Excel Results worksheet is permanently saved under **G:\Laboratory\Data\Water\IC Data\2002** under the correct month. It is also saved in Tess’ computer under **C:\My Documents\IC Data** and correct year and month. Easiest way to create the worksheet is to open a previously saved file (of the same year and month) and then cut and paste the data. There are two worksheets in each file, one for the complete results, the other for the raw data (the Sample vs Amount table exported from peaknet).
- a) Before any changes are made, save the file under a new name: MMDDYY and initials
 - b) On RAW worksheet, delete old table and replace with recently ran sequence data. Add a column between Sample ID and Fluoride Amount for the dilution factor.
 - c) Change Date Analyzed and Analyst if applicable. Calibrations are generally done once a month with the most recent noted under Date of Calibration – change if necessary.
 - d) **Copy** and paste data results from raw worksheet onto Results worksheet under correct sample name. Use the **Paste Special option – Values** - to retain similar fonts on results worksheet. **% Recoveries** will be automatically calculated as will **% Differences**, and **Averages** for the duplicate spikes but references to certain cells may need to be changed for the correct result.
 - e) Verify that all QC are accurate before entering into labworks.
- 6) For drinking water, results should be recorded as ND – Not Detected for levels below DLR (Detection Limit for Reporting) as follows:
- a) Fluoride 0.1 mg/L
 - b) Nitrate 2.0 mg/L
 - c) Sulfate 0.5 mg/L
 - d) Bromide 0.1 mg/L
 - e) Chloride, Nitrite, Phosphate 1.0 mg/L
- f) Any samples with readings above the calibration range (20 mg/L fluoride, 100 mg/l chloride, nitrite, bromide, nitrate, sulfate, and 200 mg/l phosphate) needs to be diluted and

repeated in the next run. List these samples on a new worksheet with the appropriate dilution and place the worksheet on the clipboard.

- 7) Do not report results if control/spike values do not fall within limits (refer to section on quality control). If controls, spikes, etc. are out of range, notify the principal analyst. If controls are within limits, date and initial the worksheet and give the worksheet to the clerk for data entry. When the worksheet and backlog are returned place them in the binder.

SHUT DOWN

After the run is complete the Ion Analyzer can be shut down. The IC should be shut down on weekends if the system is not in operation on Friday night so as not to damage the suppressor unit:

- 1) On the Control Panel screen of Peaknet - turn **OFF** pump and **DISCONNECT** DX-80
- 2) Close Peaknet.
- 3) Turn off DX-80, autosampler and close nitrogen cylinder valve.

PREVENTIVE MAINTENANCE:

- 1) Each quarter, replace the bed supports on guard column
- 2) Maintain the following spare parts. These items are considered consumables:
 - a) Anion Refill Kit (Part No. 057069) contains 4 bottles each of AS14A eluent and anion regenerant concentrate.
 - b) AS14A anion separator column, 3 mm (Part No. 056901)
 - c) AS14G anion guard column (Part No. 056899)
 - d) AMMS III suppressor (Part No. 056751)
 - e) DS5 Detection Stabilizer (Part No. 057290T)

DOS AND DON'TS

- * Try to make additions, changes, and deletions to the sequence during the middle of a run and then save immediately. If the changes are not saved immediately, the program may get confused on which sequence to use and will freeze. If this happens, wait until the current sample is completed, turn off all equipment and wait for about 15 minutes before restarting.
- * Be gentle when loading samples onto the autosampler, especially the first rack. If racks are installed too roughly, conveyor belt may get stuck and samples will not be injected in the proper sequence.

REFERENCES:

- 1) DX-80 Ion Chromatograph with SRS Control Operator's Manual, Dionex Corporation, 2002.
- 2) Methods for the Determination of Inorganic Substances in Environmental Samples, Method Number 300.0, Determination of Inorganic Anions by Ion Chromatography, John D. Pfaff, U.S. Environmental Protection Agency, 1993.
- 3) Standard Methods, 18th Edition, 1992. Part 4110.

Originally written by: Johanna Rosen for DX-100

Date: 12-96

Updated by: Theresa Lam for DX-80 Ion Analyzer

Date: 05-02

Approved by: _____
(Lab Director's signature)

Chapter 7
Appendix 7-C

MCWRA's Chloride Data Contouring Protocols

MEMORANDUM

Monterey County

DATE: April 17, 2018

FROM: Sean Noble
TO: Water Quality
SUBJECT: How to Contour SWI in ArcGIS

Background

The purpose of this memo is to describe the process of creating the initial seawater intrusion contours using ArcGIS. This is an attempt to standardize the process. Contours are based on chloride (Cl) data sampled from coastal wells in the Pressure 400-Foot and Pressure 180-Foot Aquifers. This data for comes from three primary sources. First, coastal wells are sampled twice each summer by Agency staff. Second, monitoring wells are sampled once each summer, using a portable pump. Finally, data from outside sources are pulled in to supplement the data and create better geospatial coverage. Historically contours are generated on every odd year, using even year data to fill any data gaps. Data is used to create contours that are then added to the historical seawater intrusion maps. The maps are as follows:

P180 Sea Water Intrusion Map

P400 Sea Water Intrusion Map

(In the future the deep aquifer may be added to the process)

After reviewing all the data and uploading it to the WRAIMS database, we are ready to move on to ArcGIS.

**** The 2017 year Pressure 400 will be used as an example ****

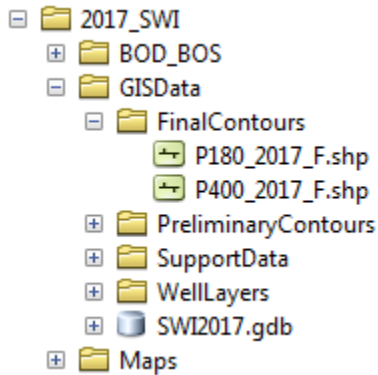
ArcCatalog

Open ArcCatalog and navigate to R:\Workspace\Common\WaterQuality\SWI. Notice that the folders are labeled by year with the exception of the CommonDirectories. This folder stores GIS data that can be used for any year that is contoured. It contains commonly used boundaries, databases, and layers.

In ArcCatalog copy/paste folder of the last year contoured (2015_SWI) and rename current year (2017_SWI).

This will be the naming convention for naming files:

Aquifer_Year _Version(if applicable), examples:



Within each year there are two main folders:

GISData

FinalContours, storage of approved shapefiles

PreliminaryContours – primary exported contour shapefiles

SupportData – secondary export shapefiles, database tables, and imagery

Maps

Stores final project maps and products

ArcMap

Step 1 – Project Formatting

Rename the ArcMap contour projects stored in the Maps folder:

R:\Workspace\Common\WaterQuality\SWI\2017_SWI\Maps**P400_2015.mxd** ->

R:\Workspace\Common\WaterQuality\SWI\2017_SWI\Maps**P400_2017.mxd**

By using the previous project, all of the background shapefiles can stay and be reused for the new project.

Step 2 – Database Formatting

Navigate to:

R:\Workspace\Common\WaterQuality\SWI\CommonDirectories\Databases

And open the **SWIContours (Current).mdb** database

First, make sure that all relevant data has been reviewed and loaded to WRAIMS. Open the **_Contouring_Start_** table and edit the year to the year being contoured.

Run the macro: **SWI_ContourTables**

The macro SWI_ContourTables runs four make table queries to produce these tables:

SWI180_ALL

SWI400_ALL

SWI_180_CONTOUR_WELLS

SWI_400_CONTOUR_WELLS

The ‘..._ALL’ tables include all wells that are in the Monthly Water Quality program and in the appropriate aquifers. Some wells have the aquifer designation PRESSURE BOTH. These well are included in both ‘..._ALL’ tables, but are not included in the contouring. The ‘..._CONTOUR_WELLS’ tables are a subsection of the ‘..._ALL’ tables and only include wells to be used in contouring for the respective aquifers.

If certain wells need to be excluded, modify the **tblExcludedWells** table. Wells are excluded based on facility code and aquifer (180 or 400), so make sure both of those fields are filled out correctly. This table is used dictate which wells are excluded and to document which wells have been excluded and why. It should be kept updated as changes to the dataset are made. After adding new wells to tblExcludedWells, rerun the macros to update the tables.

The **ExternalData** table can be used to add data that is not stored in WRAIMS but has been approved to be used for contouring. In the 2017 example, the data from the Monterey Peninsula Water Supply Project monitoring wells was added this way. Only wells with a FACILITY_CODE and in the WellsAll GIS layer can be utilized in this manner (R:\Workspace\Common\MapElements\WellsAll.lyr).

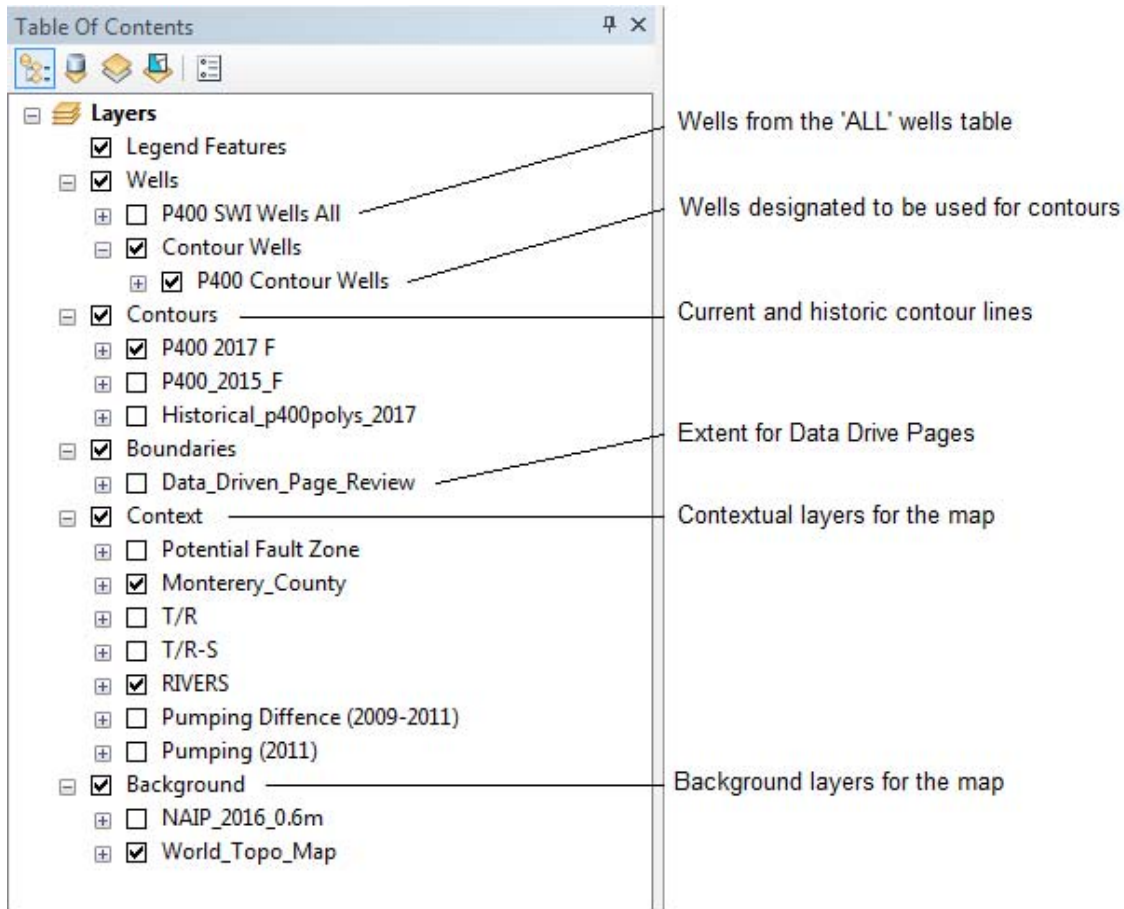
The tables include both present and past measurements and automatically include data from the previous year if the current year is missing data.

Field Name	Description
FACILITY_CODE	Facility Code of the well
FACILITY_NAME	State Well ID based on township and range
BASIN_NAME	Aquifer designation
ContourValue	Value used to contour as a year average of all samples taken during the most recent year
ContourValYr	Year that the value used to contour was sampled
ConYrCl	Contour year average of Cl data
ConYrStDev	Contour year standard deviation of Cl data
1yrBackCl	Previous year average of Cl data (2016)
1YrStDev	Previous year standard deviation of Cl data (2016)
2yrBackCl	Two years prior average of Cl data (2015)
2YrStDev	Two years prior standard deviation of Cl data (2015)
3yrBackCl	Three years prior average of Cl data (2014)
3YrStDev	Three years prior standard deviation of Cl data (2014)
PERF_START	Start of recorded perforation in well casing
PERF_END	End of recorded perforation in well casing
Use	Abbreviation of the wells primary uses
WATER_USE_DESCRIPTION	Description of the wells primary uses
FACILITY_STATUS_NAME	The status of the well

Step 3 – Data Labeling & Symbology

In ArcGIS:

All of the well layers in the ArcMap projects should automatically update to the ‘Current’ database values. The projects should be laid out in similar formats as demonstrated below. Compare the values and dates of various wells with recorded values in WRAIMS to ensure the correct data is being used.



Step 4 – Draft 1

To generate profiles run the tool

ArcToolbox -> SWIContouringTools -> SWI_Spline_Coastal_Contouring

And fill out the fields

Contour Wells: Wells\Contour Wells\P180 Contour Wells
Z value field: SWI_400_CONTOUR_WELLS.ContourValue
Spline type: TENSION
Number of points: 4
Weight: 0.01

Contour Output:

R:\Workspace\Common\WaterQuality\SWI\2017_SWI\GISData\PreliminaryContours\
p400_2017_v1.shp

In Layout view change any labels and titles to match the current year and draft, and make any appropriate changes to the legends.

Export to PDF,

R:\Workspace\Common\WaterQuality\SWI\2017_SWI\GISData\PreliminaryContours\p400_2017_V1.pdf. From PDF, print to 11x17 and review. If all the data is there and the labels and symbology are correct then Print to Plotter, 30x30.

Steps Summary

Version 1 is the computers attempt to contour the data based on all the data that has been collected and reviewed for the appropriate aquifer. The next set of versions are created through careful examination of the data to establish what wells will be excluded from the contouring. Use past exclusion to help with wells with ambiguous aquifer designations and refer to well logs, well measurement histories, piper diagrams, and sample notes for wells that don't seem to fit the general trend. Once the list of wells to exclude is agreed upon, run the tool again. This process is iterated until **tblExcludedWells** is agreed to be final by the project supervisor. The next step is to generate the last set of computer generated lines (AT_2017_F) and edit them to match previous contours and represent the general trend of seawater intrusion.

Editing Contour Lines

The computer generated AT_2017_F needs to stay intact incase it has to be referenced at some point. The first thing to do is copy/paste AT_2017_F into the R:\Workspace\Common\WaterQuality\SWI\2017_SWI\GISData\FinalContours folder (this will be the version you edit). In ArcGIS:

Right click on the layer you wish to edit
Go to **Edit Features**
Click **Start Editing**

It sometimes makes editing easier to make the edited layer the only selectable layer.

Right click on layer
Go to **Selection**
Click on **Make This The Only Selectable Layer**

Double-click on the contour line you wish to modify. Many vertices will appear on the line as boxes. These are the points to drag in order to modify the line. When adding lines remember to edit the attribute table to add the appropriate contour value. Due to the limited data the contours will have to be heavily edited to achieve a general representation of sea water intrusion into the aquifers. As a general rule, lines will not recede approved by the project lead. Unless otherwise

directed, lines that are seaward of past contours will default to the furthest inland historical extent (use the historical contour lines). Judgement will have to be used to decide how to alter lines to represent general seawater intrusion: work with the project lead on hand kriging and editing.

Final Clean Up

Once the list of excluded wells has been finalized copy the “Current” database and rename it with the contour year. This creates a backup and documents which wells were used and what values. Similarly, ensure that all shape files are in the correct places and properly labeled, especially the final contours.

Chapter 7
Appendix 7-D

DDW and ILRP Wells in the Water Quality Monitoring Network

180/400-Foot Aquifer Subbasin DDW Wells

Well ID	Water System Name	Well Screen Info			Coordinates		Monitoring Date Range	
		Top of Screen Depth (ft bgs)	Bottom of Screen Depth (ft bgs)	Screen Length (ft)	Latitude (NAD83)	Longitude (NAD83)	First Year	Last Year
2700518-002	WATSONVILLE PRODUCE INC		0	0	36.78700	-121.72139	4/6/2004	11/12/2010
2700547-001	DESMOND RD WS #03		248	40	36.80299	-121.70051	4/8/1987	12/21/2020
2700548-001	DOLAN RD MWC		246	75	36.79594	-121.73707	3/30/1987	9/21/2020
2700577-001	ELKHORN SCHOOL WS		0	0	36.79711	-121.71809	4/8/1987	10/12/2020
2700579-001	ELKHORN RD WS #04		140	10	36.84000	-121.72056	5/14/1987	11/3/2020
2700594-001	HIDDEN VALLEY WA		404	40	36.83722	-121.70411	3/25/1987	9/22/2020
2700624-001	LEAFWOOD COMMUNITY WA		240	56	36.80840	-121.70459	5/14/1987	12/21/2020
2700674-002	PARADISE LAKE MUTUAL WATER CO.		398	40	36.81644	-121.70550	1/26/2004	4/13/2020
2700674-003	PARADISE LAKE MUTUAL WATER CO.		340	60	36.81644	-121.70550	1/26/2004	8/20/2020
2700802-001	WALKER VALLEY WS #03				36.81292	-121.71514	5/14/1987	8/27/2013
2700842-002	BAUMANN RD WS #01		290	20	36.78700	-121.72139	12/30/2003	11/9/2020
2700850-001	ALTMAN PLANTS WS #03 - ESPINOSA 303		225	355	36.74652	-121.69451	12/18/2003	6/16/2020
2700992-001	MILLER'S LODGE WS		14	10	36.62422	-121.62999	8/22/1986	12/3/2019
2700998-004	BUD ANTLE MARINA WS				36.72764	-121.78220	1/26/2011	3/30/2020
2701057-001	N/A		325	53	36.57131	-121.52222	1/30/2004	1/11/2016
2701109-001	ASSOCIATED TAGLINE WS		0	0	36.71564	-121.71908	5/27/1987	6/2/2020
2701152-001	FLORICULTURA PACIFIC WS		508	72	36.59308	-121.53903	10/14/2003	9/2/2020
2701153-001	GROWERS TRANSPLANTING WS		410	75	36.73547	-121.68475	10/15/2001	9/14/2020
2701171-001	CHEVRON OIL FIELD WS		88	40	36.59308	-121.53903	7/19/2012	7/19/2012
2701202-002	CAL AM WATER COMPANY - CHUALAR		750	150	36.57035	-121.51500	7/7/1998	3/20/2020
2701202-004	CAL AM WATER COMPANY - CHUALAR		760	140	36.56959	-121.51371	11/19/2002	3/20/2020
2701214-001	FIRESTONE BUSINESS PARK WS		524	24	36.62672	-121.59290	4/8/1987	2/18/2016
2701214-002	FIRESTONE BUSINESS PARK WS		517	28	36.62673	-121.59299	12/9/2003	12/22/2020
2701229-001	BLUEROCK VIEW APARTMENTS WS				36.69000	-121.69000	4/6/1987	12/29/2020
2701232-001	OLD NATIVIDAD RD WS #01		390	100	36.65907	-121.62292	8/14/1986	12/21/2020
2701325-001	SAN CLEMENTE RANCHO WS				36.50417	-121.50667	4/30/2002	9/5/2018
2701364-001	PEDRAZZI MWC		474	34	36.60000	-121.63000	8/28/1986	8/12/2020
2701414-001	ARCHER RD WS #02				36.79194	-121.69972	3/16/1987	3/16/1987
2701452-002	MONTEREY DUNES MWA		1323	60	36.76944	-121.79528	12/11/2002	7/23/2019
2701452-004	MONTEREY DUNES MWA				36.75820	-121.80102	1/8/2007	12/11/2019
2701498-001	HARBOR VIEW WA		220	10	36.81727	-121.71527	3/25/1987	11/22/2020
2701515-001	MOSS LANDING HARBOR WS		400	350	36.79877	-121.74571	8/1/1986	8/17/2020
2701515-005	MOSS LANDING HARBOR WS				36.62620	-121.64660	8/15/2013	8/17/2020

2701575-002	N/A				36.59028	-121.60639	5/25/2018	12/11/2018
2701633-001	PARADISE RD WS #21		150	10	36.81387	-121.70236	3/4/2002	1/27/2011
2701647-001	GREEN ACRES WA		220	40	36.79628	-121.73238	4/21/1987	8/6/2020
2701683-001	MOSS LANDING MWC		309	245	36.79975	-121.74275	4/15/2008	7/6/2020
2701698-001	RIVER RD WS #02				36.50417	-121.50667	3/17/1987	1/9/2002
2701721-001	N/A				36.77000	-121.73000	5/27/1987	12/19/2000
2701768-001	N/A				36.73319	-121.77889	3/17/1987	8/4/2003
2701813-001	ARMSTRONG RD WS #01				36.69000	-121.70000	7/26/2003	1/17/2009
2701820-001	CORDA RD WS		520	40	36.51808	-121.46044	7/14/2003	12/15/2020
2701825-001	GLEN OAKS WS #01				36.51808	-121.46044	5/27/2003	8/10/2015
2701894-001	N/A				36.59000	-121.55000	9/17/1986	9/17/1986
2701897-001	BERRY DR WS #02		408	192	36.60000	-121.63173	8/21/1986	8/12/2020
2701912-002	SPRECKELS LN WS #03				36.63043	-121.66826	3/3/2016	7/14/2020
2701926-001	MORO RD WS #09		445	40	36.80299	-121.70051	3/16/1987	4/5/2016
2702121-001	ROSEHART INDUSTRIAL PARK WS		520	52	36.69611	-121.70072	4/24/2002	6/2/2020
2702135-001	FOOTHILL WA				36.56056	-121.56278	8/7/1986	11/3/2020
2702150-001	RIVER RD WS #19				36.48000	-121.47000	3/17/1987	3/21/2003
2702180-001	GRAVES SCHOOL WS		370	60	36.69611	-121.70072	4/6/1987	4/2/2020
2702226-002	CDFW ELKHORN SLOUGH ECOLOGICAL RESERVE		350	140	36.82403	-121.73577	6/26/1990	12/21/2020
2702226-003	CDFW ELKHORN SLOUGH ECOLOGICAL RESERVE		380	280	36.81519	-121.73198	6/4/2004	12/21/2020
2702259-003	LHOIST NORTH AMERICA WS				36.80333	-121.78278	4/8/2014	4/28/2014
2702320-001	HITCHCOCK RD WS #01		560	80	36.66430	-121.70081	7/26/2003	12/9/2020
2702440-001	N/A		0	0	36.51905	-121.52949	4/26/2004	10/13/2004
2702444-001	RIVER RD WS #28		430	0	36.59670	-121.62416	6/3/2004	9/17/2020
2702452-001	EL CAMINO MACHINE & WELDING WS		0	0	36.63669	-121.60194	4/21/2004	8/11/2020
2702452-002	EL CAMINO MACHINE & WELDING WS		0	0	36.63646	-121.60175	6/12/2013	11/24/2020
2702453-001	MARINA LANDFILL WS		40	210	36.71272	-121.76911	12/4/2002	8/3/2020
2702456-001	MONTEREY ONE WATER (FORMERLY MRWPCA)				36.70541	-121.76922	9/27/2017	10/5/2020
2702456-002	MONTEREY ONE WATER (FORMERLY MRWPCA)		670	80	36.63646	-121.60175	5/5/2004	8/1/2017
2702482-001	ALTMAN PLANTS WS #05 -ESP 325 (PREV CS2)		300	100	36.74564	-121.68665	1/14/2002	5/28/2020
2702484-003	GROWERS SERVICE ASSN WS (ICE)		604	28	36.65113	-121.63218	12/10/2003	5/14/2020
2702584-003	HITCHCOCK RD WS #02				36.66147	-121.68343	3/30/2011	9/14/2020
2702704-001	HARRIS RD WS #10				36.62422	-121.62999	3/9/2009	4/8/2020
2702964-001	PEZZINI FARMS WS				36.74189	-121.76960	6/7/2017	9/30/2019
2710005-003	CASTROVILLE COMMUNITY SERVICES DISTRICT		0	300	36.77122	-121.75435	4/8/1985	2/3/2020
2710005-004	CASTROVILLE COMMUNITY SERVICES DISTRICT		0	160	36.75543	-121.74379	4/8/1985	12/21/2020

2710005-005	CASTROVILLE COMMUNITY SERVICES DISTRICT		0	85	36.75679	-121.73658	4/8/1985	1/13/2020
2710005-009	CASTROVILLE COMMUNITY SERVICES DISTRICT				36.77133	-121.75403	3/13/2007	12/7/2020
2710007-004	GONZALES, CITY OF		400	260	36.49903	-121.43588	10/19/1987	8/4/2020
2710007-006	GONZALES, CITY OF		440	220	36.50561	-121.44638	6/24/1998	11/3/2020
2710010-002	CWSC SALINAS		249	210	36.67849	-121.65299	4/6/1982	4/1/2003
2710010-009	CWSC SALINAS		357	80	36.66113	-121.66068	3/9/1983	11/30/2020
2710010-015	CWSC SALINAS		330	63	36.65076	-121.62008	4/6/1982	5/27/2020
2710010-017	CWSC SALINAS		451	66	36.66456	-121.67020	9/29/1983	5/13/2020
2710010-019	CWSC SALINAS		360	144	36.65045	-121.63070	7/19/1982	12/9/2020
2710010-020	CWSC SALINAS		462	61	36.70258	-121.66350	11/14/1983	12/16/2020
2710010-023	CWSC SALINAS		330	135	36.67021	-121.67952	6/21/1983	7/29/2020
2710010-026	CWSC SALINAS		420	160	36.69746	-121.66701	5/12/1983	12/16/2020
2710010-027	CWSC SALINAS		350	190	36.66545	-121.68064	2/8/1984	8/11/2020
2710010-030	CWSC SALINAS		490	150	36.68826	-121.66590	4/30/1986	12/16/2020
2710010-077	CWSC SALINAS		385	220	36.65510	-121.64883	7/16/2002	4/23/2020
2710010-102	CWSC SALINAS		565	120	36.66466	-121.65405	12/12/2007	11/17/2020
2710010-131	CWSC SALINAS				36.64804	-121.63070	10/11/2011	12/15/2020
2710012-002	CWSC SALINAS HILLS		413	52	36.60495	-121.63936	4/4/1984	8/6/2020
2710012-003	CWSC SALINAS HILLS		410	320	36.60228	-121.63861	10/4/1983	6/18/2020
2710012-009	CWSC SALINAS HILLS		360	380	36.62377	-121.66588	4/1/1991	8/6/2020
2710012-016	CWSC SALINAS HILLS		453	36	36.60023	-121.63169	3/27/2002	9/17/2020
2710012-017	CWSC SALINAS HILLS				36.60117	-121.63341	8/28/1986	12/17/2020
2710012-018	CWSC SALINAS HILLS		540	120	36.60619	-121.64275	2/28/2006	11/12/2020
2710012-024	CWSC SALINAS HILLS				36.59869	-121.62869	10/8/2002	8/26/2020
2710019-001	CWSC OAK HILLS		300	300	36.78127	-121.70807	9/3/1982	3/26/2020
2710019-003	CWSC OAK HILLS		200	420	36.77544	-121.72213	10/31/1985	12/9/2020
2710019-008	CWSC OAK HILLS				36.77361	-121.72929	1/31/2012	12/15/2020
2710023-002	TASCO SPRECKELS WATER COMPANY		390	62	36.62326	-121.65063	8/16/1995	12/9/2020
2710023-005	TASCO SPRECKELS WATER COMPANY				36.62211	-121.65092	9/25/2006	12/9/2020
2710023-009	TASCO SPRECKELS WATER COMPANY				36.62726	-121.64650	12/7/2015	12/9/2020

180/400-Foot Aquifer Subbasin ILRP Wells

Well ID	Well Type	Well Screen Info			Coordinates		Monitoring Date Range	
		Top of Screen Depth (ft bgs)	Bottom of Screen Depth (ft bgs)	Screen Length (ft)	Latitude (NAD83)	Longitude (NAD83)	First Year	Last Year
AGC10000001-CCGC_0001	ON-FARM DOMESTIC				36.50544	-121.50916	10/24/2013	10/24/2013
AGC10000001-CCGC_0010	ON-FARM DOMESTIC				36.62735	-121.62755	10/21/2013	10/21/2013
AGC10000001-CCGC_0012	ON-FARM DOMESTIC				36.67890	-121.71400	10/21/2013	10/21/2013
AGC10000001-CCGC_0023	ON-FARM DOMESTIC				36.59305	-121.53632	10/21/2013	10/21/2013
AGC10000001-CCGC_0031	ON-FARM DOMESTIC				36.67660	-121.69975	10/22/2013	10/22/2013
AGC10000001-CCGC_0032	ON-FARM DOMESTIC				36.53880	-121.47402	10/25/2013	10/25/2013
AGC10000001-CCGC_0035	ON-FARM DOMESTIC				36.54883	-121.49877	10/21/2013	10/21/2013
AGC10000001-CCGC_0036	ON-FARM DOMESTIC				36.72103	-121.74617	10/22/2013	10/22/2013
AGC10000001-CCGC_0037	ON-FARM DOMESTIC				36.71922	-121.75455	10/22/2013	10/22/2013

AGC100000001-CCGC_0038	ON-FARM DOMESTIC				36.72735	-121.74327	10/22/2013	10/22/2013
AGC100000001-CCGC_0039	ON-FARM DOMESTIC				36.51170	-121.46920	10/25/2013	10/25/2013
AGC100000001-CCGC_0045	ON-FARM DOMESTIC	570			36.51385	-121.48253	10/23/2013	10/23/2013
AGC100000001-CCGC_0046	ON-FARM DOMESTIC				36.50980	-121.48500	10/23/2013	10/23/2013
AGC100000001-CCGC_0047	ON-FARM DOMESTIC	580			36.50900	-121.47560	10/23/2013	10/23/2013
AGC100000001-CCGC_0048	ON-FARM DOMESTIC	670			36.51480	-121.46920	10/23/2013	10/23/2013
AGC100000001-CCGC_0054	ON-FARM DOMESTIC				36.55264	-121.53686	10/21/2013	10/21/2013
AGC100000001-CCGC_0056	ON-FARM DOMESTIC				36.51877	-121.47708	10/23/2013	6/24/2015
AGC100000001-CCGC_0057	ON-FARM DOMESTIC				36.51647	-121.46733	10/23/2013	10/23/2013
AGC100000001-CCGC_0059	ON-FARM DOMESTIC				36.51169	-121.46427	10/23/2013	8/28/2014
AGC100000001-CCGC_0060	ON-FARM DOMESTIC				36.55367	-121.54482	10/21/2013	10/21/2013
AGC100000001-CCGC_0068	ON-FARM DOMESTIC				36.67130	-121.70465	10/22/2013	10/22/2013
AGC100000001-CCGC_0069	ON-FARM DOMESTIC				36.64648	-121.67895	10/21/2013	10/21/2013
AGC100000001-CCGC_0070	ON-FARM DOMESTIC				36.68600	-121.73445	10/21/2013	10/21/2013
AGC100000001-CCGC_0071	ON-FARM DOMESTIC				36.74208	-121.74092	10/25/2013	10/25/2013
AGC100000001-CCGC_0109	ON-FARM DOMESTIC				36.64108	-121.70229	3/10/2014	3/10/2014
AGC100000001-CCGC_0110	ON-FARM DOMESTIC				36.65014	-121.69505	3/10/2014	3/10/2014
AGC100000001-CCGC_0111	ON-FARM DOMESTIC				36.63401	-121.62740	3/10/2014	3/10/2014
AGC100000001-CCGC_0112	ON-FARM DOMESTIC				36.64411	-121.63367	3/10/2014	3/10/2014
AGC100000001-CCGC_0114	ON-FARM DOMESTIC				36.64123	-121.68018	3/11/2014	3/11/2014
AGC100000001-CCGC_0117	ON-FARM DOMESTIC				36.69293	-121.75523	3/11/2014	3/11/2014
AGC100000001-CCGC_0118	ON-FARM DOMESTIC				36.69187	-121.70799	3/11/2014	3/11/2014
AGC100000001-CCGC_0120	ON-FARM DOMESTIC				36.69397	-121.70140	3/11/2014	3/11/2014
AGC100000001-CCGC_0122	ON-FARM DOMESTIC				36.58895	-121.54105	3/12/2014	3/12/2014
AGC100000001-CCGC_0123	ON-FARM DOMESTIC				36.61069	-121.57110	3/12/2014	3/12/2014
AGC100000001-CCGC_0126	ON-FARM DOMESTIC				36.77033	-121.71179	3/12/2014	3/12/2014
AGC100000001-CCGC_0127	ON-FARM DOMESTIC				36.75918	-121.70183	3/12/2014	3/12/2014
AGC100000001-CCGC_0128	ON-FARM DOMESTIC				36.76853	-121.70036	3/12/2014	3/12/2014
AGC100000001-CCGC_0131	ON-FARM DOMESTIC				36.68254	-121.67858	3/13/2014	3/13/2014
AGC100000001-CCGC_0133	ON-FARM DOMESTIC				36.60090	-121.60335	3/13/2014	3/13/2014
AGC100000001-CCGC_0134	ON-FARM DOMESTIC				36.59864	-121.60401	3/13/2014	3/13/2014
AGC100000001-CCGC_0135	ON-FARM DOMESTIC				36.60361	-121.60947	3/13/2014	3/13/2014
AGC100000001-CCGC_0136	ON-FARM DOMESTIC				36.49762	-121.50223	3/14/2014	3/14/2014
AGC100000001-CCGC_0137	ON-FARM DOMESTIC				36.54449	-121.55027	3/14/2014	3/14/2014
AGC100000001-CCGC_0145	ON-FARM DOMESTIC				36.48009	-121.47879	3/10/2014	3/10/2014
AGC100000001-CCGC_0146	ON-FARM DOMESTIC				36.64520	-121.61012	3/10/2014	3/10/2014
AGC100000001-CCGC_0159	ON-FARM DOMESTIC				36.55890	-121.55553	3/12/2014	3/12/2014
AGC100000001-CCGC_0182	ON-FARM DOMESTIC				36.66213	-121.68796	3/13/2014	3/13/2014
AGC100000001-CCGC_0183	ON-FARM DOMESTIC				36.67133	-121.68198	3/13/2014	3/13/2014
AGC100000001-CCGC_0184	ON-FARM DOMESTIC				36.60604	-121.60017	3/13/2014	3/13/2014
AGC100000001-CCGC_0185	ON-FARM DOMESTIC				36.59610	-121.60171	3/13/2014	3/13/2014
AGC100000001-CCGC_0193	ON-FARM DOMESTIC				36.53132	-121.46655	3/19/2014	3/19/2014
AGC100000001-CCGC_0378	ON-FARM DOMESTIC				36.80149	-121.72186	5/1/2014	5/1/2014
AGC100000001-CCGC_0398	ON-FARM DOMESTIC				36.58935	-121.60287	8/7/2014	8/7/2014
AGC100000001-CCGC_0399	ON-FARM DOMESTIC				36.59607	-121.59765	8/7/2014	8/7/2014
AGC100000001-CCGC_0404	ON-FARM DOMESTIC				36.70589	-121.68010	8/7/2014	8/7/2014
AGC100000001-CCGC_0405	ON-FARM DOMESTIC				36.70905	-121.70044	8/7/2014	8/7/2014
AGC100000001-CCGC_0406	ON-FARM DOMESTIC				36.55190	-121.50496	8/7/2014	8/7/2014

AGC100000001-CCGC_0441	ON-FARM DOMESTIC				36.64205	-121.66720	8/14/2014	8/14/2014
AGC100000001-CCGC_0442	ON-FARM DOMESTIC				36.65451	-121.68216	8/14/2014	8/14/2014
AGC100000001-CCGC_0443	ON-FARM DOMESTIC				36.66439	-121.68044	8/14/2014	8/14/2014
AGC100000001-CCGC_0444	ON-FARM DOMESTIC				36.65747	-121.68575	8/14/2014	8/14/2014
AGC100000001-CCGC_0475	ON-FARM DOMESTIC				36.68114	-121.72552	8/28/2014	8/28/2014
AGC100000001-CCGC_0533	ON-FARM DOMESTIC				36.67841	-121.73455	4/6/2015	4/6/2015
AGC100000001-CCGC_0537	ON-FARM DOMESTIC				36.69415	-121.69383	4/6/2015	4/6/2015
AGC100000001-CCGC_0543	ON-FARM DOMESTIC				36.67895	-121.72928	4/6/2015	4/6/2015
AGC100000001-CCGC_0544	ON-FARM DOMESTIC				36.73244	-121.70570	4/6/2015	4/6/2015
AGC100000001-CCGC_0546	ON-FARM DOMESTIC				36.64743	-121.69202	4/7/2015	4/7/2015
AGC100000001-CCGC_0547	ON-FARM DOMESTIC				36.67162	-121.69472	4/7/2015	4/7/2015
AGC100000001-CCGC_0548	ON-FARM DOMESTIC				36.67837	-121.72296	4/7/2015	4/7/2015
AGC100000001-CCGC_0549	ON-FARM DOMESTIC				36.69322	-121.73548	4/7/2015	5/3/2016
AGC100000001-CCGC_0550	ON-FARM DOMESTIC				36.64276	-121.64684	4/7/2015	4/7/2015
AGC100000001-CCGC_0559	ON-FARM DOMESTIC				36.47854	-121.47536	6/24/2015	6/24/2015
AGC100000001-CCGC_0562	ON-FARM DOMESTIC				36.53164	-121.47224	6/24/2015	6/24/2015
AGC100000001-CCGC_0583	ON-FARM DOMESTIC				36.65292	-121.67973	6/24/2015	6/24/2015
AGC100000001-CCGC_0584	ON-FARM DOMESTIC				36.72249	-121.69755	6/24/2015	6/24/2015
AGC100000001-CCGC_0585	ON-FARM DOMESTIC				36.69660	-121.69693	6/24/2015	6/24/2015
AGC100000001-CCGC_0596	ON-FARM DOMESTIC				36.72757	-121.67544	6/30/2015	6/30/2015
AGC100000001-CCGC_0598	ON-FARM DOMESTIC				36.71118	-121.67595	6/30/2015	4/28/2016
AGC100000001-CCGC_0616	ON-FARM DOMESTIC				36.66958	-121.74030	8/25/2015	8/25/2015
AGC100000001-CCGC_0617	ON-FARM DOMESTIC				36.66651	-121.73640	8/25/2015	8/25/2015
AGC100000001-CCGC_0618	ON-FARM DOMESTIC				36.73176	-121.74947	8/25/2015	8/25/2015
AGC100000001-CCGC_0632	ON-FARM DOMESTIC				36.70597	-121.67630	8/27/2015	8/27/2015
AGC100000001-CCGC_0642	ON-FARM DOMESTIC				36.58581	-121.60444	4/28/2016	4/28/2016
AGC100000001-CCGC_0649	ON-FARM DOMESTIC				36.73546	-121.73783	5/3/2016	5/3/2016
AGC100000001-CCGC_0650	ON-FARM DOMESTIC				36.74254	-121.72749	5/3/2016	5/3/2016
AGC100000001-CCGC_0651	ON-FARM DOMESTIC				36.74130	-121.73444	5/3/2016	5/3/2016
AGC100000001-CCGC_0652	ON-FARM DOMESTIC				36.74438	-121.73898	5/3/2016	5/3/2016
AGL020000702-CCGC_0057	ON-FARM DOMESTIC				36.51600	-121.46780	5/2/2017	4/15/2019
AGL020000705-CCGC_0056	ON-FARM DOMESTIC				36.51900	-121.47680	5/2/2017	4/15/2019
AGL020000721-WELL #1	ON-FARM DOMESTIC				36.50999	-121.51623	11/14/2012	9/22/2017
AGL020000967-CCGC_0038	ON-FARM DOMESTIC	540	18		36.72735	-121.74327	6/2/2017	6/2/2017
AGL020000967-SPIEGL DOM	ON-FARM DOMESTIC				36.72740	-121.74343	4/27/2018	4/8/2019
AGL020000969-CCGC_0039	ON-FARM DOMESTIC	210	60		36.51170	-121.46920	6/2/2017	6/2/2017
AGL020000969-VOSTI DOM	ON-FARM DOMESTIC				36.51165	-121.46935	4/27/2018	4/8/2019
AGL020000972-BROOMEDOM	ON-FARM DOMESTIC				36.53880	-121.47407	4/27/2018	4/8/2019
AGL020000972-CCGC_0032	ON-FARM DOMESTIC				36.53880	-121.47402	6/2/2017	6/2/2017
AGL020000974-CCGC_0031	ON-FARM DOMESTIC				36.67660	-121.69975	6/2/2017	6/2/2017
AGL020000975-DOM	ON-FARM DOMESTIC				36.72107	-121.74625	6/5/2018	4/8/2019
AGL020000977-DOM	ON-FARM DOMESTIC				36.71923	-121.75468	6/5/2018	4/8/2019
AGL020001154-HOUSE LOT 7	ON-FARM DOMESTIC				36.63971	-121.64213	12/12/2013	3/13/2014
AGL020001154-HUNTER1_DU	ON-FARM DOMESTIC				36.63960	-121.64158	6/7/2017	12/18/2017
AGL020001162-BRUN_DOM	ON-FARM DOMESTIC				36.63053	-121.60002	12/20/2017	9/12/2019
AGL020001166-ABRAMS_DOM	ON-FARM DOMESTIC				36.59563	-121.53960	6/13/2017	12/14/2017

AGL020001183-HOUSE LOT 12	ON-FARM DOMESTIC				36.58783	-121.52991	12/12/2013	3/14/2014
AGL020001183-HOUSE LOT 17	ON-FARM DOMESTIC				36.59319	-121.52415	12/12/2013	3/14/2014
AGL020001183-JENSEN12_D	ON-FARM DOMESTIC				36.58783	-121.52988	6/7/2017	6/7/2017
AGL020001183-JENSEN17_D	ON-FARM DOMESTIC				36.59318	-121.52415	6/8/2017	12/14/2017
AGL020001221-BRAMERS_D	ON-FARM DOMESTIC				36.64127	-121.64568	6/8/2017	12/18/2017
AGL020001221-BRAMERSHSELOT 1	ON-FARM DOMESTIC				36.64113	-121.64562	12/13/2013	3/13/2014
AGL020001225-#2HRDEN DUAL	ON-FARM DOMESTIC				36.70604	-121.67622	12/12/2017	5/18/2018
AGL020001225-HARDEN DOM	ON-FARM DOMESTIC				36.70518	-121.67431	12/12/2017	5/18/2018
AGL020001239-DW	ON-FARM DOMESTIC				36.65951	-121.73098	1/27/2014	8/27/2018
AGL020001246-MASSA DOM	ON-FARM DOMESTIC				36.72500	-121.68204	12/12/2017	5/18/2018
AGL020001278-BIANCO_DOM	ON-FARM DOMESTIC				36.52675	-121.46822	6/13/2017	12/18/2017
AGL020001285-DAORO_DUAL	ON-FARM DOMESTIC				36.53127	-121.46660	6/7/2017	12/18/2017
AGL020001593-DOM_WELL4	ON-FARM DOMESTIC				36.76998	-121.70315	12/17/2012	4/21/2014
AGL020001593-DOM_WELL5	ON-FARM DOMESTIC				36.77056	-121.71147	12/17/2012	4/21/2014
AGL020001617-WELL 21	ON-FARM DOMESTIC				36.58931	-121.60279	11/27/2018	6/18/2019
AGL020002102-DOM_BERTEL	ON-FARM DOMESTIC				36.77542	-121.77302	12/11/2013	9/29/2017
AGL020002708-DOMESTIC	ON-FARM DOMESTIC				36.74189	-121.76965	6/19/2015	9/8/2020
AGL020002802-CCGC_0048	ON-FARM DOMESTIC		370	300	36.51480	-121.46920	8/29/2017	11/12/2020
AGL020002820-CCGC_0045	ON-FARM DOMESTIC		360	210	36.51385	-121.48253	8/29/2017	11/12/2020
AGL020002823-CCGC_0047	ON-FARM DOMESTIC				36.50900	-121.47560	8/29/2017	11/25/2020
AGL020002825-CCGC_0046	ON-FARM DOMESTIC				36.50980	-121.48500	8/29/2017	11/25/2020
AGL020002876-R4N W3D	ON-FARM DOMESTIC				36.49070	-121.45296	10/16/2013	4/26/2018
AGL020002878-R6_YARD	ON-FARM DOMESTIC				36.50918	-121.51452	6/19/2015	4/26/2018
AGL020002878-R6_YARD2	ON-FARM DOMESTIC				36.51225	-121.50974	4/11/2017	4/26/2018
AGL020002886-R12_W13	ON-FARM DOMESTIC				36.67936	-121.70371	4/23/2015	5/4/2018
AGL020002893-R17_MYARD	ON-FARM DOMESTIC				36.63806	-121.60426	7/14/2015	4/30/2018
AGL020002897-R19 WD	ON-FARM DOMESTIC				36.76693	-121.78466	10/10/2013	6/11/2018
AGL020002899-R21_YARD1	ON-FARM DOMESTIC				36.59357	-121.61357	4/11/2017	5/1/2018
AGL020002899-R21_YARD2	ON-FARM DOMESTIC				36.59367	-121.60297	4/14/2017	5/1/2018
AGL020003051-AF01-01DOM	ON-FARM DOMESTIC				36.53822	-121.51284	10/31/2012	12/8/2020
AGL020003652-DOM_BOGGIA	ON-FARM DOMESTIC				36.74130	-121.73443	12/18/2013	10/1/2014
AGL020003699-CCGC_0133	ON-FARM DOMESTIC		437	15	36.60090	-121.60335	10/31/2017	9/25/2019
AGL020003699-CCGC_0184	ON-FARM DOMESTIC				36.60604	-121.60017	10/31/2017	9/25/2019
AGL020003699-CCGC_0185	ON-FARM DOMESTIC				36.59610	-121.60171	10/31/2017	9/25/2019
AGL020003705-DOM_MOLERA	ON-FARM DOMESTIC				36.74693	-121.77450	12/18/2013	10/1/2014
AGL020003706-CCGC_0135	ON-FARM DOMESTIC				36.60361	-121.60947	10/31/2017	9/25/2019
AGL020003810-CCGC_0109	ON-FARM DOMESTIC		360	40	36.64108	-121.70229	6/1/2017	5/1/2019
AGL020003818-CCGC_0111	ON-FARM DOMESTIC				36.63401	-121.62740	6/1/2017	5/1/2019
AGL020003867-CCGC_0145	ON-FARM DOMESTIC				36.48009	-121.47879	6/1/2017	5/2/2019
AGL020003916-CCGC_0146	ON-FARM DOMESTIC				36.64520	-121.61012	6/1/2017	5/2/2019
AGL020003934-CCGC_0110	ON-FARM DOMESTIC				36.65014	-121.69505	6/1/2017	5/1/2019
AGL020004048-CCGC_0010	ON-FARM DOMESTIC				36.62735	-121.62755	5/30/2017	7/9/2019
AGL020004052-CCGC_0012	ON-FARM DOMESTIC				36.67890	-121.71400	6/26/2019	6/26/2019

AGL020004156-CCGC_0122	ON-FARM DOMESTIC				36.58895	-121.54105	10/24/2017	7/30/2019
AGL020004180-CCGC_0001	ON-FARM DOMESTIC				36.50544	-121.50916	8/24/2018	8/27/2019
AGL020004191-DOM_OCBAR8	ON-FARM DOMESTIC				36.67231	-121.71359	9/5/2013	6/7/2019
AGL020004282-CCGC_0123	ON-FARM DOMESTIC				36.61069	-121.57110	10/24/2017	7/30/2019
AGL020004301-VIOLINI_WELL_1	ON-FARM DOMESTIC				36.62167	-121.66381	7/25/2017	10/2/2019
AGL020004355-CCGC_0114	ON-FARM DOMESTIC				36.64123	-121.68018	6/7/2017	11/4/2019
AGL020004363-BOBHOUSE_D	ON-FARM DOMESTIC				36.53158	-121.53266	6/7/2017	11/4/2019
AGL020004375-CCGC_0054	ON-FARM DOMESTIC				36.55264	-121.53686	5/25/2017	10/24/2017
AGL020004435-WELL	ON-FARM DOMESTIC				36.74567	-121.68661	8/6/2012	9/10/2014
AGL020004461-LEON_RIVER	ON-FARM DOMESTIC				36.73695	-121.78233	12/18/2018	6/25/2019
AGL020004578-CCGC_0068	ON-FARM DOMESTIC	260	123		36.67130	-121.70465	6/29/2017	7/16/2019
AGL020004612-CCGC_0069	ON-FARM DOMESTIC	400	40		36.64648	-121.67895	6/28/2017	7/16/2019
AGL020004618-CCGC_0070	ON-FARM DOMESTIC				36.68600	-121.73445	6/29/2017	7/16/2019
AGL020004624-CCGC_0071	ON-FARM DOMESTIC	418	6		36.74208	-121.74092	6/29/2017	7/16/2019
AGL020004640-CCGC_0546	ON-FARM DOMESTIC				36.64743	-121.69202	6/28/2017	6/28/2017
AGL020004641-CCGC_0548	ON-FARM DOMESTIC				36.67837	-121.72296	6/29/2017	6/29/2017
AGL020004703-RODGERS_D	ON-FARM DOMESTIC				36.73615	-121.70490	5/31/2018	5/31/2018
AGL020004704-CCGC_0544	ON-FARM DOMESTIC				36.73244	-121.70570	11/16/2017	11/5/2019
AGL020004829-DM WELL 3	ON-FARM DOMESTIC				36.67929	-121.68028	12/27/2013	11/15/2018
AGL020004847-DOM WELL	ON-FARM DOMESTIC				36.68121	-121.72553	12/11/2012	7/17/2018
AGL020004986-DOM WELL	ON-FARM DOMESTIC				36.67917	-121.68444	6/8/2015	11/15/2018
AGL020005087-DOM WELL	ON-FARM DOMESTIC				36.54470	-121.49340	2/19/2019	8/13/2019
AGL020005192-DOM_WELL_S	ON-FARM DOMESTIC				36.80178	-121.72162	4/15/2013	4/15/2013
AGL020005198-2150_ELKHO	ON-FARM DOMESTIC				36.80015	-121.72425	8/26/2015	11/15/2017
AGL020005403-CCGC_0023	ON-FARM DOMESTIC				36.59305	-121.53632	6/27/2017	1/30/2019
AGL020005801-WELL	ON-FARM DOMESTIC				36.80050	-121.70720	7/21/2015	11/1/2017
AGL020007215-DM WELL	ON-FARM DOMESTIC				36.52639	-121.53278	2/26/2018	2/26/2018
AGL020007485-JARDINI	ON-FARM DOMESTIC				36.55855	-121.55793	6/22/2017	6/22/2017
AGL020007547-B24 HOUSE	ON-FARM DOMESTIC				36.69668	-121.69707	6/29/2017	12/27/2017
AGL020007547-OFF BOR QVF	ON-FARM DOMESTIC				36.70600	-121.68070	6/29/2017	12/27/2017
AGL020007548-SAN JON DOM	ON-FARM DOMESTIC				36.70910	-121.70050	6/29/2017	6/29/2017
AGL020007551-GL QVF	ON-FARM DOMESTIC				36.76290	-121.71850	6/29/2017	12/27/2017
AGL020007552-SCH HOUSE	ON-FARM DOMESTIC				36.72527	-121.70223	6/29/2017	1/24/2018
AGL020007557-MR QVF 1	ON-FARM DOMESTIC				36.55199	-121.50480	6/29/2017	12/27/2017
AGL020008224-CCGC_0583	ON-FARM DOMESTIC				36.65292	-121.67973	10/31/2017	10/31/2017
AGL020008433-17-DOM	ON-FARM DOMESTIC				36.56417	-121.52897	6/14/2017	10/12/2017
AGL020008433-R 7 DW	ON-FARM DOMESTIC				36.56400	-121.52860	5/22/2014	5/22/2014
AGL020008554-WELL 20	ON-FARM DOMESTIC				36.59610	-121.59770	11/27/2018	6/18/2019
AGL020011542-DOM_GT	ON-FARM DOMESTIC				36.74747	-121.72363	12/11/2013	12/11/2013
AGL020011542-NIEL_SOUTH	ON-FARM DOMESTIC				36.74747	-121.72362	12/21/2017	5/4/2018
AGL020011562-DOM_NIELSE	ON-FARM DOMESTIC				36.74610	-121.73958	12/11/2013	9/29/2017
AGL020011567-DOM_QB	ON-FARM DOMESTIC				36.73567	-121.71510	12/11/2013	12/11/2013
AGL020011569-DOM_SANJON	ON-FARM DOMESTIC				36.72213	-121.69638	12/11/2013	9/29/2017
AGL020011573-DOM_M_HILL	ON-FARM DOMESTIC				36.75118	-121.79465	12/11/2013	9/29/2017

AGL020011575-DOM_M_HILL	ON-FARM DOMESTIC				36.75118	-121.79465	6/7/2017	9/29/2017
AGL020011582-DOM_PRESTO	ON-FARM DOMESTIC				36.75718	-121.76243	12/11/2013	11/1/2017
AGL020011584-DOM_DESAN	ON-FARM DOMESTIC				36.78622	-121.76505	12/11/2013	9/29/2017
AGL020011790-WELL_DOM	ON-FARM DOMESTIC				36.56118	-121.55280	6/23/2017	9/20/2017
AGL020012422-R1-YARD 2E	ON-FARM DOMESTIC				36.62443	-121.62705	5/3/2017	4/30/2018
AGL020012424-VOSTI4YARD	ON-FARM DOMESTIC				36.50124	-121.44404	8/10/2015	4/26/2018
AGL020012462-FONTES_12	ON-FARM DOMESTIC				36.70046	-121.71741	4/5/2017	5/4/2018
AGL020012462-FONTES_12Y	ON-FARM DOMESTIC				36.69352	-121.72010	5/3/2017	5/3/2017
AGL020013402-WELL_DOM	ON-FARM DOMESTIC				36.58935	-121.62153	6/25/2017	9/17/2019
AGL020013402-WELL_DOMRENTAL	ON-FARM DOMESTIC				36.59560	-121.61978	9/17/2019	9/17/2019
AGL020013410-WELL_OLDDOM	ON-FARM DOMESTIC				36.51180	-121.46410	6/25/2017	6/25/2017
AGL020013485-DW	ON-FARM DOMESTIC				36.70306	-121.70917	1/27/2014	8/27/2018
AGL020013486-DW	ON-FARM DOMESTIC				36.71167	-121.74000	1/27/2014	8/27/2018
AGL020014783-TURRI D	ON-FARM DOMESTIC				36.56034	-121.50633	2/10/2014	11/1/2017
AGL020015622-DELMONTE_JEF	ON-FARM DOMESTIC				36.72732	-121.77997	6/1/2017	6/1/2017
AGL020015807-CCGC_0547	ON-FARM DOMESTIC				36.67162	-121.69472	6/29/2017	6/29/2017
AGL020015945-CCGC_0120	ON-FARM DOMESTIC				36.69397	-121.70140	7/25/2017	7/25/2017
AGL020016624-MSJ QVFD	ON-FARM DOMESTIC				36.70910	-121.70050	12/27/2017	12/27/2017
AGL020017226-DOM WELL	ON-FARM DOMESTIC				36.64412	-121.63385	12/27/2017	4/13/2018
AGL020017228-DOM WELL	ON-FARM DOMESTIC				36.64943	-121.67294	12/27/2017	4/13/2018
AGL020017663-CCGC_0118	ON-FARM DOMESTIC				36.69187	-121.70799	7/25/2017	7/25/2017
AGL020019642-CCGC_0117	ON-FARM DOMESTIC				36.69293	-121.75523	6/7/2017	12/9/2019
AGL020019642-MARV-TER_D	ON-FARM DOMESTIC				36.69270	-121.75666	6/7/2017	11/4/2019
AGL020022744-CCGC_0584	ON-FARM DOMESTIC				36.72249	-121.69755	11/16/2017	11/16/2017
AGL020023022-TARP_WEST_DOM	ON-FARM DOMESTIC				36.59055	-121.61733	6/21/2017	10/31/2019
AGL020024082-#3 CH QVF	ON-FARM DOMESTIC				36.75900	-121.70100	6/29/2017	12/27/2017
AGL020026783-HILLTOP_D	ON-FARM DOMESTIC				36.73384	-121.72079	11/16/2017	11/5/2019
AGL020026802-DM WELL	ON-FARM DOMESTIC				36.80180	-121.72085	1/24/2018	1/24/2018
AGL020027408-CCGC_0550	ON-FARM DOMESTIC				36.64276	-121.64684	10/24/2017	7/30/2019
AGL020027508-CCGC_0650	ON-FARM DOMESTIC				36.74254	-121.72749	11/16/2017	11/5/2019
AGL020027508-CCGC_0651	ON-FARM DOMESTIC				36.74130	-121.73444	11/16/2017	11/5/2019
AGL020027692-DOM_KS01	ON-FARM DOMESTIC				36.83927	-121.72614	4/26/2017	12/12/2017
AGL020027805-PEDRAZZI_DOM	ON-FARM DOMESTIC				36.58872	-121.60439	6/21/2017	10/30/2017
AGL020027813-CCGC_0549	ON-FARM DOMESTIC				36.69322	-121.73548	6/29/2017	6/29/2017
AGL020027837-WELL D	ON-FARM DOMESTIC				36.53273	-121.47845	3/30/2017	11/1/2017
AGL020027896-#5 CW QVF	ON-FARM DOMESTIC				36.77040	-121.71160	6/29/2017	12/27/2017
AGL020028095-HOME DOM	ON-FARM DOMESTIC				36.64227	-121.66571	12/12/2017	5/18/2018
AGL020028097-MACHADO DOM	ON-FARM DOMESTIC				36.66471	-121.68073	12/12/2017	5/18/2018
AGL020028099-ABE DUAL	ON-FARM DOMESTIC				36.65735	-121.68576	12/12/2017	5/18/2018
AGL020028101-LANINI DUAL	ON-FARM DOMESTIC				36.65448	-121.68219	12/12/2017	5/18/2018
AGL020028136-BARDIN_DUAL	ON-FARM DOMESTIC				36.57554	-121.58697	6/21/2017	10/10/2017
AGL020028328-RIV WELL	ON-FARM DOMESTIC				36.49249	-121.49281	5/9/2017	5/18/2020
AGL020028368-DOLE	ON-FARM DOMESTIC				36.59736	-121.52433	12/29/2017	4/13/2018
AGL020028432-DOM WELL	ON-FARM DOMESTIC				36.59863	-121.60402	12/20/2017	4/12/2018

AGL020028446-NAKAGA_IRR	ON-FARM DOMESTIC				36.80110	-121.71639	12/21/2017	5/7/2018
AGL020035697-BIANCO DOM	ON-FARM DOMESTIC				36.52681	-121.46823	3/14/2019	3/14/2019
AGL020035698-HEESS DOM	ON-FARM DOMESTIC				36.52287	-121.52301	3/14/2019	3/14/2019
AGL020035700-MFADMIR2_D	ON-FARM DOMESTIC				36.64744	-121.69202	5/1/2019	5/1/2019
AGC100000001-CCGC_0020	IRRIGATION SUPPLY				36.63792	-121.60444	10/21/2013	10/21/2013
AGL020000702-PU AGWELL 1	IRRIGATION SUPPLY				36.52400	-121.46940	5/2/2017	5/2/2017
AGL020000705-PE AGWELL 1	IRRIGATION SUPPLY				36.51900	-121.47720	5/2/2017	5/2/2017
AGL020000721-ABRAMS	IRRIGATION SUPPLY				36.50078	-121.50423	11/14/2012	9/22/2017
AGL020000721-CAYMUS	IRRIGATION SUPPLY				36.50494	-121.50819	11/14/2012	9/22/2017
AGL020000721-RIVER 1	IRRIGATION SUPPLY				36.52013	-121.51810	11/14/2012	9/22/2017
AGL020000876-IRRIG	IRRIGATION SUPPLY				36.82013	-121.70670	12/21/2017	12/21/2017
AGL020000967-LOT 2	IRRIGATION SUPPLY				36.72740	-121.74388	4/27/2018	4/27/2018
AGL020000969-VOSTI 1	IRRIGATION SUPPLY				36.51165	-121.46923	4/27/2018	4/27/2018
AGL020000974-BLANCO1AG	IRRIGATION SUPPLY				36.67656	-121.69990	9/3/2019	9/3/2019
AGL020001154-HUNTER WELL 1	IRRIGATION SUPPLY				36.63944	-121.64152	12/12/2013	3/13/2014
AGL020001162-BRUN_AG	IRRIGATION SUPPLY				36.62942	-121.60320	6/7/2017	6/7/2017
AGL020001166-ABRAMS1_AG	IRRIGATION SUPPLY				36.59590	-121.54518	6/7/2017	12/18/2017
AGL020001183-JENSEN WELL 3	IRRIGATION SUPPLY				36.58641	-121.53062	12/12/2013	3/14/2014
AGL020001183-JENSEN3_AG	IRRIGATION SUPPLY				36.58642	-121.53065	6/7/2017	12/14/2017
AGL020001206-REEVES PRIMARY	IRRIGATION SUPPLY				36.71818	-121.67804	4/11/2016	12/12/2017
AGL020001221-BRAMERS WELL	IRRIGATION SUPPLY				36.63806	-121.64674	12/13/2013	3/13/2014
AGL020001221-BRAMERS_AG	IRRIGATION SUPPLY				36.63822	-121.64673	6/13/2017	12/18/2017
AGL020001229-AW 1	IRRIGATION SUPPLY				36.62623	-121.65955	9/15/2014	10/31/2017
AGL020001229-AW 2	IRRIGATION SUPPLY				36.62377	-121.65152	9/15/2014	10/31/2017
AGL020001239-AW 1	IRRIGATION SUPPLY				36.65465	-121.71687	9/18/2014	9/19/2019
AGL020001239-AW 2	IRRIGATION SUPPLY				36.66137	-121.73066	9/15/2014	9/19/2019
AGL020001239-AW 3	IRRIGATION SUPPLY				36.66204	-121.72984	9/18/2014	9/19/2019
AGL020001246-#1MASSA IRR	IRRIGATION SUPPLY				36.72324	-121.67986	12/12/2017	12/12/2017
AGL020001258-AW 1	IRRIGATION SUPPLY				36.64667	-121.66444	1/27/2014	9/19/2019
AGL020001258-AW 2	IRRIGATION SUPPLY				36.64750	-121.66472	1/27/2014	9/19/2019
AGL020001258-AW 3	IRRIGATION SUPPLY				36.65167	-121.66250	1/27/2014	9/19/2019
AGL020001269-AW 1	IRRIGATION SUPPLY				36.63995	-121.61683	9/18/2014	9/19/2019
AGL020001269-AW 2	IRRIGATION SUPPLY				36.64205	-121.62276	9/15/2014	9/19/2019
AGL020001278-BIANCO_AG	IRRIGATION SUPPLY				36.52675	-121.46813	6/13/2017	12/18/2017
AGL020001283-MANN WELL 3	IRRIGATION SUPPLY				36.59847	-121.53182	12/12/2013	3/14/2014
AGL020001283-MANN3_AG	IRRIGATION SUPPLY				36.59847	-121.53185	6/7/2017	12/14/2017
AGL020001542-AG_CUCUNA	IRRIGATION SUPPLY				36.81306	-121.71500	6/19/2014	6/8/2018
AGL020001593-AG_WELL1	IRRIGATION SUPPLY				36.75929	-121.70916	12/17/2012	4/21/2014
AGL020001593-AG_WELL2	IRRIGATION SUPPLY				36.75798	-121.69291	12/17/2012	4/21/2014
AGL020001593-AG_WELL3	IRRIGATION SUPPLY				36.75917	-121.70175	11/29/2012	4/21/2014
AGL020001593-AG_WELL4	IRRIGATION SUPPLY				36.77016	-121.69902	11/29/2012	10/11/2013
AGL020001593-AG_WELL5	IRRIGATION SUPPLY				36.77056	-121.71147	11/29/2012	10/11/2013

AGL020001617-WELL 1	IRRIGATION SUPPLY				36.59504	-121.60057	11/20/2017	4/23/2019
AGL020001971-WELL	IRRIGATION SUPPLY				36.54472	-121.53173	7/12/2016	11/6/2017
AGL020002105-AG_HAYMORE	IRRIGATION SUPPLY				36.73215	-121.69043	12/11/2013	9/29/2017
AGL020002604-AG_WELL95A	IRRIGATION SUPPLY				36.73732	-121.75895	9/21/2012	3/13/2013
AGL020002605-AG_WELL55B	IRRIGATION SUPPLY				36.74322	-121.76788	9/21/2012	3/13/2013
AGL020002669-71906	IRRIGATION SUPPLY				36.53814	-121.48701	5/24/2017	5/24/2017
AGL020002669-71907	IRRIGATION SUPPLY				36.49135	-121.49135	5/24/2017	5/24/2017
AGL020002669-71908	IRRIGATION SUPPLY				36.52968	-121.47457	5/24/2017	5/24/2017
AGL020002804-R4 P1 WELL	IRRIGATION SUPPLY				36.52192	-121.46937	7/16/2019	11/25/2020
AGL020002870-R1 W3	IRRIGATION SUPPLY				36.62383	-121.63712	10/14/2013	4/30/2018
AGL020002876-R4N W5	IRRIGATION SUPPLY				36.48733	-121.44440	10/16/2013	4/26/2018
AGL020002877-R5 W2	IRRIGATION SUPPLY				36.70815	-121.70366	10/14/2013	5/4/2018
AGL020002878-R6 W1	IRRIGATION SUPPLY				36.51786	-121.51550	10/16/2013	4/26/2018
AGL020002886-R12 W1	IRRIGATION SUPPLY				36.68604	-121.71151	10/14/2013	5/4/2018
AGL020002892-AG_MARTIN2	IRRIGATION SUPPLY				36.57520	-121.55543	12/3/2013	8/7/2019
AGL020002893-R17 W1	IRRIGATION SUPPLY				36.62943	-121.60721	10/14/2013	4/30/2018
AGL020002894-AG_MORISO1	IRRIGATION SUPPLY				36.52818	-121.46307	12/3/2013	10/9/2019
AGL020002898-R20-W1CSIP	IRRIGATION SUPPLY				36.77753	-121.78132	10/10/2013	10/10/2013
AGL020002899-R21 W2	IRRIGATION SUPPLY				36.59702	-121.60528	10/15/2013	5/1/2018
AGL020002966-AG_PETERS4	IRRIGATION SUPPLY				36.62170	-121.57858	12/3/2013	12/3/2013
AGL020002970-AG_DIAC1	IRRIGATION SUPPLY				36.61300	-121.57305	12/3/2013	12/22/2017
AGL020002975-AG_NMART_1	IRRIGATION SUPPLY				36.57755	-121.56878	12/3/2013	9/24/2019
AGL020003051-AF01-05WELL	IRRIGATION SUPPLY				36.53669	-121.50811	10/31/2012	12/8/2020
AGL020003053-AF03-09WELL	IRRIGATION SUPPLY				36.55180	-121.50585	4/4/2013	12/8/2020
AGL020003487-AG_LYONS1	IRRIGATION SUPPLY				36.75659	-121.72900	6/16/2017	11/7/2017
AGL020003487-WELL #2	IRRIGATION SUPPLY				36.75660	-121.72908	5/2/2014	5/2/2014
AGL020003524-WELL	IRRIGATION SUPPLY				36.69276	-121.75525	4/22/2014	4/22/2014
AGL020003637-AG_WELL1	IRRIGATION SUPPLY				36.71348	-121.66877	12/18/2013	8/9/2019
AGL020003644-AG_BLANCO	IRRIGATION SUPPLY				36.67380	-121.69423	12/18/2013	8/7/2019
AGL020003654-AG_BORAND5	IRRIGATION SUPPLY				36.69652	-121.67958	12/18/2013	9/24/2019
AGL020003658-SHULTZ_AG	IRRIGATION SUPPLY				36.73342	-121.74575	6/9/2017	6/9/2017
AGL020003659-AG_FERRAS1	IRRIGATION SUPPLY				36.64905	-121.66107	12/18/2013	8/9/2019
AGL020003661-AG_HUNT_18	IRRIGATION SUPPLY				36.64650	-121.63665	12/18/2013	8/7/2019
AGL020003691-AG_JACOB	IRRIGATION SUPPLY				36.64893	-121.70103	12/18/2013	8/7/2019
AGL020003694-AG_DOLAN	IRRIGATION SUPPLY				36.66440	-121.68753	12/18/2013	8/7/2019
AGL020003699-BLUE_IRR	IRRIGATION SUPPLY				36.60955	-121.60985	10/31/2017	10/31/2017
AGL020003706-GRYWELL_I	IRRIGATION SUPPLY				36.60352	-121.60892	10/31/2017	10/31/2017
AGL020003778-WELL	IRRIGATION SUPPLY				36.64199	-121.67942	12/12/2017	12/12/2017
AGL020003778-WELL 1	IRRIGATION SUPPLY				36.64450	-121.68548	12/12/2017	12/12/2017
AGL020003780-WELL	IRRIGATION SUPPLY				36.66216	-121.68813	12/12/2017	8/5/2019
AGL020003793-WELL	IRRIGATION SUPPLY				36.66361	-121.73249	12/12/2017	8/5/2019
AGL020003810-JACKS_IRR	IRRIGATION SUPPLY				36.65049	-121.71629	6/1/2017	6/1/2017
AGL020003812-WELL	IRRIGATION SUPPLY				36.67303	-121.68141	12/12/2017	8/5/2019

AGL020003816-TORO_IRR1	IRRIGATION SUPPLY				36.62899	-121.67969	6/1/2017	6/1/2017
AGL020003818-SPRECKLES_5	IRRIGATION SUPPLY				36.63766	-121.63368	6/1/2017	6/1/2017
AGL020003834-WELL	IRRIGATION SUPPLY				36.77861	-121.70028	12/26/2017	5/21/2018
AGL020003867-OMO_IRR1	IRRIGATION SUPPLY				36.48087	-121.48059	6/1/2017	6/1/2017
AGL020003880-MFMOLE2_I	IRRIGATION SUPPLY				36.73488	-121.75981	5/1/2019	5/1/2019
AGL020003903-WELL 1	IRRIGATION SUPPLY				36.65185	-121.69842	12/12/2017	8/5/2019
AGL020003903-WELL 2	IRRIGATION SUPPLY				36.65867	-121.70742	12/12/2017	8/5/2019
AGL020003916-AIRPUMP2_I	IRRIGATION SUPPLY				36.64650	-121.61051	6/1/2017	6/1/2017
AGL020003917-WELL	IRRIGATION SUPPLY				36.67741	-121.72601	12/12/2017	12/12/2017
AGL020004048-HARRIS_PAS	IRRIGATION SUPPLY				36.62053	-121.61093	5/30/2017	5/30/2017
AGL020004052-HARRIS_SCHWEEN	IRRIGATION SUPPLY				36.68545	-121.71116	5/30/2017	5/30/2017
AGL020004056-HARRIS_WHALE	IRRIGATION SUPPLY				36.69723	-121.74097	5/30/2017	5/30/2017
AGL020004069-HARRIS_YUKI	IRRIGATION SUPPLY				36.53215	-121.49567	5/30/2017	5/30/2017
AGL020004072-VIOLOT3_I	IRRIGATION SUPPLY				36.60178	-121.61538	10/24/2017	10/24/2017
AGL020004072-VIOLOT8_I	IRRIGATION SUPPLY				36.60251	-121.61375	10/24/2017	10/24/2017
AGL020004124-WELL 1	IRRIGATION SUPPLY				36.78713	-121.73167	12/13/2012	10/12/2017
AGL020004124-WELL 2	IRRIGATION SUPPLY				36.78552	-121.73587	12/13/2012	10/12/2017
AGL020004130-WELL 1	IRRIGATION SUPPLY				36.76614	-121.72057	12/13/2012	10/12/2017
AGL020004136-WELL 1	IRRIGATION SUPPLY				36.75835	-121.72414	12/13/2012	10/12/2017
AGL020004156-JUANL10_I	IRRIGATION SUPPLY				36.58358	-121.54065	10/24/2017	10/24/2017
AGL020004156-JUANLOT4_I	IRRIGATION SUPPLY				36.58342	-121.54610	10/24/2017	10/24/2017
AGL020004156-JUANLOT9_I	IRRIGATION SUPPLY				36.58511	-121.54402	10/24/2017	10/24/2017
AGL020004169-WELL 2	IRRIGATION SUPPLY				36.61172	-121.61971	6/13/2017	9/18/2018
AGL020004169-WELL 4	IRRIGATION SUPPLY				36.61183	-121.62469	6/13/2017	9/18/2018
AGL020004172-WELL 1	IRRIGATION SUPPLY				36.62208	-121.66362	6/12/2017	9/21/2018
AGL020004178-WELL 1	IRRIGATION SUPPLY				36.67891	-121.72931	6/12/2017	9/21/2018
AGL020004178-WELL 2	IRRIGATION SUPPLY				36.67894	-121.73038	6/13/2017	9/21/2018
AGL020004178-WELL 4	IRRIGATION SUPPLY				36.67817	-121.73455	6/13/2017	9/21/2018
AGL020004178-WELL 5	IRRIGATION SUPPLY				36.67825	-121.73446	6/13/2017	9/21/2018
AGL020004179-AG_GARIN4	IRRIGATION SUPPLY				36.69174	-121.70795	9/5/2013	11/3/2017
AGL020004180-BASSETT_I	IRRIGATION SUPPLY				36.50759	-121.50795	8/24/2018	8/27/2019
AGL020004183-BLANCO WELL	IRRIGATION SUPPLY				36.69385	-121.72028	6/13/2017	6/13/2017
AGL020004193-AG_MCDOUG3	IRRIGATION SUPPLY				36.66192	-121.70795	9/5/2013	6/7/2019
AGL020004202-WELL 1	IRRIGATION SUPPLY				36.76472	-121.78328	6/13/2017	9/12/2018
AGL020004208-WELL 1	IRRIGATION SUPPLY				36.72612	-121.79113	6/13/2017	9/25/2018
AGL020004208-WELL 2	IRRIGATION SUPPLY				36.72897	-121.79132	6/13/2017	12/6/2017
AGL020004214-AZEVEDO	IRRIGATION SUPPLY				36.84562	-121.74852	6/12/2014	9/25/2014
AGL020004215-VASQUEZ	IRRIGATION SUPPLY				36.84376	-121.74163	6/12/2014	9/17/2018
AGL020004282-MUSANL29_I	IRRIGATION SUPPLY				36.61164	-121.56940	10/24/2017	10/24/2017
AGL020004289-STRUBYL5_I	IRRIGATION SUPPLY				36.71650	-121.68624	10/24/2017	10/24/2017
AGL020004296-FIRESTONE_1	IRRIGATION SUPPLY				36.61729	-121.58325	7/17/2017	11/8/2017
AGL020004298-HILLTOWN_WELL_1	IRRIGATION SUPPLY				36.62667	-121.66992	7/25/2017	11/8/2017
AGL020004303-FELIPE_1	IRRIGATION SUPPLY				36.60015	-121.62849	7/17/2017	11/8/2017
AGL020004345-WELL 1	IRRIGATION SUPPLY				36.73701	-121.67860	11/20/2017	4/24/2019

AGL020004355-DAVIS2_I	IRRIGATION SUPPLY				36.64223	-121.68048	6/7/2017	6/7/2017
AGL020004355-DAVIS4_1	IRRIGATION SUPPLY				36.63729	-121.69165	6/7/2017	6/7/2017
AGL020004363-TJERILD1_I	IRRIGATION SUPPLY				36.52387	-121.52076	6/7/2017	6/7/2017
AGL020004366-HOMEPUMP2_I	IRRIGATION SUPPLY				36.56667	-121.55565	5/25/2017	5/25/2017
AGL020004370-VIOPUMP3_I	IRRIGATION SUPPLY				36.56336	-121.55299	5/25/2017	5/25/2017
AGL020004377-R3PUMP5_I	IRRIGATION SUPPLY				36.54164	-121.53046	5/25/2017	5/25/2017
AGL020004436-STONEWALL	IRRIGATION SUPPLY				36.48183	-121.48872	11/30/2012	10/24/2017
AGL020004578-BARDN1W2_I	IRRIGATION SUPPLY				36.67444	-121.70289	6/28/2017	6/28/2017
AGL020004610-TABLACK_I	IRRIGATION SUPPLY				36.68955	-121.73574	6/29/2017	6/29/2017
AGL020004616-TADAVEMC_I	IRRIGATION SUPPLY				36.68227	-121.73524	6/29/2017	6/29/2017
AGL020004617-TAFOSTER_I	IRRIGATION SUPPLY				36.64872	-121.68974	6/28/2017	6/28/2017
AGL020004618-TAFRANK2_I	IRRIGATION SUPPLY				36.68602	-121.73473	6/29/2017	6/29/2017
AGL020004621-TAJENSEN_I	IRRIGATION SUPPLY				36.66956	-121.69214	6/28/2017	6/28/2017
AGL020004626-TAMATHEW_I	IRRIGATION SUPPLY				36.65585	-121.68304	6/29/2017	6/29/2017
AGL020004629-TAPORBOT_I	IRRIGATION SUPPLY				36.66757	-121.72414	6/29/2017	6/29/2017
AGL020004630-TAPORTER_I	IRRIGATION SUPPLY				36.67241	-121.71719	6/29/2017	6/29/2017
AGL020004633-TASTIRW1_I	IRRIGATION SUPPLY				36.64317	-121.66556	6/28/2017	6/28/2017
AGL020004635-RHARRIS2_I	IRRIGATION SUPPLY				36.61780	-121.63647	6/28/2017	6/28/2017
AGL020004636-HUNTER1_I	IRRIGATION SUPPLY				36.64489	-121.66216	6/28/2017	6/28/2017
AGL020004638-ROSILOT8_I	IRRIGATION SUPPLY				36.62914	-121.64745	6/28/2017	6/28/2017
AGL020004639-STORM1_I	IRRIGATION SUPPLY				36.65192	-121.64561	6/28/2017	6/28/2017
AGL020004641-BARDIN1_I	IRRIGATION SUPPLY				36.67026	-121.71993	6/28/2017	6/28/2017
AGL020004654-SULPOMW1_I	IRRIGATION SUPPLY				36.66901	-121.71727	6/29/2017	6/29/2017
AGL020004704-HMHAMBEY_I	IRRIGATION SUPPLY				36.72949	-121.70043	5/31/2018	5/31/2018
AGL020004833-AG WELL 1	IRRIGATION SUPPLY				36.62877	-121.61395	1/6/2014	12/11/2018
AGL020004847-AG WELL	IRRIGATION SUPPLY				36.68158	-121.72547	7/17/2018	7/17/2018
AGL020004886-LEONARDI	IRRIGATION SUPPLY				36.59776	-121.62634	6/16/2017	6/16/2017
AGL020004906-AG WELL 1	IRRIGATION SUPPLY				36.67908	-121.71905	1/8/2014	11/16/2018
AGL020004931-AG WELL 2	IRRIGATION SUPPLY				36.55532	-121.52207	12/26/2013	5/23/2014
AGL020004964-AG WELL 6	IRRIGATION SUPPLY				36.58194	-121.57417	7/10/2017	7/10/2017
AGL020004968-AG WELL 2	IRRIGATION SUPPLY				36.58394	-121.57552	1/8/2014	12/28/2018
AGL020004986-AG WELL 2	IRRIGATION SUPPLY				36.67303	-121.68951	12/26/2013	11/15/2018
AGL020005012-AG WELL 1	IRRIGATION SUPPLY				36.68640	-121.68646	1/8/2014	11/15/2018
AGL020005030-AG WELL 1	IRRIGATION SUPPLY				36.58914	-121.56049	12/26/2013	12/11/2018
AGL020005049-AG WELL 1	IRRIGATION SUPPLY				36.58338	-121.59173	1/8/2014	5/23/2014
AGL020005051-WELL_AG	IRRIGATION SUPPLY				36.58991	-121.60625	6/25/2017	6/25/2017
AGL020005087-AG WELL	IRRIGATION SUPPLY				36.54260	-121.49130	2/19/2019	2/19/2019
AGL020005167-PANZIERA	IRRIGATION SUPPLY				36.66644	-121.73632	6/19/2017	12/19/2017
AGL020005192-AG_WELL_SU	IRRIGATION SUPPLY				36.80187	-121.72088	4/15/2013	4/15/2013
AGL020005401-SALINAS2	IRRIGATION SUPPLY				36.74767	-121.70765	2/5/2016	2/5/2016
AGL020005842-RUBIO-9071	IRRIGATION SUPPLY				36.78564	-121.71987	4/21/2017	4/21/2017
AGL020006080-AG WELL	IRRIGATION SUPPLY				36.74688	-121.71538	4/24/2018	9/18/2018
AGL020006623-ESCOLLE	IRRIGATION SUPPLY				36.47858	-121.47529	3/11/2013	3/11/2013
AGL020007123-VIERRAWELL	IRRIGATION SUPPLY				36.71187	-121.71046	10/26/2017	10/26/2017
AGL020007181-WELL #2	IRRIGATION SUPPLY				36.60827	-121.57119	12/19/2017	4/24/2018

AGL020007215-AG WELL	IRRIGATION SUPPLY				36.52667	-121.53306	2/26/2018	2/26/2018
AGL020007441-ESP-1	IRRIGATION SUPPLY				36.73554	-121.68477	10/2/2013	5/4/2018
AGL020007457-RUSSELL-1	IRRIGATION SUPPLY				36.74269	-121.68697	8/31/2015	5/4/2017
AGL020007457-RUSSELL-2	IRRIGATION SUPPLY				36.74275	-121.68724	8/31/2015	12/20/2017
AGL020007527-IRRIGATION	IRRIGATION SUPPLY				36.48883	-121.47693	12/28/2017	12/28/2017
AGL020007534-GH19-01	IRRIGATION SUPPLY				36.50810	-121.48087	4/3/2013	12/16/2020
AGL020007535-GH17-02	IRRIGATION SUPPLY				36.55127	-121.49800	4/10/2013	12/15/2020
AGL020007536-GH16-15	IRRIGATION SUPPLY				36.52914	-121.48515	10/31/2012	12/15/2020
AGL020007541-GH21-215	IRRIGATION SUPPLY				36.56622	-121.53185	10/31/2012	12/7/2020
AGL020007547-BOR QVF 6	IRRIGATION SUPPLY				36.70550	-121.68342	6/29/2017	12/27/2017
AGL020007548-SAN JON 1	IRRIGATION SUPPLY				36.71100	-121.69370	6/29/2017	12/27/2017
AGL020007549-HET QVF 1	IRRIGATION SUPPLY				36.72287	-121.68682	6/29/2017	12/27/2017
AGL020007553-MARTIN MAIN	IRRIGATION SUPPLY				36.75850	-121.72410	12/27/2017	5/26/2018
AGL020008223-NISSEN_IRR	IRRIGATION SUPPLY				36.68874	-121.74491	10/31/2017	10/31/2017
AGL020008223-NISSEN1_I	IRRIGATION SUPPLY				36.69259	-121.74408	10/31/2017	10/31/2017
AGL020008234-SCHOOL_IRR	IRRIGATION SUPPLY				36.69378	-121.70184	10/31/2017	10/31/2017
AGL020008235-BALESTRA_I	IRRIGATION SUPPLY				36.69187	-121.70835	10/31/2017	10/31/2017
AGL020008332-WELL 1	IRRIGATION SUPPLY				36.69503	-121.69316	6/12/2017	12/6/2017
AGL020008403-TASIMON2_I	IRRIGATION SUPPLY				36.65929	-121.71438	6/29/2017	6/29/2017
AGL020008405-ROSMASSA_I	IRRIGATION SUPPLY				36.57535	-121.51371	6/28/2017	6/28/2017
AGL020008426-R19-4	IRRIGATION SUPPLY				36.56328	-121.52033	6/14/2017	10/12/2017
AGL020008433-17-20	IRRIGATION SUPPLY				36.57325	-121.53786	6/19/2017	10/12/2017
AGL020008433-17-21	IRRIGATION SUPPLY				36.57711	-121.53172	6/19/2017	10/12/2017
AGL020008433-R17-28	IRRIGATION SUPPLY				36.56633	-121.52478	6/14/2017	10/12/2017
AGL020008433-R17-29	IRRIGATION SUPPLY				36.55894	-121.52922	6/14/2017	11/1/2017
AGL020008433-R17-32	IRRIGATION SUPPLY				36.56772	-121.52983	6/14/2017	10/12/2017
AGL020008433-R17-33	IRRIGATION SUPPLY				36.57047	-121.53444	6/14/2017	10/12/2017
AGL020008438-R16-19	IRRIGATION SUPPLY				36.56542	-121.51300	6/14/2017	10/25/2017
AGL020008438-R16-5	IRRIGATION SUPPLY				36.57406	-121.50753	6/14/2017	10/25/2017
AGL020008528-WDAVIS4_I	IRRIGATION SUPPLY				36.63733	-121.69170	7/24/2018	7/24/2018
AGL020008543-BORONDA_I	IRRIGATION SUPPLY				36.69242	-121.70490	7/25/2017	7/25/2017
AGL020008550-WELL	IRRIGATION SUPPLY				36.63664	-121.66856	6/9/2015	7/25/2017
AGL020008554-WELL 5	IRRIGATION SUPPLY				36.59932	-121.58587	11/20/2017	4/22/2019
AGL020008603-#2 ODELLO IRR	IRRIGATION SUPPLY				36.71504	-121.67794	12/12/2017	12/12/2017
AGL020008762-AG_PORTO6	IRRIGATION SUPPLY				36.49054	-121.44456	9/6/2013	6/7/2019
AGL020009002-DOLAN_WELL	IRRIGATION SUPPLY				36.80180	-121.75153	5/28/2014	12/12/2017
AGL020009042-BAJO	IRRIGATION SUPPLY				36.57296	-121.57626	8/19/2014	8/19/2014
AGL020009043-POZZI	IRRIGATION SUPPLY				36.60765	-121.64377	8/19/2014	8/19/2014
AGL020009044-PALMAS	IRRIGATION SUPPLY				36.59334	-121.60400	8/19/2014	8/19/2014
AGL020010462-CRAN AG	IRRIGATION SUPPLY				36.71042	-121.70704	10/26/2017	11/19/2019
AGL020010482-HOME WELL	IRRIGATION SUPPLY				36.68248	-121.67879	8/2/2017	10/26/2017
AGL020010483-PUMP 1	IRRIGATION SUPPLY				36.69392	-121.71593	8/2/2017	10/26/2017
AGL020010483-PUMP 2	IRRIGATION SUPPLY				36.69748	-121.70960	8/2/2017	10/26/2017
AGL020011568-R14_BLK19	IRRIGATION SUPPLY				36.71772	-121.68445	6/7/2017	9/29/2017
AGL020011571-AG_JON_G	IRRIGATION SUPPLY				36.72218	-121.69633	12/11/2013	6/7/2017

AGL020011571- AG_SJON_MA	IRRIGATION SUPPLY				36.71650	-121.69932	6/7/2017	9/29/2017
AGL020011571-R14_BLK19	IRRIGATION SUPPLY				36.71772	-121.68445	6/3/2016	6/3/2016
AGL020011790-WELL AG	IRRIGATION SUPPLY				36.56126	-121.55281	6/23/2017	9/20/2017
AGL020011791-WELL AG	IRRIGATION SUPPLY				36.53668	-121.54198	6/23/2017	9/20/2017
AGL020012422-R1 W12	IRRIGATION SUPPLY				36.61288	-121.63564	10/14/2013	4/30/2018
AGL020012423-R4S W4	IRRIGATION SUPPLY				36.48798	-121.46063	10/16/2013	4/26/2018
AGL020012424-VOSTI 4 W2	IRRIGATION SUPPLY				36.49297	-121.44898	10/16/2013	6/8/2018
AGL020012463-R12 W20	IRRIGATION SUPPLY				36.69029	-121.70712	10/14/2013	6/11/2018
AGL020012664-AG_WELL_C	IRRIGATION SUPPLY				36.77334	-121.76025	10/8/2012	4/26/2018
AGL020012823-AG WELL	IRRIGATION SUPPLY				36.77455	-121.71360	2/15/2013	6/17/2013
AGL020013342- AG_VAUGHN3	IRRIGATION SUPPLY				36.68937	-121.69827	9/5/2013	11/3/2017
AGL020013402-WELL_AG	IRRIGATION SUPPLY				36.59551	-121.62159	6/25/2017	6/25/2017
AGL020013403-WELL_AG	IRRIGATION SUPPLY				36.59143	-121.55957	6/25/2017	6/25/2017
AGL020013405-WELL_AG_3	IRRIGATION SUPPLY				36.55423	-121.54453	6/25/2017	6/25/2017
AGL020013410-WELL_AG_2	IRRIGATION SUPPLY				36.51028	-121.45904	6/25/2017	6/25/2017
AGL020013410- WELL_AG_HM	IRRIGATION SUPPLY				36.51225	-121.46555	6/25/2017	6/25/2017
AGL020013482-AW	IRRIGATION SUPPLY				36.70611	-121.71083	4/30/2014	4/30/2014
AGL020013482-AW 1	IRRIGATION SUPPLY				36.70614	-121.71104	9/18/2014	9/18/2014
AGL020013483-AW 1	IRRIGATION SUPPLY				36.63500	-121.67667	1/27/2014	9/19/2019
AGL020013483-AW 2	IRRIGATION SUPPLY				36.63694	-121.66861	1/27/2014	9/19/2019
AGL020013485-AW 1	IRRIGATION SUPPLY				36.70252	-121.70902	9/18/2014	10/10/2018
AGL020013485- AW_NEW_WELL	IRRIGATION SUPPLY				36.70216	-121.71201	10/31/2017	9/19/2019
AGL020013486-AW 1	IRRIGATION SUPPLY				36.71139	-121.73944	1/27/2014	9/19/2019
AGL020013486-AW 2	IRRIGATION SUPPLY				36.71056	-121.74361	1/27/2014	9/19/2019
AGL020013668-WELL	IRRIGATION SUPPLY				36.73090	-121.68784	7/27/2017	7/27/2017
AGL020013670-WELL 2	IRRIGATION SUPPLY				36.69528	-121.73482	6/13/2017	9/18/2018
AGL020014363-SOM	IRRIGATION SUPPLY				36.59678	-121.55299	5/11/2017	9/26/2017
AGL020014763-QUATRIN1_I	IRRIGATION SUPPLY				36.69139	-121.67579	6/7/2017	6/7/2017
AGL020014781-WELL #2	IRRIGATION SUPPLY				36.50179	-121.47464	12/19/2012	11/14/2017
AGL020014783-WELL #1	IRRIGATION SUPPLY				36.55947	-121.50735	12/17/2012	11/1/2017
AGL020014787-WELL #2	IRRIGATION SUPPLY				36.59898	-121.59242	12/17/2012	5/14/2014
AGL020014842- AG_AZEVEDO	IRRIGATION SUPPLY				36.84725	-121.75018	12/14/2012	10/10/2018
AGL020014842-AZEVEDO_1	IRRIGATION SUPPLY				36.84681	-121.74972	12/21/2017	12/21/2017
AGL020014842-AZEVEDO_2	IRRIGATION SUPPLY				36.84563	-121.74853	4/12/2019	10/10/2019
AGL020014885- AG_MERDIAN	IRRIGATION SUPPLY				36.78837	-121.70530	12/14/2012	10/10/2019
AGL020014885-MERIDIAN_2	IRRIGATION SUPPLY				36.78566	-121.71301	9/26/2016	10/10/2019
AGL020014885-MERIDIAN_3	IRRIGATION SUPPLY				36.78531	-121.70241	9/26/2016	10/10/2019
AGL020014954-GH22-03	IRRIGATION SUPPLY				36.58812	-121.56517	10/31/2012	12/8/2020
AGL020015807-TANUTALL_I	IRRIGATION SUPPLY				36.66470	-121.70017	6/28/2017	6/28/2017
AGL020015811-LOT24-33_I	IRRIGATION SUPPLY				36.63956	-121.66394	6/28/2017	6/28/2017
AGL020015944-WELL	IRRIGATION SUPPLY				36.68636	-121.67711	6/10/2015	7/25/2017
AGL020015966-SIP 1	IRRIGATION SUPPLY				36.61962	-121.65389	12/12/2012	3/7/2013
AGL020016122-WELL 2	IRRIGATION SUPPLY				36.63995	-121.64058	6/12/2017	6/12/2017
AGL020016363-WELL	IRRIGATION SUPPLY				36.68832	-121.68126	3/25/2013	6/13/2013
AGL020016624-MSJ QVFI	IRRIGATION SUPPLY				36.70860	-121.69950	12/27/2017	12/27/2017

AGL020016642-#2 CN QVF	IRRIGATION SUPPLY				36.75840	-121.69240	6/29/2017	12/27/2017
AGL020016762-MAIN IRR	IRRIGATION SUPPLY				36.85032	-121.73830	4/23/2015	12/29/2017
AGL020016782-RSSLLBGWL	IRRIGATION SUPPLY				36.74276	-121.68689	12/20/2012	5/17/2013
AGL020016782-RSSLLSMWL	IRRIGATION SUPPLY				36.74276	-121.68689	12/20/2012	12/20/2012
AGL020017225-WELL 3	IRRIGATION SUPPLY				36.70778	-121.73046	12/27/2017	4/13/2018
AGL020017226-WELL 2	IRRIGATION SUPPLY				36.63904	-121.62690	12/27/2017	4/13/2018
AGL020017227-WELL 1	IRRIGATION SUPPLY				36.64866	-121.66965	12/27/2017	4/13/2018
AGL020017228-WELL 1	IRRIGATION SUPPLY				36.64841	-121.67118	12/27/2017	4/13/2018
AGL020017642-RIANDA_PUMP_1	IRRIGATION SUPPLY				36.48107	-121.47047	10/10/2017	10/3/2018
AGL020017663-BALESTRA_I	IRRIGATION SUPPLY				36.69186	-121.70841	7/25/2017	7/25/2017
AGL020017742-AG WELL 3	IRRIGATION SUPPLY				36.58861	-121.55389	7/10/2017	7/10/2017
AGL020019644-SANDHIL1_I	IRRIGATION SUPPLY				36.69284	-121.77155	6/7/2017	6/7/2017
AGL020019983-LOT1-8W2_I	IRRIGATION SUPPLY				36.68872	-121.74495	6/29/2017	6/29/2017
AGL020019984-TAWYNNE1_I	IRRIGATION SUPPLY				36.68712	-121.73519	6/29/2017	6/29/2017
AGL020020063-R28W1ACSIP	IRRIGATION SUPPLY				36.71990	-121.71420	10/14/2013	10/14/2013
AGL020020702-AG_BRYGGMA	IRRIGATION SUPPLY				36.72947	-121.67612	6/5/2017	10/20/2017
AGL020020802-SIMON1_I	IRRIGATION SUPPLY				36.66423	-121.70263	7/25/2017	7/25/2017
AGL020021343-71898	IRRIGATION SUPPLY				36.61431	-121.57790	5/24/2017	5/24/2017
AGL020021343-71899	IRRIGATION SUPPLY				36.61732	-121.58327	5/24/2017	5/24/2017
AGL020021343-71900	IRRIGATION SUPPLY				36.61436	-121.58418	5/24/2017	5/24/2017
AGL020021343-71901	IRRIGATION SUPPLY				36.61678	-121.59341	5/24/2017	5/24/2017
AGL020021382-71903	IRRIGATION SUPPLY				36.62253	-121.60219	5/24/2017	5/24/2017
AGL020021422-AG WELL	IRRIGATION SUPPLY				36.59243	-121.61684	2/20/2018	7/10/2018
AGL020021965-FAJIO	IRRIGATION SUPPLY				36.57011	-121.57087	6/16/2017	6/16/2017
AGL020021971-SIMON1_IRR	IRRIGATION SUPPLY				36.66423	-121.70258	10/31/2017	10/31/2017
AGL020021982-HICKS_AG	IRRIGATION SUPPLY				36.58962	-121.60575	9/25/2017	9/25/2017
AGL020022262-SELVA_PUMP	IRRIGATION SUPPLY				36.48266	-121.48282	10/10/2017	10/3/2018
AGL020022302-WELL	IRRIGATION SUPPLY				36.78888	-121.71768	4/28/2016	7/27/2017
AGL020023022-TARP_W_AG	IRRIGATION SUPPLY				36.59055	-121.61733	6/16/2017	6/16/2017
AGL020023022-TARP_WEST_AG_1	IRRIGATION SUPPLY				36.59055	-121.61731	10/31/2019	10/31/2019
AGL020024042-STRAW_CYN	IRRIGATION SUPPLY				36.83000	-121.70389	6/19/2014	6/19/2014
AGL020026802-AG WELL	IRRIGATION SUPPLY				36.80180	-121.72090	1/24/2018	1/24/2018
AGL020027408-TARPLOT3_I	IRRIGATION SUPPLY				36.64252	-121.64655	10/24/2017	10/24/2017
AGL020027420-R23HOOT P1	IRRIGATION SUPPLY				36.54164	-121.46566	5/20/2016	4/26/2018
AGL020027513-AG_ELKHORN	IRRIGATION SUPPLY				36.81750	-121.72107	3/5/2015	1/17/2018
AGL020027551-AG_MORIMOT	IRRIGATION SUPPLY				36.74204	-121.68398	6/16/2016	8/28/2017
AGL020027805-PEDRAZZ_AG	IRRIGATION SUPPLY				36.58870	-121.60445	6/16/2017	6/16/2017
AGL020027813-SULVIERA_I	IRRIGATION SUPPLY				36.69323	-121.73839	6/29/2017	6/29/2017
AGL020027837-AG WELL	IRRIGATION SUPPLY				36.53174	-121.46044	3/30/2017	11/1/2017
AGL020027895-#4 CE QVF	IRRIGATION SUPPLY				36.77000	-121.69900	6/29/2017	12/27/2017
AGL020027906-R6PUMP1_I	IRRIGATION SUPPLY				36.59244	-121.58901	5/25/2017	5/25/2017
AGL020027938-AG_HOOKER1	IRRIGATION SUPPLY				36.53176	-121.47249	5/23/2017	6/7/2019
AGL020027970-CHULAR W1	IRRIGATION SUPPLY				36.54642	-121.54954	6/14/2017	12/6/2017
AGL020027974-BAILLIE_1	IRRIGATION SUPPLY				36.60143	-121.58755	5/8/2017	9/13/2017

AGL020027974-BAILLIE_2	IRRIGATION SUPPLY				36.60333	-121.58352	5/8/2017	9/8/2017
AGL020027974-BAILLIE_3	IRRIGATION SUPPLY				36.60597	-121.58122	5/8/2017	9/8/2017
AGL020027974-BAILLIE_4	IRRIGATION SUPPLY				36.60645	-121.57882	5/4/2017	9/13/2017
AGL020027975-R16_P1	IRRIGATION SUPPLY				36.60298	-121.58367	5/5/2016	5/1/2018
AGL020028005-BUENVIS1_I	IRRIGATION SUPPLY				36.59267	-121.61210	7/25/2017	7/25/2017
AGL020028005-BUENVIS2_I	IRRIGATION SUPPLY				36.59376	-121.61485	7/25/2017	7/25/2017
AGL020028005-BUENVIS3_I	IRRIGATION SUPPLY				36.59167	-121.60953	7/25/2017	7/25/2017
AGL020028095-HOME IRR	IRRIGATION SUPPLY				36.64206	-121.66729	12/12/2017	12/12/2017
AGL020028097-MACHADO IRR	IRRIGATION SUPPLY				36.66434	-121.68110	12/12/2017	12/12/2017
AGL020028103-TERAJI IRR	IRRIGATION SUPPLY				36.65049	-121.65755	12/12/2017	12/12/2017
AGL020028122-AG_PEDRAZ1	IRRIGATION SUPPLY				36.58635	-121.59843	9/29/2016	4/12/2019
AGL020028122-AG_PEDRAZ2	IRRIGATION SUPPLY				36.58623	-121.58996	8/15/2016	4/12/2019
AGL020028122-AG_PEDRAZ3	IRRIGATION SUPPLY				36.58340	-121.59168	8/11/2016	10/10/2019
AGL020028138-TARP_EAST	IRRIGATION SUPPLY				36.59054	-121.60734	6/16/2017	6/16/2017
AGL020028194-MFBAILL1_I	IRRIGATION SUPPLY				36.72483	-121.76015	5/1/2019	5/1/2019
AGL020028215-R31_LEO_W1	IRRIGATION SUPPLY				36.59767	-121.62651	4/7/2017	4/7/2017
AGL020028216-R32_PED_W1	IRRIGATION SUPPLY				36.58808	-121.60393	4/7/2017	4/7/2017
AGL020028217-R33_TARPW1	IRRIGATION SUPPLY				36.59064	-121.60760	4/7/2017	4/7/2017
AGL020028315-#2BAILIE IRR	IRRIGATION SUPPLY				36.60325	-121.58360	12/12/2017	12/12/2017
AGL020028399-NORTH WELL	IRRIGATION SUPPLY				36.49759	-121.50224	5/25/2017	10/9/2017
AGL020028432-AG WELL	IRRIGATION SUPPLY				36.59998	-121.60394	2/20/2018	7/10/2018
AGL020028446-NAKAGA_DOM	IRRIGATION SUPPLY				36.80154	-121.72120	12/21/2017	5/7/2018
AGL020030108-FLEW_W1	IRRIGATION SUPPLY				36.59995	-121.60345	12/5/2017	5/1/2018
AGL020030231-CHUALAR_1	IRRIGATION SUPPLY				36.55580	-121.51590	6/7/2019	6/7/2019
AGL020030333-IRR WELL	IRRIGATION SUPPLY				36.48923	-121.48198	4/26/2018	4/26/2018
AGL020032745-HICKS_AG	IRRIGATION SUPPLY				36.58963	-121.60579	10/31/2019	10/31/2019
AGL020035698-HEESS IRR	IRRIGATION SUPPLY				36.52623	-121.53288	4/4/2019	4/4/2019
AGL020035701-BUENVIS2_I	IRRIGATION SUPPLY				36.60337	-121.58365	5/1/2019	5/1/2019
AGL020035760-SALMINA1_I	IRRIGATION SUPPLY				36.69502	-121.69310	7/16/2019	7/16/2019
AGL020036211-ROMIE_1	IRRIGATION SUPPLY				36.56320	-121.52040	6/7/2019	6/7/2019
AGL020036835-STEINBECK_IW	IRRIGATION SUPPLY				36.59853	-121.57471	5/21/2020	5/21/2020

Chapter 7
Appendix 7-E

Central Coast Ag Order 3.0 and Ag Order 4.0
Monitoring and Reporting Program

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

**MONITORING AND REPORTING PROGRAM
ORDER NO. R3-2017-0002-01**

TIER 1

**DISCHARGERS ENROLLED UNDER
CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR
DISCHARGES FROM IRRIGATED LANDS**

This Monitoring and Reporting Program Order No. R3-2017-0002-01 (MRP) is issued pursuant to California Water Code (Water Code) sections 13267 and 13269, which authorize the California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board) to require preparation and submittal of technical and monitoring reports. Water Code section 13269 requires a waiver of waste discharge requirements to include as a condition the performance of monitoring and the public availability of monitoring results. *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands*, Order No. R3-2017-0002 (Order) includes criteria and requirements for three tiers. This MRP sets forth monitoring and reporting requirements for **Tier 1 Dischargers** enrolled under the Order. A summary of the requirements is shown below.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS FOR TIER 1:

- Part 1: Surface Receiving Water Monitoring and Reporting (*cooperative or individual*)
Part 2: Groundwater Monitoring and Reporting (*cooperative or individual*)

Pursuant to Water Code section 13269(a)(2), monitoring requirements must be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. The monitoring and reports required by this MRP are to evaluate effects of discharges of waste from irrigated agricultural operations and individual farms/ranches on waters of the state and to determine compliance with the Order.

MONITORING AND REPORTING BASED ON TIERS

The Order and MRP include criteria and requirements for three tiers, based upon those characteristics of individual farms/ranches at the operation that present the highest level of waste discharge or greatest risk to water quality. Dischargers must meet conditions of the Order and MRP for the appropriate tier that applies to their land and/or the individual farm/ranch. Within a tier, Dischargers comply with requirements based on the

specific level of discharge and threat to water quality from individual farms/ranches. The lowest tier, Tier 1, applies to dischargers who discharge the lowest level of waste (amount or concentration) or pose the lowest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. The highest tier, Tier 3, applies to dischargers who discharge the highest level of waste or pose the greatest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. Tier 2 applies to dischargers whose discharge has a moderate threat to water quality. Water quality is defined in terms of regional, state, or federal numeric or narrative water quality standards. Per the Order, Dischargers may submit a request to the Executive Officer to approve transfer to a lower tier. If the Executive Officer approves a transfer to a lower tier, any interested person may request that the Central Coast Water Board conduct a review of the Executive Officer's determination.

PART 1. SURFACE RECEIVING WATER MONITORING AND REPORTING REQUIREMENTS

The surface receiving water monitoring and reporting requirements described herein are generally a continuation of the surface receiving water monitoring and reporting requirements of Monitoring and Reporting Program Order No. 2012-0011-01, as revised August 22, 2016, with the intent of uninterrupted regular monitoring and reporting during the transition from Order No. R3-2012-0011-01 to Order No. R3-2017-0002-01.

Monitoring and reporting requirements for surface receiving water identified in Part 1.A. and Part 1.B. apply to Tier 1 Dischargers. Surface receiving water refers to water flowing in creeks and other surface waters of the State. Surface receiving water monitoring may be conducted through a cooperative monitoring program on behalf of Dischargers, or Dischargers may choose to conduct surface receiving water monitoring and reporting individually. Key monitoring and reporting requirements for surface receiving water are shown in Tables 1 and 2.

A. Surface Receiving Water Quality Monitoring

1. Dischargers must elect a surface receiving water monitoring option (cooperative monitoring program or individual receiving water monitoring) to comply with surface receiving water quality monitoring requirements, and identify the option selected on the Notice of Intent (NOI).
2. Dischargers are encouraged to choose participation in a cooperative monitoring program (e.g., the existing Cooperative Monitoring Program or a similar program) to comply with receiving water quality monitoring requirements. Dischargers not participating in a cooperative monitoring program must conduct surface receiving water quality monitoring individually that achieves the same purpose.

3. Dischargers (individually or as part of a cooperative monitoring program) must conduct surface receiving water quality monitoring to a) assess the impacts of their waste discharges from irrigated lands to receiving water, b) assess the status of receiving water quality and beneficial use protection in impaired waterbodies dominated by irrigated agricultural activity, c) evaluate status, short term patterns and long term trends (five to ten years or more) in receiving water quality, d) evaluate water quality impacts resulting from agricultural discharges (including but not limited to tile drain discharges), e) evaluate stormwater quality, f) evaluate condition of existing perennial, intermittent, or ephemeral streams or riparian or wetland area habitat, including degradation resulting from erosion or agricultural discharges of waste, and g) assist in the identification of specific sources of water quality problems.

Surface Receiving Water Quality Sampling and Analysis Plan

4. **By March 1, 2018, or as directed by the Executive Officer**, Dischargers (individually or as part of a cooperative monitoring program) must submit a surface receiving water quality Sampling and Analysis Plan (SAAP) and Quality Assurance Project Plan (QAPP); this requirement is satisfied if an approved SAAP and QAPP addressing all surface receiving water quality monitoring requirements described in this Order has been submitted pursuant to Order No. R3-2012-0011 and associated Monitoring and Reporting Programs. Dischargers (or a third party cooperative monitoring program) must develop the Sampling and Analysis Plan to describe how the proposed monitoring will achieve the objectives of the MRP and evaluate compliance with the Order. The Sampling and Analysis Plan may propose alternative monitoring site locations, adjusted monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water. The Executive Officer must approve the Sampling and Analysis Plan and QAPP.
5. The Sampling and Analysis Plan must include the following minimum required components:
 - a. Monitoring strategy to achieve objectives of the Order and MRP;
 - b. Map of monitoring sites with GIS coordinates;
 - c. Identification of known water quality impairments and impaired waterbodies per the 2010 Clean Water Act 303(d) List of Impaired Waterbodies (List of Impaired Waterbodies);
 - d. Identification of beneficial uses and applicable water quality standards;
 - e. Identification of applicable Total Maximum Daily Loads;
 - f. Monitoring parameters;
 - g. Monitoring schedule, including description and frequencies of monitoring events;

h. Description of data analysis methods;

6. The QAPP must include receiving water and site-specific information, project organization and responsibilities, and quality assurance components of the MRP. The QAPP must also include the laboratory and field requirements to be used for analyses and data evaluation. The QAPP must contain adequate detail for project and Water Board staff to identify and assess the technical and quality objectives, measurement and data acquisition methods, and limitations of the data generated under the surface receiving water quality monitoring. All sampling and laboratory methodologies and QAPP content must be consistent with U.S. EPA methods, State Water Board's Surface Water Ambient Monitoring Program (SWAMP) protocols and the Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP). Following U.S. EPA guidelines¹ and SWAMP templates², the receiving water quality monitoring QAPP must include the following minimum required components:
 - a. Project Management. This component addresses basic project management, including the project history and objectives, roles and responsibilities of the participants, and other aspects.
 - b. Data Generation and Acquisition. This component addresses all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities are employed and are properly documented. Quality control requirements are applicable to all the constituents sampled as part of the MRP, as described in the appropriate method.
 - c. Assessment and Oversight. This component addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of the assessment is to provide project oversight that will ensure that the QA Project Plan is implemented as prescribed.
 - d. Data Validation and Usability. This component addresses the quality assurance activities that occur after the data collection, laboratory analysis and data generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the MRP objectives.

¹ USEPA. 2001 (2006) USEPA Requirements for Quality Assurance Project Plans (QA/R-5) Office of Environmental Information, Washington, D.C. USEPA QA/R-5

² http://waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa

7. The Central Coast Water Board may conduct an audit of contracted laboratories at any time in order to evaluate compliance with the QAPP.
8. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may also revise the Sampling and Analysis Plan, including adding, removing, or changing monitoring site locations, changing monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water.

Surface Receiving Water Quality Monitoring Sites

9. The Sampling and Analysis Plan must, at a minimum, include monitoring sites to evaluate waterbodies identified in Table 1, unless otherwise approved by the Executive Officer. The Sampling and Analysis Plan must include sites to evaluate receiving water quality impacts most directly resulting from areas of agricultural discharge (including areas receiving tile drain discharges). Site selection must take into consideration the existence of any long term monitoring sites included in related monitoring programs (e.g. CCAMP and the existing CMP). Sites may be added or modified, subject to prior approval by the Executive Officer, to better assess the pollutant loading from individual sources or the impacts to receiving waters caused by individual discharges. Any modifications must consider sampling consistency for purposes of trend evaluation.

Surface Receiving Water Quality Monitoring Parameters

10. The Sampling and Analysis Plan must, at a minimum, include the following types of monitoring and evaluation parameters listed below and identified in Table 2:
 - a. Flow Monitoring;
 - b. Water Quality (physical parameters, metals, nutrients, pesticides);
 - c. Toxicity (water and sediment);
 - d. Assessment of Benthic Invertebrates.
11. All analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health (CDPH) or at laboratories approved by the Executive Officer. Unless otherwise noted, all sampling, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, U.S. EPA, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link: <http://www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls>

12. Water quality and flow monitoring is used to assess the sources, concentrations, and loads of waste discharges from individual farms/ranches and groups of Dischargers to surface waters, to evaluate impacts to water quality and beneficial uses, and to evaluate the short term patterns and long term trends in receiving water quality. Monitoring data must be compared to existing numeric and narrative water quality objectives.
13. Toxicity testing is to evaluate water quality relative to the narrative toxicity objective. Water column toxicity analyses must be conducted on 100% (undiluted) sample. At sites where persistent unresolved toxicity is found, the Executive Officer may require concurrent toxicity and chemical analyses and a Toxicity Identification Evaluation (TIE) to identify the individual discharges causing the toxicity.

Surface Receiving Water Quality Monitoring Frequency and Schedule

14. The Sampling and Analysis Plan must include a schedule for sampling. Timing, duration, and frequency of monitoring must be based on the land use, complexity, hydrology, and size of the waterbody. Table 2 includes minimum monitoring frequency and parameter lists. Agricultural parameters that are less common may be monitored less frequently. Modifications to the receiving water quality monitoring parameters, frequency, and schedule may be submitted for Executive Officer consideration and approval. At a minimum, the Sampling and Analysis Plan schedule must consist of monthly monitoring of common agricultural parameters in major agricultural areas, including two major storm events during the wet season (October 1 – April 30).
15. Storm event monitoring must be conducted within 18 hours of storm events, preferably including the first flush run-off event that results in significant increase in stream flow. For purposes of this MRP, a storm event is defined as precipitation producing onsite runoff (surface water flow) capable of creating significant ponding, erosion or other water quality problem. A significant storm event will generally result in greater than 1-inch of rain within a 24-hour period.
16. Dischargers (individually or as part of a cooperative monitoring program) must perform receiving water quality monitoring per the Sampling and Analysis Plan and QAPP approved by the Executive Officer.

B. Surface Receiving Water Quality Reporting

Surface Receiving Water Quality Data Submittal

1. Dischargers (individually or as part of a cooperative monitoring program) must submit water quality monitoring data to the Central Coast Water Board electronically, in a format specified by the Executive Officer and compatible with SWAMP/CCAMP electronic submittal guidelines, each January 1, April 1, July 1, and October 1.

Surface Receiving Water Quality Monitoring Annual Report

2. **By July 1, 2017**, and every July 1 annually thereafter, Dischargers (individually or as part of a cooperative monitoring program) must submit an Annual Report, electronically, in a format specified by the Executive Officer including the following minimum elements:
 - a. Signed Transmittal Letter;
 - b. Title Page;
 - c. Table of Contents;
 - d. Executive Summary;
 - e. Summary of Exceedance Reports submitted during the reporting period;
 - f. Monitoring objectives and design;
 - g. Monitoring site descriptions and rainfall records for the time period covered;
 - h. Location of monitoring sites and map(s);
 - i. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
 - j. Summary of water quality data for any sites monitored as part of related monitoring programs, and used to evaluate receiving water as described in the Sampling and Analysis Plan.
 - k. Discussion of data to clearly illustrate compliance with the Order and water quality standards;
 - l. Discussion of short term patterns and long term trends in receiving water quality and beneficial use protection;
 - m. Evaluation of pesticide and toxicity analyses results, and recommendation of candidate sites for Toxicity Identification Evaluations (TIEs);
 - n. Identification of the location of any agricultural discharges observed discharging directly to surface receiving water;
 - o. Laboratory data submitted electronically in a SWAMP/CCAMP comparable format;
 - p. Sampling and analytical methods used;
 - q. Copy of chain-of-custody forms;
 - r. Field data sheets, signed laboratory reports, laboratory raw data;
 - s. Associated laboratory and field quality control samples results;
 - t. Summary of Quality Assurance Evaluation results;

- u. Specify the method used to obtain flow at each monitoring site during each monitoring event;
- v. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site ID and date;
- w. Conclusions.

PART 2. GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

Groundwater monitoring may be conducted through a cooperative monitoring and reporting program on behalf of growers, or Dischargers may choose to conduct groundwater monitoring and reporting individually. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in this Order, unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Key monitoring and reporting requirements for groundwater are shown in Table 3.

A. Groundwater Monitoring

1. Dischargers must sample private domestic wells and the primary irrigation well on their farm/ranch to evaluate groundwater conditions in agricultural areas, identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards, and identify priority areas for follow up actions.
2. Dischargers must sample at least one groundwater well for each farm/ranch on their operation, including groundwater wells that are located within the property boundary of the enrolled county assessor parcel numbers (APNs). For farms/ranches with multiple groundwater wells, Dischargers must sample all domestic wells and the primary irrigation well. For the purposes of this MRP, a "domestic well" is any well that is used or may be used for domestic use purposes, including any groundwater well that is connected to a residence, workshop, or place of business that may be used for human consumption, cooking, or sanitary purposes. Groundwater monitoring parameters must include well screen interval depths (if available), general chemical parameters, and general cations and anions listed in Table 3.
3. Dischargers must conduct two rounds of monitoring of required groundwater wells during calendar year 2017; one sample collected during spring (**March - June**) and one sample collected during fall (**September - December**).
4. Groundwater samples must be collected by a qualified third party (e.g., consultant, technician, person conducting cooperative monitoring) using proper sampling methods, chain-of-custody, and quality assurance/quality

control protocols. Groundwater samples must be collected at or near the well head before the pressure tank and prior to any well head treatment. In cases where this is not possible, the water sample must be collected from a sampling point as close to the pressure tank as possible, or from a cold-water spigot located before any filters or water treatment systems.

5. Laboratory analyses for groundwater samples must be conducted by a State certified laboratory according to U.S. EPA approved methods; unless otherwise noted, all monitoring, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, United States Environmental Protection Agency, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link below: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/resources4growers/2016_04_11_labs.pdf
6. If a discharger determines that water in any domestic well exceeds 10 mg/L of nitrate as N, the discharger or third party must provide notice to the Central Coast Water Board within 24 hours of learning of the exceedance. For domestic wells on a Discharger's farm/ranch that exceed 10 mg/L nitrate as N, the Discharger must provide written notification to the users within 10 days of learning of the exceedance and provide written confirmation of the notification to the Central Coast Water Board.

The drinking water notification must include the statement that the water poses a human health risk due to elevated nitrate concentration, and include a warning against the use of the water for drinking or cooking. In addition, Dischargers must also provide prompt written notification to any new well users (e.g. tenants and employees with access to the affected well), whenever there is a change in occupancy.

For all other domestic wells not on a Discharger's farm/ranch but that may be impacted by nitrate, the Central Coast Water Board will notify the users promptly.

The drinking water notification and confirmation letters required by this Order are available to the public.

B. Groundwater Reporting

1. **Within 60 days of sample collection**, Dischargers must coordinate with the laboratory to submit the following groundwater monitoring results and information, electronically, using the Water Board's GeoTracker electronic deliverable format (EDF):
 - a. GeoTracker Ranch Global Identification Number

- b. Field point name (Well Name)
 - c. Field Point Class (Well Type)
 - d. Latitude
 - e. Longitude
 - f. Sample collection date
 - g. Analytical results
 - h. Well construction information (e.g., total depth, screened intervals, depth to water), as available
2. Dischargers must submit groundwater well information required in the electronic Notice of Intent (eNOI) for each farm/ranch and update the eNOI to reflect changes in the farm/ranch information within 30 days of the change. Groundwater well information reported on the eNOI includes, but is not limited to:
 - a. Number of groundwater wells present at each farm/ranch
 - b. Identification of any groundwater wells abandoned or destroyed (including method destroyed) in compliance with the Order
 - c. Use for fertigation or chemigation
 - d. Presence of back flow prevention devices
 - e. Number of groundwater wells used for agricultural purposes
 - f. Number of groundwater wells used for or may be used for domestic use purposes (domestic wells).

PART 3. GENERAL MONITORING AND REPORTING REQUIREMENTS

A. Submittal of Technical Reports

1. Dischargers must submit reports in a format specified by the Executive Officer. A transmittal letter must accompany each report, containing the following penalty of perjury statement signed by the Discharger or the Discharger's authorized agent:

"In compliance with Water Code § 13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision following a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".

2. If the Discharger asserts that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure (e.g. trade secrets or secret processes), the Discharger must provide an explanation of how those portions of the reports are exempt from public disclosure. The

Discharger must clearly indicate on the cover of the report (typically an electronic submittal) that the Discharger asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, submit separately (in a separate electronic file) unredacted pages (to be maintained separately by staff). The Central Coast Water Board staff will determine whether any such report or portion of a report qualifies for an exemption from public disclosure. If the Central Coast Water Board staff disagrees with the asserted exemption from public disclosure, the Central Coast Water Board staff will notify the Discharger prior to making such report or portions of such report available for public inspection.

B. Central Coast Water Board Authority

1. Monitoring reports are required pursuant to section 13267 of the California Water Code. Pursuant to section 13268 of the Water Code, a violation of a request made pursuant to section 13267 may subject you to civil liability of up to \$1000 per day.
2. The Water Board needs the required information to determine compliance with Order No.R3-2017-0002. The evidence supporting these requirements is included in the findings of Order No.R3-2017-0002.

John M. Robertson
Executive Officer

March 8, 2017

Date

Table 1. Major Waterbodies in Agricultural Areas¹

Hydrologic SubArea	Waterbody Name	Hydrologic SubArea	Waterbody Name
30510	Pajaro River	30920	Quail Creek
30510	Salsipuedes Creek	30920	Salinas Reclamation Canal
30510	Watsonville Slough	31022	Chorro Creek
30510	Watsonville Creek ²	31023	Los Osos Creek
30510	Beach Road Ditch ²	31023	Warden Creek
30530	Carnadero Creek	31024	San Luis Obispo Creek
30530	Furlong Creek ²	31024	Prefumo Creek
30530	Llagas Creek	31031	Arroyo Grande Creek
30530	Miller's Canal	31031	Los Berros Creek
30530	San Juan Creek	31210	Bradley Canyon Creek
30530	Tesquisquita Slough	31210	Bradley Channel
30600	Moro Cojo Slough	31210	Green Valley Creek
30910	Alisal Slough	31210	Main Street Canal
30910	Blanco Drain	31210	Orcutt Solomon Creek
30910	Old Salinas River	31210	Oso Flaco Creek
30910	Salinas River (below Gonzales Rd.)	31210	Little Oso Flaco Creek
30920	Salinas River (above Gonzales Rd. and below Nacimiento R.)	31210	Santa Maria River
30910	Santa Rita Creek ²	31310	San Antonio Creek ²
30910	Tembladero Slough	31410	Santa Ynez River
30920	Alisal Creek	31531	Bell Creek
30920	Chualar Creek	31531	Glenn Annie Creek
30920	Espinosa Slough	31531	Los Carneros Creek ²
30920	Gabilan Creek	31534	Arroyo Paredon Creek
30920	Natividad Creek	31534	Franklin Creek

¹ At a minimum, monitoring sites must be included for these waterbodies in agricultural areas, unless otherwise approved by the Executive Officer. Monitoring sites may be proposed for addition or modification to better assess the impacts of waste discharges from irrigated lands to surface water. Dischargers choosing to comply with surface receiving water quality monitoring, individually (not part of a cooperative monitoring program) must only monitor sites for waterbodies receiving the discharge.

² These creeks are included because they are newly listed waterbodies on the 2010 303(d) list of Impaired Waters that are associated with areas of agricultural discharge.

Table 2. Surface Receiving Water Quality Monitoring Parameters

Parameters and Tests	RL ³	Monitoring Frequency ¹
Photo Monitoring		
Upstream and downstream photographs at monitoring location		With every monitoring event
<u>WATER COLUMN SAMPLING</u>		
Physical Parameters and General Chemistry		
Flow (field measure) (CFS) following SWAMP field SOP ⁹	.25	Monthly, including 2 stormwater events
pH (field measure)	0.1	"
Electrical Conductivity (field measure) (µS/cm)	2.5	"
Dissolved Oxygen (field measure) (mg/L)	0.1	"
Temperature (field measure) (°C)	0.1	"
Turbidity (NTU)	0.5	"
Total Dissolved Solids (mg/L)	10	"
Total Suspended Solids (mg/L)	0.5	"
Nutrients		
Total Nitrogen (mg/L)	0.5	Monthly, including 2 stormwater events
Nitrate + Nitrite (as N) (mg/L)	0.1	"
Total Ammonia (mg/L)	0.1	"
Unionized Ammonia (calculated value, mg/L)		"
Total Phosphorus (as P) (mg/L)	0.02	
Soluble Orthophosphate (mg/L)	0.01	"
Water column chlorophyll a (µg/L)	1.0	"
Algae cover, Floating Mats, % coverage	-	"
Algae cover, Attached, % coverage	-	"
Water Column Toxicity Test		
Algae - <i>Selenastrum capricornutum</i> (96-hour chronic; Method 1003.0 in EPA/821/R-02/013)	-	4 times each year, twice in dry season, twice in wet season
Water Flea – <i>Ceriodaphnia dubia</i> (7-day chronic; Method 1002.0 in EPA/821/R-02/013)	-	"
Midge - <i>Chironomus spp.</i> (96-hour acute; Alternate test species in EPA 821-R-02-012)	-	"

Parameters and Tests	RL ³	Monitoring Frequency ¹
Toxicity Identification Evaluation (TIE)	-	As directed by Executive Officer
Pesticides² /Herbicides (µg/L)		
Organophosphate Pesticides		
Azinphos-methyl	0.02	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Chlorpyrifos	0.005	"
Diazinon	0.005	"
Dichlorvos	0.01	"
Dimethoate	0.01	"
Dimeton-s	0.005	"
Disulfoton (Disyton)	0.005	"
Malathion	0.005	"
Methamidophos	0.02	"
Methidathion	0.02	"
Parathion-methyl	0.02	"
Phorate	0.01	"
Phosmet	0.02	"
Neonicotinoids		
Thiamethoxam	.002	"
Imidacloprid	.002	"
Thiacloprid	.002	"
Dinotefuran	.006	"
Acetamiprid	.01	"
Clothianidin	.02	"
Herbicides		
Atrazine	0.05	"
Cyanazine	0.20	"
Diuron	0.05	"
Glyphosate	2.0	"
Linuron	0.1	"
Paraquat	0.20	"
Simazine	0.05	"
Trifluralin	0.05	"
Metals (µg/L)		
Arsenic (total) ^{5,7}	0.3	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Boron (total) ^{6,7}	10	"
Cadmium (total & dissolved) ^{4,5,7}	0.01	"

Parameters and Tests	RL ³	Monitoring Frequency ¹
Copper (total and dissolved) ^{4,7}	0.01	"
Lead (total and dissolved) ^{4,7}	0.01	"
Nickel (total and dissolved) ^{4,7}	0.02	"
Molybdenum (total) ⁷	1	"
Selenium (total) ⁷	0.30	"
Zinc (total and dissolved) ^{4,5,7}	0.10	"
Other (µg/L)		
Total Phenolic Compounds ⁸	5	2 times in 2017, once in spring (April-May) and once in fall (August-September)
Hardness (mg/L as CaCO ₃)	1	"
Total Organic Carbon (ug/L)	0.6	"
<u>SEDIMENT SAMPLING</u>		
Sediment Toxicity - <i>Hyalella azteca</i> 10-day static renewal (EPA, 2000)		2 times each year, once in spring (April-May) and once in fall (August-September)
Pyrethroid Pesticides in Sediment (µg/kg)		
Gamma-cyhalothrin	2	2 times in both 2017 and 2018, once in spring (April-May) and once in fall (August-September) of each year, concurrent with sediment toxicity sampling
Lambda-cyhalothrin	2	"
Bifenthrin	2	"
Beta-cyfluthrin	2	"
Cyfluthrin	2	"
Esfenvalerate	2	"
Permethrin	2	"
Cypermethrin	2	"
Danitol	2	"
Fenvalerate	2	"
Fluvalinate	2	"
Other Monitoring in Sediment		
Chlorpyrifos (µg/kg)	2	"
Total Organic Carbon	0.01%	"
		"
Sediment Grain Size Analysis	1%	"

¹Monitoring frequency may be used as a guide for developing alternative Sampling and Analysis Plans implemented by individual growers.

²Pesticide list may be modified based on specific pesticide use in Central Coast Region. Analytes on this list must be reported, at a minimum.

³Reporting Limit, taken from SWAMP where applicable.

⁴Holmgren, Meyer, Cheney and Daniels. 1993. Cadmium, Lead, Zinc, Copper and Nickel in Agricultural Soils of the United States. J. of Environ. Quality 22:335-348.

⁵Sax and Lewis, ed. 1987. Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. Zinc arsenate is an insecticide.

⁶<http://www.coastalagro.com/products/labels/9%25BORON.pdf>; Boron is applied directly or as a component of fertilizers as a plant nutrient.

⁷Madramootoo, Johnston, Willardson, eds. 1997. Management of Agricultural Drainage Water Quality. International Commission on Irrigation and Drainage. U.N. FAO. SBN 92-6-104058.3.

⁸<http://cat.inist.fr/?aModele=afficheN&cpsid=14074525>; Phenols are breakdown products of herbicides and pesticides. Phenols can be directly toxic and cause endocrine disruption.

⁹See SWAMP field measures SOP, p. 17

mg/L – milligrams per liter; ug/L – micrograms per liter; ug/kg – micrograms per kilogram;

NTU – Nephelometric Turbidity Units; CFS – cubic feet per second.

Table 3. Groundwater Sampling Parameters

Parameter	RL	Analytical Method ³	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10		
Total Alkalinity as CaCO ₃		EPA Method 310.1 or 310.2	mg/L
Calcium	0.05	General Cations ¹ EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO ₄)	1.0		
Chloride	0.1	General Anions EPA Method 300 or EPA Method 353.2	
Nitrate + Nitrite (as N) ² or Nitrate as N	0.1		

¹General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater monitoring and laboratory analysis.

²The MRP allows analysis of “nitrate plus nitrite” to represent nitrate concentrations (as N). The “nitrate plus nitrite” analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate.

³Dischargers may use alternative analytical methods approved by EPA.

RL – Reporting Limit; µS/cm – micro siemens per centimeter

Table 4. Tier 1 - Time Schedule for Key Monitoring and Reporting Requirements (MRPs)

REQUIREMENT	TIME SCHEDULE ¹
Submit Sampling And Analysis Plan and Quality Assurance Project Plan (SAAP/QAPP) for Surface Receiving Water Quality Monitoring (<i>individually or through cooperative monitoring program</i>)	By March 1, 2018, or as directed by the Executive Officer; satisfied if an approved SAAP/QAPP has been submitted pursuant to Order No. R3-2012-0011 and associated MRPs
Initiate surface receiving water quality monitoring (<i>individually or through cooperative monitoring program</i>)	Per an approved SAAP and QAPP
Submit surface receiving water quality monitoring data (<i>individually or through cooperative monitoring program</i>)	Each January 1, April 1, July 1, and October 1

Submit surface receiving water quality Annual Monitoring Report (<i>individually or through cooperative monitoring program</i>)	By July 1 2017; annually thereafter by July 1
Initiate monitoring of groundwater wells	First sample from March-June 2017, second sample from September-December 2017
Submit groundwater monitoring results	Within 60 days of the sample collection

¹ Dates are relative to adoption of this Order, unless otherwise specified.

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

**MONITORING AND REPORTING PROGRAM
ORDER NO. R3-2017-0002-02**

TIER 2

**DISCHARGERS ENROLLED UNDER
THE CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR
DISCHARGES FROM IRRIGATED LANDS**

This Monitoring and Reporting Program Order No. R3-2017-0002-02 (MRP) is issued pursuant to California Water Code (Water Code) sections 13267 and 13269, which authorize the California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board) to require preparation and submittal of technical and monitoring reports. Water Code section 13269 requires a waiver of waste discharge requirements to include as a condition the performance of monitoring and the public availability of monitoring results. *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands*, Order No. R3-2017-0002 (Order) includes criteria and requirements for three tiers. This MRP sets forth monitoring and reporting requirements for **Tier 2 Dischargers** enrolled under the Order. A summary of the requirements is shown below.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS FOR TIER 2:

- | | |
|---------|--|
| Part 1: | Surface Receiving Water Monitoring and Reporting (<i>cooperative or individual</i>) |
| Part 2: | Groundwater Monitoring and Reporting (<i>cooperative or individual</i>)
Total Nitrogen Applied Reporting (<i>required for subset of Tier 2 Dischargers if farm/ranch growing any crop with high nitrate loading risk to groundwater</i>); |
| Part 3: | Annual Compliance Form |

Pursuant to Water Code section 13269(a)(2), monitoring requirements must be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. The monitoring and reports required by this MRP are to evaluate effects of discharges of waste from irrigated agricultural operations and individual farms/ranches on waters of the state and to determine compliance with the Order.

MONITORING AND REPORTING BASED ON TIERS

The Order and MRP include criteria and requirements for three tiers, based upon those characteristics of the individual farms/ranches at the operation that present the highest level of waste discharge or greatest risk to water quality. Dischargers must meet conditions of the Order and MRP for the appropriate tier that applies to their land and/or the individual farm/ranch. Within a tier, Dischargers comply with requirements based on the specific level of discharge and threat to water quality from individual farms/ranches. The lowest tier, Tier 1, applies to dischargers who discharge the lowest level of waste (amount or concentration) or pose the lowest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. The highest tier, Tier 3, applies to dischargers who discharge the highest level of waste or pose the greatest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. Tier 2 applies to dischargers whose discharge has a moderate threat to water quality. Water quality is defined in terms of regional, state, or federal numeric or narrative water quality standards. Per the Order, Dischargers may submit a request to the Executive Officer to approve transfer to a lower tier. If the Executive Officer approves a transfer to a lower tier, any interested person may request that the Central Coast Water Board conduct a review of the Executive Officer's determination.

PART 1. SURFACE RECEIVING WATER MONITORING AND REPORTING REQUIREMENTS

The surface receiving water monitoring and reporting requirements described herein are generally a continuation of the surface receiving water monitoring and reporting requirements of Monitoring and Reporting Program Order No. 2012-0011-02, as revised August 22, 2016, with the intent of uninterrupted regular monitoring and reporting during the transition from Order No. R3-2012-0011-02 to Order No. R3-2017-0002-02.

Monitoring and reporting requirements for surface receiving water identified in Part 1.A. and Part 1.B. apply to Tier 2 Dischargers. Surface receiving water refers to water flowing in creeks and other surface waters of the State. Surface receiving water monitoring may be conducted through a cooperative monitoring program on behalf of Dischargers, or Dischargers may choose to conduct surface receiving water monitoring and reporting individually. Key monitoring and reporting requirements for surface receiving water are shown in Tables 1 and 2. Time schedules are shown in Table 4.

A. Surface Receiving Water Quality Monitoring

1. Dischargers must elect a surface receiving water monitoring option (cooperative monitoring program or individual receiving water monitoring) to comply with surface receiving water quality monitoring requirements, and identify the option selected on the Notice of Intent (NOI).

2. Dischargers are encouraged to choose participation in a cooperative monitoring program (e.g., the existing Cooperative Monitoring Program or a similar program) to comply with receiving water quality monitoring requirements. Dischargers not participating in a cooperative monitoring program must conduct surface receiving water quality monitoring individually that achieves the same purpose.
3. Dischargers (individually or as part of a cooperative monitoring program) must conduct surface receiving water quality monitoring to a) assess the impacts of their waste discharges from irrigated lands to receiving water, b) assess the status of receiving water quality and beneficial use protection in impaired waterbodies dominated by irrigated agricultural activity, c) evaluate status, short term patterns and long term trends (five to ten years or more) in receiving water quality, d) evaluate water quality impacts resulting from agricultural discharges (including but not limited to tile drain discharges), e) evaluate stormwater quality, f) evaluate condition of existing perennial, intermittent, or ephemeral streams or riparian or wetland area habitat, including degradation resulting from erosion or agricultural discharges of waste, and g) assist in the identification of specific sources of water quality problems.

Surface Receiving Water Quality Sampling and Analysis Plan

4. **By March 1, 2018, or as directed by the Executive Officer**, Dischargers (individually or as part of a cooperative monitoring program) must submit a surface receiving water quality Sampling and Analysis Plan (SAAP) and Quality Assurance Project Plan (QAPP); this requirement is satisfied if an approved SAAP and QAPP addressing all surface receiving water quality monitoring requirements described in this Order has been submitted pursuant to Order No.R3-2012-0011 and associated Monitoring and Reporting Programs. Dischargers (or a third party cooperative monitoring program) must develop the Sampling and Analysis Plan to describe how the proposed monitoring will achieve the objectives of the MRP and evaluate compliance with the Order. The Sampling and Analysis Plan may propose alternative monitoring site locations, adjusted monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water. The Executive Officer must approve the Sampling and Analysis Plan and QAPP.
5. The Sampling and Analysis Plan must include the following minimum required components:
 - a. Monitoring strategy to achieve objectives of the Order and MRP;
 - b. Map of monitoring sites with GIS coordinates;

- c. Identification of known water quality impairments and impaired waterbodies per the 2010 Clean Water Act 303(d) List of Impaired Waterbodies (List of Impaired Waterbodies);
 - d. Identification of beneficial uses and applicable water quality standards;
 - e. Identification of applicable Total Maximum Daily Loads;
 - f. Monitoring parameters;
 - g. Monitoring schedule, including description and frequencies of monitoring events;
 - h. Description of data analysis methods;
6. The QAPP must include receiving water and site-specific information, project organization and responsibilities, and quality assurance components of the MRP. The QAPP must also include the laboratory and field requirements to be used for analyses and data evaluation. The QAPP must contain adequate detail for project and Water Board staff to identify and assess the technical and quality objectives, measurement and data acquisition methods, and limitations of the data generated under the surface receiving water quality monitoring. All sampling and laboratory methodologies and QAPP content must be consistent with U.S. EPA methods, State Water Board's Surface Water Ambient Monitoring Program (SWAMP) protocols and the Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP). Following U.S. EPA guidelines¹ and SWAMP templates², the receiving water quality monitoring QAPP must include the following minimum required components:
- a. Project Management. This component addresses basic project management, including the project history and objectives, roles and responsibilities of the participants, and other aspects.
 - b. Data Generation and Acquisition. This component addresses all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities are employed and are properly documented. Quality control requirements are applicable to all the constituents sampled as part of the MRP, as described in the appropriate method.
 - c. Assessment and Oversight. This component addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of the assessment is to provide project oversight that

¹ USEPA 2001 (2006) USEPA requirements for Quality Assurance Project Plans (QA/R-5) Office of Environmental Information, Washington, D.C. USEPA QA/R-5

² http://waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa

will ensure that the QA Project Plan is implemented as prescribed.

- d. Data Validation and Usability. This component addresses the quality assurance activities that occur after the data collection, laboratory analysis and data generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the MRP objectives.
7. The Central Coast Water Board may conduct an audit of contracted laboratories at any time in order to evaluate compliance with the QAPP.
 8. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may also revise the Sampling and Analysis Plan, including adding, removing, or changing monitoring site locations, changing monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water.

Surface Receiving Water Quality Monitoring Sites

9. The Sampling and Analysis Plan must, at a minimum, include monitoring sites to evaluate waterbodies identified in Table 1, unless otherwise approved by the Executive Officer. The Sampling and Analysis Plan must include sites to evaluate receiving water quality impacts most directly resulting from areas of agricultural discharge (including areas receiving tile drain discharges). Site selection must take into consideration the existence of any long term monitoring sites included in related monitoring programs (e.g. CCAMP and the existing CMP). Sites may be added or modified, subject to prior approval by the Executive Officer, to better assess the pollutant loading from individual sources or the impacts to receiving waters caused by individual discharges. Any modifications must consider sampling consistency for purposes of trend evaluation.

Surface Receiving Water Quality Monitoring Parameters

10. The Sampling and Analysis Plan must, at a minimum, include the following types of monitoring and evaluation parameters listed below and identified in Table 2:
 - a. Flow Monitoring;
 - b. Water Quality (physical parameters, metals, nutrients, pesticides);
 - c. Toxicity (water and sediment);
 - d. Assessment of Benthic Invertebrates.

11. All analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health (CDPH) or at laboratories approved by the Executive Officer. Unless otherwise noted, all sampling, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, U.S. EPA, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link: <http://www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls>
12. Water quality and flow monitoring is used to assess the sources, concentrations, and loads of waste discharges from individual farms/ranches and groups of Dischargers to surface waters, to evaluate impacts to water quality and beneficial uses, and to evaluate the short term patterns and long term trends in receiving water quality. Monitoring data must be compared to existing numeric and narrative water quality objectives.
13. Toxicity testing is to evaluate water quality relative to the narrative toxicity objective. Water column toxicity analyses must be conducted on 100% (undiluted) sample. At sites where persistent unresolved toxicity is found, the Executive Officer may require concurrent toxicity and chemical analyses and a Toxicity Identification Evaluation (TIE) to identify the individual discharges causing the toxicity.

Surface Receiving Water Quality Monitoring Frequency and Schedule

14. The Sampling and Analysis Plan must include a schedule for sampling. Timing, duration, and frequency of monitoring must be based on the land use, complexity, hydrology, and size of the waterbody. Table 2 includes minimum monitoring frequency and parameter lists. Agricultural parameters that are less common may be monitored less frequently. Modifications to the receiving water quality monitoring parameters, frequency, and schedule may be submitted for Executive Officer consideration and approval. At a minimum, the Sampling and Analysis Plan schedule must consist of monthly monitoring of common agricultural parameters in major agricultural areas, including two major storm events during the wet season (October 1 – April 30).
15. Storm event monitoring must be conducted within 18 hours of storm events, preferably including the first flush run-off event that results in significant increase in stream flow. For purposes of this MRP, a storm event is defined as precipitation producing onsite runoff (surface water flow) capable of creating significant ponding, erosion or other water quality problem. A

significant storm event will generally result in greater than 1-inch of rain within a 24-hour period.

16. Dischargers (individually or as part of a cooperative monitoring program) must perform receiving water quality monitoring per the Sampling and Analysis Plan and QAPP approved by the Executive Officer.

B. Surface Receiving Water Quality Reporting

Surface Receiving Water Quality Data Submittal

1. Dischargers (individually or as part of a cooperative monitoring program) must submit water quality monitoring data to the Central Coast Water Board electronically, in a format specified by the Executive Officer and compatible with SWAMP/CCAMP electronic submittal guidelines, each January 1, April 1, July 1, and October 1.

Surface Receiving Water Quality Monitoring Annual Report

2. **By July 1, 2017**, and every July 1 annually thereafter, Dischargers (individually or as part of a cooperative monitoring program) must submit an Annual Report, electronically, in a format specified by the Executive Officer including the following minimum elements:
 - a. Signed Transmittal Letter;
 - b. Title Page;
 - c. Table of Contents;
 - d. Executive Summary;
 - e. Summary of Exceedance Reports submitted during the reporting period;
 - f. Monitoring objectives and design;
 - g. Monitoring site descriptions and rainfall records for the time period covered;
 - h. Location of monitoring sites and map(s);
 - i. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
 - j. Summary of water quality data for any sites monitored as part of related monitoring programs, and used to evaluate receiving water as described in the Sampling and Analysis Plan.
 - k. Discussion of data to clearly illustrate compliance with the Order and water quality standards;
 - l. Discussion of short term patterns and long term trends in receiving water quality and beneficial use protection;
 - m. Evaluation of pesticide and toxicity analyses results, and recommendation of candidate sites for Toxicity Identification Evaluations (TIEs);

- n. Identification of the location of any agricultural discharges observed discharging directly to surface receiving water;
- o. Laboratory data submitted electronically in a SWAMP/CCAMP comparable format;
- p. Sampling and analytical methods used;
- q. Copy of chain-of-custody forms;
- r. Field data sheets, signed laboratory reports, laboratory raw data;
- s. Associated laboratory and field quality control samples results;
- t. Summary of Quality Assurance Evaluation results;
- u. Specify the method used to obtain flow at each monitoring site during each monitoring event;
- v. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site ID and date;
- w. Conclusions.

PART 2. GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

Groundwater monitoring may be conducted through a cooperative monitoring and reporting program on behalf of growers, or Dischargers may choose to conduct groundwater monitoring and reporting individually. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in this Order, unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Key monitoring and reporting requirements for groundwater are shown in Table 3.

A. Groundwater Monitoring

1. Dischargers must sample private domestic wells and the primary irrigation well on their farm/ranch to evaluate groundwater conditions in agricultural areas, identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards, and identify priority areas for follow up actions.
2. Dischargers must sample at least one groundwater well for each farm/ranch on their operation, including groundwater wells that are located within the property boundary of the enrolled county assessor parcel numbers (APNs). For farms/ranches with multiple groundwater wells, Dischargers must sample all domestic wells and the primary irrigation well. For the purposes of this MRP, a "domestic well" is any well that is used or may be used for domestic use purposes, including any groundwater well that is connected to a residence, workshop, or place of business that may be used for human consumption, cooking, or sanitary purposes. Groundwater monitoring

parameters must include well screen interval depths (if available), general chemical parameters, and general cations and anions listed in Table 3.

3. Dischargers must conduct two rounds of monitoring of required groundwater wells during calendar year 2017; one sample collected during spring (**March - June**) and one sample collected during fall (**September - December**).
4. Groundwater samples must be collected by a qualified third party (e.g., consultant, technician, person conducting cooperative monitoring) using proper sampling methods, chain-of-custody, and quality assurance/quality control protocols. Groundwater samples must be collected at or near the well head before the pressure tank and prior to any well head treatment. In cases where this is not possible, the water sample must be collected from a sampling point as close to the pressure tank as possible, or from a cold-water spigot located before any filters or water treatment systems.
5. Laboratory analyses for groundwater samples must be conducted by a State certified laboratory according to U.S. EPA approved methods; unless otherwise noted, all monitoring, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, United States Environmental Protection Agency, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link below: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/resources4growers/2016_04_11_labs.pdf
6. If a discharger determines that water in any domestic well exceeds 10 mg/L of nitrate as N, the discharger or third party must provide notice to the Central Coast Water Board within 24 hours of learning of the exceedance. For domestic wells on a Discharger's farm/ranch, that exceed 10 mg/L of nitrate as N, the Discharger must provide written notification to the users within 10 days of learning of the exceedance and provide written confirmation of the notification to the Central Coast Water Board.

The drinking water notification must include the statement that the water poses a human health risk due to elevated nitrate concentration, and include a warning against the use of the water for drinking or cooking. In addition, Dischargers must also provide prompt written notification to any new well users (e.g. tenants and employees with access to the affected well), whenever there is a change in occupancy.

For all other domestic wells not on a Discharger's farm/ranch but that may be impacted by nitrate, the Central Coast Water Board will notify the users promptly.

The drinking water notification and confirmation letters required by this Order are available to the public.

B. Groundwater Reporting

1. **Within 60 days of sample collection**, Dischargers must coordinate with the laboratory to submit the following groundwater monitoring results and information, electronically, using the Water Board's GeoTracker electronic deliverable format (EDF):
 - a. GeoTracker Ranch Global Identification Number
 - b. Field point name (Well Name)
 - c. Field Point Class (Well Type)
 - d. Latitude
 - e. Longitude
 - f. Sample collection date
 - g. Analytical results
 - h. Well construction information (e.g., total depth, screened intervals, depth to water), as available

2. Dischargers must submit groundwater well information required in the electronic Notice of Intent (eNOI) for each farm/ranch and update the eNOI to reflect changes in the farm/ranch information within 30 days of the change. Groundwater well information reported on the eNOI includes, but is not limited to:
 - a. Number of groundwater wells present at each farm/ranch
 - b. Identification of any groundwater wells abandoned or destroyed (including method destroyed) in compliance with the Order
 - c. Use for fertigation or chemigation
 - d. Presence of back flow prevention devices
 - e. Number of groundwater wells used for agricultural purposes
 - f. Number of groundwater wells used for or may be used for domestic use purposes (domestic wells).

C. Total Nitrogen Applied Reporting

1. By March 1, 2018, and by March 1 annually thereafter, Tier 2 Dischargers growing any crop with a high potential to discharge nitrogen to groundwater must record and report total nitrogen applied for each specific crop that was irrigated and grown for commercial purposes on that farm/ranch during the preceding calendar year (January through December).

Crops with a high potential to discharge nitrogen to groundwater are: beet, broccoli, cabbage, cauliflower, celery, Chinese cabbage (napa), collard, endive, kale, leek, lettuce (leaf and head), mustard, onion (dry and green),

spinach, strawberry, pepper (fruiting), and parsley.

Total nitrogen applied must be reported on the Total Nitrogen Applied Report form as described in the Total Nitrogen Applied Report form instructions.

Total nitrogen applied includes any product containing any form or concentration of nitrogen including, but not limited to, organic and inorganic fertilizers, slow release products, compost, compost teas, manure, and extracts.

2. The Total Nitrogen Applied Report form includes the following information:
 - a. General ranch information such as GeoTracker file numbers, name, location, acres.
 - b. Nitrogen concentration of irrigation water
 - c. Nitrogen applied in pounds per acre with irrigation water
 - d. Nitrogen present in the soil
 - e. Nitrogen applied with compost and amendments
 - f. Specific crops grown
 - g. Nitrogen applied in pounds per acre with fertilizers and other materials to each specific crop grown
 - h. Crop acres of each specific crop grown
 - i. Whether each specific crop was grown organically or conventionally
 - j. Basis for the nitrogen applied
 - k. Explanation and comments section
 - l. Certification statement with penalty of perjury declaration
 - m. Additional information regarding whether each specific crop was grown in a nursery, greenhouse, hydroponically, in containers, and similar variables.

PART 3. ANNUAL COMPLIANCE FORM

Tier 2 Dischargers must submit annual compliance information, electronically, on the Annual Compliance Form. The purpose of the electronic Annual Compliance Form is to provide information to the Central Coast Water Board to assist in the evaluation of threat to water quality from individual agricultural discharges of waste and measure progress towards water quality improvement and verify compliance with the Order and MRP. Time schedules are shown in Table 4.

A. Annual Compliance Form

1. **By March 1, 2018, and updated annually thereafter by March 1**, Tier 2 Dischargers must submit an Annual Compliance Form electronically, in a

format specified by the Executive Officer. The electronic Annual Compliance Form includes, but is not limited to the following minimum requirements¹:

- a. Question regarding consistency between the Annual Compliance Form and the electronic Notice of Intent (eNOI);
- b. Information regarding type and characteristics of discharge (e.g., number of discharge points, estimated flow/volume, number of tailwater days);
- c. Identification of any direct agricultural discharges to a stream, lake, estuary, bay, or ocean;
- d. Identification of specific farm water quality management practices completed, in progress, and planned to address water quality impacts caused by discharges of waste including irrigation management, pesticide management, nutrient management, salinity management, stormwater management, and sediment and erosion control to achieve compliance with this Order; and identification of specific methods used, and described in the Farm Plan consistent with Order Provision 44.g., for the purposes of assessing the effectiveness of management practices implemented and the outcomes of such assessments;
- e. Proprietary information question and justification;
- f. Authorization and certification statement and declaration of penalty of perjury.

PART 5. GENERAL MONITORING AND REPORTING REQUIREMENTS

A. Submittal of Technical Reports

1. Dischargers must submit reports in a format specified by the Executive Officer. A transmittal letter must accompany each report, containing the following penalty of perjury statement signed by the Discharger or the Discharger's authorized agent:

"In compliance with Water Code §13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision following a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".

¹ Items reported in the Annual Compliance Form are due by March 1, 2018, and annually thereafter, unless otherwise specified.

2. If the Discharger asserts that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure (e.g. trade secrets or secret processes), the Discharger must provide an explanation of how those portions of the reports are exempt from public disclosure. The Discharger must clearly indicate on the cover of the report (typically an electronic submittal) that the Discharger asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, submit separately (in a separate electronic file) unredacted pages (to be maintained separately by staff). The Central Coast Water Board staff will determine whether any such report or portion of a report qualifies for an exemption from public disclosure. If the Central Coast Water Board staff disagrees with the asserted exemption from public disclosure, the Central Coast Water Board staff will notify the Discharger prior to making such report or portions of such report available for public inspection.

B. Central Coast Water Board Authority

1. Monitoring reports are required pursuant to section 13267 of the California Water Code. Pursuant to section 13268 of the Water Code, a violation of a request made pursuant to section 13267 may subject you to civil liability of up to \$1000 per day.
2. The Water Board needs the required information to determine compliance with Order No. R3-2017-0002. The evidence supporting these requirements is included in the findings of Order No. R3-2017-0002.

John M. Robertson
Executive Officer

March 8, 2017

Date

Table 1. Major Waterbodies in Agricultural Areas¹

Hydrologic SubArea	Waterbody Name	Hydrologic SubArea	Waterbody Name
30510	Pajaro River	30920	Quail Creek
30510	Salsipuedes Creek	30920	Salinas Reclamation Canal
30510	Watsonville Slough	31022	Chorro Creek
30510	Watsonville Creek ²	31023	Los Osos Creek
30510	Beach Road Ditch ²	31023	Warden Creek
30530	Carnadero Creek	31024	San Luis Obispo Creek
30530	Furlong Creek ²	31024	Prefumo Creek
30530	Llagas Creek	31031	Arroyo Grande Creek
30530	Miller's Canal	31031	Los Berros Creek
30530	San Juan Creek	31210	Bradley Canyon Creek
30530	Tesquisquita Slough	31210	Bradley Channel
30600	Moro Cojo Slough	31210	Green Valley Creek
30910	Alisal Slough	31210	Main Street Canal
30910	Blanco Drain	31210	Orcutt Solomon Creek
30910	Old Salinas River	31210	Oso Flaco Creek
30910	Salinas River (below Gonzales Rd.)	31210	Little Oso Flaco Creek
30920	Salinas River above Gonzales Rd. and below Nacimiento R.)	31210	Santa Maria River
30910	Santa Rita Creek ²	31310	San Antonio Creek ²
30910	Tembladero Slough	31410	Santa Ynez River
30920	Alisal Creek	31531	Bell Creek
30920	Chualar Creek	31531	Glenn Annie Creek
30920	Espinosa Slough	31531	Los Carneros Creek ²
30920	Gabilan Creek	31534	Arroyo Paredon Creek
30920	Natividad Creek	31534	Franklin Creek

¹ At a minimum, monitoring sites must be included for these waterbodies in agricultural areas, unless otherwise approved by the Executive Officer. Monitoring sites may be proposed for addition or modification to better assess the impacts of waste discharges from irrigated lands to surface water. Dischargers choosing to comply with surface receiving water quality monitoring, individually (not part of a cooperative monitoring program) must only monitor sites for waterbodies receiving the discharge.

² These creeks are included because they are newly listed waterbodies on the 2010 303(d) list of Impaired Waters that are associated with areas of agricultural discharge.

Table 2. Surface Receiving Water Quality Monitoring Parameters

Parameters and Tests	RL ³	Monitoring Frequency ¹
Photo Monitoring		
Upstream and downstream photographs at monitoring location		With every monitoring event
<u>WATER COLUMN SAMPLING</u>		
Physical Parameters and General Chemistry		
Flow (field measure) (CFS) following SWAMP field SOP ⁹	.25	Monthly, including 2 stormwater events
pH (field measure)	0.1	"
Electrical Conductivity (field measure) (µS/cm)	2.5	"
Dissolved Oxygen (field measure) (mg/L)	0.1	"
Temperature (field measure) (°C)	0.1	"
Turbidity (NTU)	0.5	"
Total Dissolved Solids (mg/L)	10	"
Total Suspended Solids (mg/L)	0.5	"
Nutrients		
Total Nitrogen (mg/L)	0.5	Monthly, including 2 stormwater events
Nitrate + Nitrite (as N) (mg/L)	0.1	"
Total Ammonia (mg/L)	0.1	"
Unionized Ammonia (calculated value, mg/L)		"
Total Phosphorus (as P) (mg/L)	0.02	
Soluble Orthophosphate (mg/L)	0.01	"
Water column chlorophyll a (µg/L)	1.0	"
Algae cover, Floating Mats, % coverage	-	"
Algae cover, Attached, % coverage	-	"
Water Column Toxicity Test		
Algae - <i>Selenastrum capricornutum</i> (96-hour chronic; Method 1003.0 in EPA/821/R-02/013)	-	4 times each year, twice in dry season, twice in wet season
Water Flea – <i>Ceriodaphnia dubia</i> (7-day chronic; Method 1002.0 in EPA/821/R-02/013)	-	"
Midge - <i>Chironomus spp.</i> (96-hour acute; Alternate test species in EPA 821-R-02-012)	-	"

Parameters and Tests	RL ³	Monitoring Frequency ¹
Toxicity Identification Evaluation (TIE)	-	As directed by Executive Officer
Pesticides² /Herbicides (µg/L)		
Organophosphate Pesticides		
Azinphos-methyl	0.02	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Chlorpyrifos	0.005	"
Diazinon	0.005	"
Dichlorvos	0.01	"
Dimethoate	0.01	"
Dimeton-s	0.005	"
Disulfoton (Disyton)	0.005	"
Malathion	0.005	"
Methamidophos	0.02	"
Methidathion	0.02	"
Parathion-methyl	0.02	"
Phorate	0.01	"
Phosmet	0.02	"
Neonicotinoids		
Thiamethoxam	.002	"
Imidacloprid	.002	"
Thiacloprid	.002	"
Dinotefuran	.006	"
Acetamiprid	.01	"
Clothianidin	.02	"
Herbicides		
Atrazine	0.05	"
Cyanazine	0.20	"
Diuron	0.05	"
Glyphosate	2.0	"
Linuron	0.1	"
Paraquat	0.20	"
Simazine	0.05	"
Trifluralin	0.05	"
Metals (µg/L)		
Arsenic (total) ^{5,7}	0.3	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Boron (total) ^{6,7}	10	"

Parameters and Tests	RL ³	Monitoring Frequency ¹
Cadmium (total & dissolved) ^{4,5,7}	0.01	"
Copper (total and dissolved) ^{4,7}	0.01	"
Lead (total and dissolved) ^{4,7}	0.01	"
Nickel (total and dissolved) ^{4,7}	0.02	"
Molybdenum (total) ⁷	1	"
Selenium (total) ⁷	0.30	"
Zinc (total and dissolved) ^{4,5,7}	0.10	"
Other (µg/L)		
Total Phenolic Compounds ⁸	5	2 times in 2017, once in spring (April-May) and once in fall (August-September)
Hardness (mg/L as CaCO ₃)	1	"
Total Organic Carbon (ug/L)	0.6	"
<u>SEDIMENT SAMPLING</u>		
Sediment Toxicity - <i>Hyalella azteca</i> 10-day static renewal (EPA, 2000)		2 times each year, once in spring (April-May) and once in fall (August-September)
Pyrethroid Pesticides in Sediment (µg/kg)		
Gamma-cyhalothrin	2	2 times in both 2017 and 2018, once in spring (April-May) and once in fall (August-September) of each year, concurrent with sediment toxicity sampling
Lambda-cyhalothrin	2	"
Bifenthrin	2	"
Beta-cyfluthrin	2	"
Cyfluthrin	2	"
Esfenvalerate	2	"
Permethrin	2	"
Cypermethrin	2	"
Danitol	2	"
Fenvalerate	2	"
Fluvalinate	2	"
Other Monitoring in Sediment		
Chlorpyrifos (µg/kg)	2	"
Total Organic Carbon	0.01%	"
		"
Sediment Grain Size Analysis	1%	"

¹Monitoring is ongoing through all five years of the Order, unless otherwise specified. Monitoring frequency may be used as a guide for developing alternative Sampling and Analysis Plan.

²Pesticide list may be modified based on specific pesticide use in Central Coast Region. Analytes on this list must be reported, at a minimum.

³ Reporting Limit, taken from SWAMP where applicable.

⁴ Holmgren, Meyer, Cheney and Daniels. 1993. Cadmium, Lead, Zinc, Copper and Nickel in Agricultural Soils of the United States. J. of Environ. Quality 22:335-348.

⁵ Sax and Lewis, ed. 1987. Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. Zinc arsenate is an insecticide.

⁶ <http://www.coastalagro.com/products/labels/9%25BORON.pdf>; Boron is applied directly or as a component of fertilizers as a plant nutrient.

⁷ Madramootoo, Johnston, Willardson, eds. 1997. Management of Agricultural Drainage Water Quality. International Commission on Irrigation and Drainage. U.N. FAO. SBN 92-6-104058.3.

⁸ <http://cat.inist.fr/?aModele=afficheN&cpsid=14074525>; Phenols are breakdown products of herbicides and pesticides. Phenols can be directly toxic and cause endocrine disruption.

⁹ See SWAMP field measures SOP, p. 17

mg/L – milligrams per liter; ug/L – micrograms per liter; ug/kg – micrograms per kilogram;

NTU – Nephelometric Turbidity Units; CFS – cubic feet per second;

Table 3. Groundwater Monitoring Parameters

Parameter	RL	Analytical Method ³	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10		mg/L
Total Alkalinity as CaCO ₃	1	EPA Method 310.1 or 310.2	
Calcium	0.05	General Cations ¹ EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO ₄)	1.0	General Anions EPA Method 300 or EPA Method 353.2	
Chloride	0.1		
Nitrate + Nitrite (as N) ² or Nitrate as N	0.1		

¹ General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater sampling and laboratory analysis.

² The MRP allows analysis of “nitrate plus nitrite” to represent nitrate concentrations (as N). The “nitrate plus nitrite” analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate.

³ Dischargers may use alternative analytical methods approved by EPA.

RL – Reporting Limit; µS/cm – micro siemens per centimeter

Table 4. Tier 2 - Time Schedule for Key Monitoring and Reporting Requirements (MRPs)

REQUIREMENT	TIME SCHEDULE ¹
Submit Sampling And Analysis Plan and Quality Assurance Project Plan (SAAP/QAPP) for Surface Receiving Water Quality Monitoring (<i>individually or through cooperative monitoring program</i>)	By March 1, 2018, or as directed by the Executive Officer; satisfied if an approved SAAP/QAPP has been submitted pursuant to Order No. R3-2012-0011 and associated MRPs
Initiate surface receiving water quality monitoring (<i>individually or through cooperative monitoring program</i>)	Per an approved SAAP and QAPP
Submit surface receiving water quality monitoring data (<i>individually or through cooperative monitoring program</i>)	Each January 1, April 1, July 1, and October 1
Submit surface receiving water quality Annual Monitoring Report (<i>individually or through cooperative monitoring program</i>)	By July 12017: annually thereafter by July 1
Initiate monitoring of groundwater wells	First sample from March-June 2017, second sample from September-December 2017
Submit electronic Annual Compliance Form	March 1, 2018 and every March 1 annually thereafter
Submit groundwater monitoring results	Within 60 days of the sample collection
Tier 2 Dischargers with farms/ranches growing high risk crops: Report total nitrogen applied on the Total Nitrogen Applied form	March 1, 2018 and every March 1 annually thereafter

¹ Dates are relative to adoption of this Order or enrollment date for Dischargers enrolled after the adoption of this Order, unless otherwise specified.

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

**MONITORING AND REPORTING PROGRAM
ORDER NO. R3-2017-0002-03**

TIER 3

**DISCHARGERS ENROLLED UNDER
CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR
DISCHARGES FROM IRRIGATED LANDS**

This Monitoring and Reporting Program Order No. R3-2017-0002-03 (MRP) is issued pursuant to California Water Code (Water Code) sections 13267 and 13269, which authorize the California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board) to require preparation and submittal of technical and monitoring reports. Water Code section 13269 requires a waiver of waste discharge requirements to include as a condition, the performance of monitoring and the public availability of monitoring results. *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands*, Order No. R3-2017-0002 (Order), includes criteria and requirements for three tiers. This MRP sets forth monitoring and reporting requirements for **Tier 3 Dischargers** enrolled under the Order. A summary of the requirements is shown below.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS FOR TIER 3:

- Part 1: Surface Receiving Water Monitoring and Reporting *(cooperative or individual)*
- Part 2: Groundwater Monitoring and Reporting *(cooperative or individual)*
Total Nitrogen Applied Reporting *(required for subset of Tier 3 Dischargers if farm/ranch growing any crop with high nitrate loading risk to groundwater);*
- Part 3: Annual Compliance Form
- Part 5: Individual Surface Water Discharge Monitoring and Reporting
- Part 6: Irrigation and Nutrient Management Plan *(required for subset of Tier 3 Dischargers if farm/ranch has High Nitrate Loading Risk)*
- Part 7: Water Quality Buffer Plan *(required for subset of Tier 3 Dischargers if farm/ranch contains or is adjacent to a waterbody impaired for temperature, turbidity or sediment)*

Pursuant to Water Code section 13269(a)(2), monitoring requirements must be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. The monitoring and reports required by this MRP are to evaluate effects of discharges of waste from irrigated agricultural operations and individual farms/ranches on waters of the state and to determine compliance with the Order.

MONITORING AND REPORTING BASED ON TIERS

The Order and MRP includes criteria and requirements for three tiers, based upon those characteristics of the individual farms/ranches at the operation that present the highest level of waste discharge or greatest risk to water quality. Dischargers must meet conditions of the Order and MRP for the appropriate tier that applies to their land and/or the individual farm/ranch. Within a tier, Dischargers comply with requirements based on the specific level of discharge and threat to water quality from individual farms/ranches. The lowest tier, Tier 1, applies to dischargers who discharge the lowest level of waste (amount or concentration) or pose the lowest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. The highest tier, Tier 3, applies to dischargers who discharge the highest level of waste or pose the greatest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. Tier 2 applies to dischargers whose discharge has a moderate threat to water quality. Water quality is defined in terms of regional, state, or federal numeric or narrative water quality standards. Per the Order, Dischargers may submit a request to the Executive Officer to approve transfer to a lower tier. If the Executive Officer approves a transfer to a lower tier, any interested person may request that the Central Coast Water Board conduct a review of the Executive Officer's determination.

PART 1. SURFACE RECEIVING WATER MONITORING AND REPORTING REQUIREMENTS

The surface receiving water monitoring and reporting requirements described herein are generally a continuation of the surface receiving water monitoring and reporting requirements of Monitoring and Reporting Program Order No. 2012-0011-03, as revised August 22, 2016, with the intent of uninterrupted regular monitoring and reporting during the transition from Order No. R3-2012-0011-03 to Order No. R3-2017-0002-03.

Monitoring and reporting requirements for surface receiving water identified in Part 1.A. and Part 1.B. apply to Tier 3 Dischargers. Surface receiving water refers to water flowing in creeks and other surface waters of the State. Surface receiving water monitoring may be conducted through a cooperative monitoring program on behalf of Dischargers, or Dischargers may choose to conduct surface receiving water monitoring and reporting individually. Key monitoring and reporting requirements for surface receiving water are shown in Tables 1 and 2. Time schedules are shown in Table 5.

A. Surface Receiving Water Quality Monitoring

1. Dischargers must elect a surface receiving water monitoring option (cooperative monitoring program or individual receiving water monitoring) to comply with surface receiving water quality monitoring requirements, and identify the option selected on the Notice of Intent (NOI).

2. Dischargers are encouraged to choose participation in a cooperative monitoring program (e.g., the existing Cooperative Monitoring Program or a similar program) to comply with receiving water quality monitoring requirements. Dischargers not participating in a cooperative monitoring program must conduct surface receiving water quality monitoring individually that achieves the same purpose.
3. Dischargers (individually or as part of a cooperative monitoring program) must conduct surface receiving water quality monitoring to a) assess the impacts of their waste discharges from irrigated lands to receiving water, b) assess the status of receiving water quality and beneficial use protection in impaired waterbodies dominated by irrigated agricultural activity, c) evaluate status, short term patterns and long term trends (five to ten years or more) in receiving water quality, d) evaluate water quality impacts resulting from agricultural discharges (including but not limited to tile drain discharges), e) evaluate stormwater quality, f) evaluate condition of existing perennial, intermittent, or ephemeral streams or riparian or wetland area habitat, including degradation resulting from erosion or agricultural discharges of waste, and g) assist in the identification of specific sources of water quality problems.

Surface Receiving Water Quality Sampling and Analysis Plan

4. **By March 1, 2018, or as directed by the Executive Officer**, Dischargers (individually or as part of a cooperative monitoring program) must submit a surface receiving water quality Sampling and Analysis Plan (SAAP) and Quality Assurance Project Plan (QAPP); this requirement is satisfied if an approved SAAP and QAPP addressing all surface receiving water quality monitoring requirements described in this Order has been submitted pursuant to Order No.R3-2012-0011 and associated Monitoring and Reporting Programs. Dischargers (or a third party cooperative monitoring program) must develop the Sampling and Analysis Plan to describe how the proposed monitoring will achieve the objectives of the MRP and evaluate compliance with the Order. The Sampling and Analysis Plan may propose alternative monitoring site locations, adjusted monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water. The Executive Officer must approve the Sampling and Analysis Plan and QAPP.
5. The Sampling and Analysis Plan must include the following minimum required components:
 - a. Monitoring strategy to achieve objectives of the Order and MRP;
 - b. Map of monitoring sites with GIS coordinates;

- c. Identification of known water quality impairments and impaired waterbodies per the 2010 Clean Water Act 303(d) List of Impaired Waterbodies (List of Impaired Waterbodies);
 - d. Identification of beneficial uses and applicable water quality standards;
 - e. Identification of applicable Total Maximum Daily Loads;
 - f. Monitoring parameters;
 - g. Monitoring schedule, including description and frequencies of monitoring events;
 - h. Description of data analysis methods;
6. The QAPP must include receiving water and site-specific information, project organization and responsibilities, and quality assurance components of the MRP. The QAPP must also include the laboratory and field requirements to be used for analyses and data evaluation. The QAPP must contain adequate detail for project and Water Board staff to identify and assess the technical and quality objectives, measurement and data acquisition methods, and limitations of the data generated under the surface receiving water quality monitoring. All sampling and laboratory methodologies and QAPP content must be consistent with U.S. EPA methods, State Water Board's Surface Water Ambient Monitoring Program (SWAMP) protocols and the Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP). Following U.S. EPA guidelines¹ and SWAMP templates², the receiving water quality monitoring QAPP must include the following minimum required components:
- a. Project Management. This component addresses basic project management, including the project history and objectives, roles and responsibilities of the participants, and other aspects.
 - b. Data Generation and Acquisition. This component addresses all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities are employed and are properly documented. Quality control requirements are applicable to all the constituents sampled as part of the MRP, as described in the appropriate method.
 - c. Assessment and Oversight. This component addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of the assessment is to provide project oversight that

¹ USEPA. 2001 (2006) USEPA Requirements for Quality Assurance Project Plans (QA/R-5) Office of Environmental Information, Washington, D.C. USEPA QA/R-5

² http://waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa

will ensure that the QA Project Plan is implemented as prescribed.

- d. Data Validation and Usability. This component addresses the quality assurance activities that occur after the data collection, laboratory analysis and data generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the MRP objectives.
7. The Central Coast Water Board may conduct an audit of contracted laboratories at any time in order to evaluate compliance with the QAPP.
 8. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may also revise the Sampling and Analysis Plan, including adding, removing, or changing monitoring site locations, changing monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water.

Surface Receiving Water Quality Monitoring Sites

9. The Sampling and Analysis Plan must, at a minimum, include monitoring sites to evaluate waterbodies identified in Table 1, unless otherwise approved by the Executive Officer. The Sampling and Analysis Plan must include sites to evaluate receiving water quality impacts most directly resulting from areas of agricultural discharge (including areas receiving tile drain discharges). Site selection must take into consideration the existence of any long term monitoring sites included in related monitoring programs (e.g. CCAMP and the existing CMP). Sites may be added or modified, subject to prior approval by the Executive Officer, to better assess the pollutant loading from individual sources or the impacts to receiving waters caused by individual discharges. Any modifications must consider sampling consistency for purposes of trend evaluation.

Surface Receiving Water Quality Monitoring Parameters

10. The Sampling and Analysis Plan must, at a minimum, include the following types of monitoring and evaluation parameters listed below and identified in Table 2:
 - a. Flow Monitoring;
 - b. Water Quality (physical parameters, metals, nutrients, pesticides);
 - c. Toxicity (water and sediment);
 - d. Assessment of Benthic Invertebrates.

11. All analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health (CDPH) or at laboratories approved by the Executive Officer. Unless otherwise noted, all sampling, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, U.S. EPA, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link: <http://www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls>
12. Water quality and flow monitoring is used to assess the sources, concentrations, and loads of waste discharges from individual farms/ranches and groups of Dischargers to surface waters, to evaluate impacts to water quality and beneficial uses, and to evaluate the short term patterns and long term trends in receiving water quality. Monitoring data must be compared to existing numeric and narrative water quality objectives.
13. Toxicity testing is to evaluate water quality relative to the narrative toxicity objective. Water column toxicity analyses must be conducted on 100% (undiluted) sample. At sites where persistent unresolved toxicity is found, the Executive Officer may require concurrent toxicity and chemical analyses and a Toxicity Identification Evaluation (TIE) to identify the individual discharges causing the toxicity.

Surface Receiving Water Quality Monitoring Frequency and Schedule

14. The Sampling and Analysis Plan must include a schedule for sampling. Timing, duration, and frequency of monitoring must be based on the land use, complexity, hydrology, and size of the waterbody. Table 2 includes minimum monitoring frequency and parameter lists. Agricultural parameters that are less common may be monitored less frequently. Modifications to the receiving water quality monitoring parameters, frequency, and schedule may be submitted for Executive Officer consideration and approval. At a minimum, the Sampling and Analysis Plan schedule must consist of monthly monitoring of common agricultural parameters in major agricultural areas, including two major storm events during the wet season (October 1 – April 30).
15. Storm event monitoring must be conducted within 18 hours of storm events, preferably including the first flush run-off event that results in significant increase in stream flow. For purposes of this MRP, a storm event is defined as precipitation producing onsite runoff (surface water flow) capable of creating significant ponding, erosion or other water quality problem. A

significant storm event will generally result in greater than 1-inch of rain within a 24-hour period.

16. Dischargers (individually or as part of a cooperative monitoring program) must perform receiving water quality monitoring per the Sampling and Analysis Plan and QAPP approved by the Executive Officer.

B. Surface Receiving Water Quality Reporting

Surface Receiving Water Quality Data Submittal

1. Dischargers (individually or as part of a cooperative monitoring program) must submit water quality monitoring data to the Central Coast Water Board electronically, in a format specified by the Executive Officer and compatible with SWAMP/CCAMP electronic submittal guidelines, each January 1, April 1, July 1, and October 1.

Surface Receiving Water Quality Monitoring Annual Report

2. **By July 1, 2017**, and every July 1 annually thereafter, Dischargers (individually or as part of a cooperative monitoring program) must submit an Annual Report, electronically, in a format specified by the Executive Officer including the following minimum elements:
 - a. Signed Transmittal Letter;
 - b. Title Page;
 - c. Table of Contents;
 - d. Executive Summary;
 - e. Summary of Exceedance Reports submitted during the reporting period;
 - f. Monitoring objectives and design;
 - g. Monitoring site descriptions and rainfall records for the time period covered;
 - h. Location of monitoring sites and map(s);
 - i. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
 - j. Summary of water quality data for any sites monitored as part of related monitoring programs, and used to evaluate receiving water as described in the Sampling and Analysis Plan.
 - k. Discussion of data to clearly illustrate compliance with the Order and water quality standards;
 - l. Discussion of short term patterns and long term trends in receiving water quality and beneficial use protection;

- m. Evaluation of pesticide and toxicity analyses results, and recommendation of candidate sites for Toxicity Identification Evaluations (TIEs);
- n. Identification of the location of any agricultural discharges observed discharging directly to surface receiving water;
- o. Laboratory data submitted electronically in a SWAMP/CCAMP comparable format;
- p. Sampling and analytical methods used;
- q. Copy of chain-of-custody forms;
- r. Field data sheets, signed laboratory reports, laboratory raw data;
- s. Associated laboratory and field quality control samples results;
- t. Summary of Quality Assurance Evaluation results;
- u. Specify the method used to obtain flow at each monitoring site during each monitoring event;
- v. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site ID and date;
- w. Conclusions.

PART 2. GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

Groundwater monitoring may be conducted through a cooperative monitoring and reporting program on behalf of growers, or Dischargers may choose to conduct groundwater monitoring and reporting individually. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in this Order, unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Key monitoring and reporting requirements for groundwater are shown in Table 3.

A. Groundwater Monitoring

1. Dischargers must sample private domestic wells and the primary irrigation well on their farm/ranch to evaluate groundwater conditions in agricultural areas, identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards, and identify priority areas for follow up actions.
2. Dischargers must sample at least one groundwater well for each farm/ranch on their operation, including groundwater wells that are located within the property boundary of the enrolled county assessor parcel numbers (APNs). For farms/ranches with multiple groundwater wells, Dischargers must sample all domestic wells and the primary irrigation well. For the purposes of this MRP, a "domestic well" is any well that is used or may be used for domestic

- use purposes, including any groundwater well that is connected to a residence, workshop, or place of business that may be used for human consumption, cooking, or sanitary purposes. Groundwater monitoring parameters must include well screen interval depths (if available), general chemical parameters, and general cations and anions listed in Table 3.
3. Dischargers must conduct two rounds of monitoring of required groundwater wells during calendar year 2017; one sample collected during spring (**March - June**) and one sample collected during fall (**September - December**).
 4. Groundwater samples must be collected by a qualified third party (e.g., consultant, technician, person conducting cooperative monitoring) using proper sampling methods, chain-of-custody, and quality assurance/quality control protocols. Groundwater samples must be collected at or near the well head before the pressure tank and prior to any well head treatment. In cases where this is not possible, the water sample must be collected from a sampling point as close to the pressure tank as possible, or from a cold-water spigot located before any filters or water treatment systems.
 5. Laboratory analyses for groundwater samples must be conducted by a State certified laboratory according to U.S. EPA approved methods; unless otherwise noted, all monitoring, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, United States Environmental Protection Agency, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link below: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/resources4growers/2016_04_11_labs.pdf
 6. If a discharger determines that water in any domestic well exceeds 10 mg/L of nitrate as N, the discharger or third party must provide notice to the Central Coast Water Board within 24 hours of learning of the exceedance. For domestic wells on a Discharger's farm/ranch that exceed 10 mg/L nitrate as N, the Discharger must provide written notification to the users within 10 days of learning of the exceedance and provide written confirmation of the notification to the Central Coast Water Board.

The drinking water notification must include the statement that the water poses a human health risk due to elevated nitrate concentration, and include a warning against the use of the water for drinking or cooking. In addition, Dischargers must also provide prompt written notification to any new well users (e.g. tenants and employees with access to the affected well), whenever there is a change in occupancy.

For all other domestic wells not on a Discharger's property, the Central Coast Water Board will notify the users promptly.

The drinking water notification and confirmation letters required by this Order are available to the public.

B. Groundwater Reporting

- 1. Within 60 days of sample collection,** Dischargers must coordinate with the laboratory to submit the following groundwater monitoring results and information, electronically, using the Water Board's GeoTracker electronic deliverable format (EDF):
 - a. GeoTracker Ranch Global Identification Number
 - b. Field point name (Well Name)
 - c. Field Point Class (Well Type)
 - d. Latitude
 - e. Longitude
 - f. Sample collection date
 - g. Analytical results
 - h. Well construction information (e.g., total depth, screened intervals, depth to water), as available

- 2.** Dischargers must submit groundwater well information required in the electronic Notice of Intent (eNOI) for each farm/ranch and update the eNOI to reflect changes in the farm/ranch information within 30 days of the change. Groundwater well information reported on the eNOI includes, but is not limited to:
 - a. Number of groundwater wells present at each farm/ranch
 - b. Identification of any groundwater wells abandoned or destroyed (including method destroyed) in compliance with the Order
 - c. Use for fertigation or chemigation
 - d. Presence of back flow prevention devices
 - e. Number of groundwater wells used for agricultural purposes
 - f. Number of groundwater wells used for or may be used for domestic use purposes (domestic wells)

C. Total Nitrogen Applied Reporting

- 1.** By March 1, 2018, and by March 1 annually thereafter, Tier 3 Dischargers growing any crop with a high potential to discharge nitrogen to groundwater must record and report total nitrogen applied for each specific crop that was irrigated and grown for commercial purposes on that farm/ranch during the preceding calendar year (January through December).

Crops with a high potential to discharge nitrogen to groundwater are: beet,

broccoli, cabbage, cauliflower, celery, Chinese cabbage (napa), collard, endive, kale, leek, lettuce (leaf and head), mustard, onion (dry and green), spinach, strawberry, pepper (fruiting), and parsley.

Total nitrogen applied must be reported on the Total Nitrogen Applied Report form as described in the Total Nitrogen Applied Report form instructions.

Total nitrogen applied includes any product containing any form or concentration of nitrogen including, but not limited to, organic and inorganic fertilizers, slow release products, compost, compost teas, manure, and extracts.

2. The Total Nitrogen Applied Report form includes the following information:
 - a. General ranch information such as GeoTracker file numbers, name, location, acres.
 - b. Nitrogen concentration of irrigation water
 - c. Nitrogen applied in pounds per acre with irrigation water
 - d. Nitrogen present in the soil
 - e. Nitrogen applied with compost and amendments
 - f. Specific crops grown
 - g. Nitrogen applied in pounds per acre with fertilizers and other materials to each specific crop grown
 - h. Crop acres of each specific crop grown
 - i. Whether each specific crop was grown organically or conventionally
 - j. Basis for the nitrogen applied
 - k. Explanation and comments section
 - l. Certification statement with penalty of perjury declaration
 - m. Additional information regarding whether each specific crop was grown in a nursery, greenhouse, hydroponically, in containers, and similar variables.

PART 3. ANNUAL COMPLIANCE FORM

Tier 3 Dischargers must submit annual compliance information, electronically, on the Annual Compliance Form. The purpose of the electronic Annual Compliance Form is to provide information to the Central Coast Water Board to assist in the evaluation of threat to water quality from individual agricultural discharges of waste and measure progress towards water quality improvement and verify compliance with the Order and MRP. Time schedules are shown in Table 5.

A. Annual Compliance Form

1. **By March 1, 2018, and updated annually thereafter by March 1**, Tier 3 Dischargers must submit an Annual Compliance Form electronically, in a format specified by the Executive Officer. The electronic Annual Compliance Form includes, but is not limited to the following minimum requirements¹:
 - a. Question regarding consistency between the Annual Compliance Form and the electronic Notice of Intent (eNOI);
 - b. Information regarding type and characteristics of discharge (e.g., number of discharge points, estimated flow/volume, number of tailwater days);
 - c. Identification of any direct agricultural discharges to a stream, lake, estuary, bay, or ocean;
 - d. Identification of specific farm water quality management practices completed, in progress, and planned to address water quality impacts caused by discharges of waste including irrigation management, pesticide management, nutrient management, salinity management, stormwater management, and sediment and erosion control to achieve compliance with this Order; and identification of specific methods used, and described in the Farm Plan consistent with Order Provision 44.g., for the purposes of assessing the effectiveness of management practices implemented and the outcomes of such assessments;
 - e. Proprietary information question and justification;
 - f. Authorization and certification statement and declaration of penalty of perjury.

PART 5. INDIVIDUAL SURFACE WATER DISCHARGE MONITORING AND REPORTING REQUIREMENTS

Monitoring and reporting requirements for individual surface water discharge identified in Part 5.A. and Part 5.B. apply to Tier 3 Dischargers with irrigation water or stormwater discharges to surface water from an outfall. Outfalls are locations where irrigation water and stormwater exit a farm/ranch, or otherwise leave the control of the discharger, after being conveyed by pipes, ditches, constructed swales, tile drains, containment structures, or other discrete structures or features that transport the water. Discharges that have commingled with discharges from another farm/ranch are considered to have left the control of the discharger. Key monitoring and reporting requirements for individual surface water discharge are shown in Tables 4A and 4B. Time schedules are shown in Table 5.

¹ Items reported in the Annual Compliance Form are due by March 1 2018, and annually thereafter, unless otherwise specified.

A. Individual Surface Water Discharge Monitoring

1. Tier 3 Dischargers must conduct individual surface water discharge monitoring to a) evaluate the quality of individual waste discharges, including concentration and load of waste (in kilograms per day) for appropriate parameters, b) evaluate effects of waste discharge on water quality and beneficial uses, and c) evaluate progress towards compliance with water quality improvement milestones in the Order.

Individual Sampling and Analysis Plan

2. **By March 1, 2018, or as directed by the Executive Officer**, Tier 3 Dischargers must submit an individual surface water discharge Sampling and Analysis Plan (SAAP) and QAPP to monitor individual discharges of irrigation water and stormwater that leaves their farm/ranch from an outfall. The Sampling and Analysis Plan and QAPP must be submitted to the Executive Officer; this requirement is satisfied if an approved SAAP and QAPP addressing all individual surface water discharge monitoring requirements described in this Order has been submitted pursuant to Order No.R3-2012-0011 and associated Monitoring and Reporting Programs.
3. The Sampling and Analysis Plan must include the following minimum required components to monitor irrigation water and stormwater discharges:
 - a. Number and location of outfalls (identified with latitude and longitude or on a scaled map);
 - b. Number and location of monitoring points;
 - c. Description of typical irrigation runoff patterns;
 - d. Map of discharge and monitoring points;
 - e. Sample collection methods;
 - f. Monitoring parameters;
 - g. Monitoring schedule and frequency of monitoring events;
4. The QAPP must include appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, quality control activities, and documentation.
5. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may require modifications to the Sampling and Analysis Plan or Tier 3 Dischargers may propose Sampling and Analysis Plan modifications for Executive Officer approval, when modifications are justified to accomplish the objectives of the MRP.

Individual Surface Water Discharge Monitoring Points

6. Tier 3 Dischargers must select monitoring points to characterize at least 80% of the estimated maximum irrigation run-off discharge volume from each farm/ranch based on that farm's/ranch's typical discharge patterns¹, including tailwater discharges and discharges from tile drains. Sample must be taken when irrigation activity is causing maximal run-off. Load estimates will be generated by multiplying flow volume of discharge by concentration of contaminants. Tier 3 Dischargers must include at least one monitoring point from each farm/ranch which drains areas where chlorpyrifos or diazinon are applied, and monitoring of runoff or tailwater must be conducted within one week of chemical application. If discharge is not routinely present, Discharger may characterize typical run-off patterns in the Annual Report. See Table 4A for additional details.
7. Tier 3 Dischargers must also monitor storage ponds and other terminal surface water containment structures that collect irrigation and stormwater runoff, unless the structure is (1) part of a tail-water return system where a major portion of the water in such structure is reapplied as irrigation water, or (2) the structure is primarily a sedimentation pond by design with a short hydraulic residence time (96 hours or less) and a discharge to surface water when functioning. If multiple ponds are present, sampling must cover at least those structures that would account for 80% of the maximum storage volume of the containment features. See Table 4B for additional details. Where water is reapplied as irrigation water. Dischargers shall document reuse in the Farm Plan.

Individual Surface Water Discharge Monitoring Parameters, Frequency, and Schedule

8. Tier 3 Dischargers must conduct monitoring for parameters, laboratory analytical methods, frequency and schedule described in Tables 4A and 4B. Dischargers may utilize in-field water testing instruments/equipment as a substitute for laboratory analytical methods if the method is approved by U.S. EPA, meets reporting limits (RL) and practical quantitation limits (PQL) specifications in the MRP, and appropriate sampling methodology and quality assurance checks can be applied to ensure that QAPP standards are met to ensure accuracy of the test.

¹ The requirement to select monitoring points to characterize at least 80% of the estimated maximum irrigation run-off based on typical discharge patterns is for the purposes of attempting to collect samples that represent a majority of the volume of irrigation run-off discharged; however the Board recognizes that predetermining these locations is not always possible and that sampling results may vary. The MRP does not specify the number or location of monitoring points to provide maximum flexibility for growers to determine how many sites necessary and exact locations are given the anticipated site-specific conditions.

9. Tier 3 Dischargers must initiate individual surface water discharge monitoring per an approved Sampling and Analysis Plan and QAPP, unless otherwise directed by the Executive Officer.

B. Individual Surface Water Discharge Reporting

Individual Surface Water Discharge Monitoring Data Submittal

By March 1, 2018, and annually thereafter by March 1, Tier 3 Dischargers must submit individual surface water discharge monitoring data and information to the Central Coast Water Board electronically, in a pdf format, containing at least the following items, or as otherwise approved by the Executive Officer:

- a. Electronic laboratory data
 - All reports of results must contain Ranch name and Global ID, site name(s), project contact, and date.
 - Electronic laboratory data reports of chemical results shall include analytical results, as well as associated quality assurance data including method detection limits, reporting limits, matrix spikes, matrix spike duplicates, laboratory blanks, and other quality assurance results required by the analysis method.
 - Electronic laboratory data reports of toxicity results shall include summary results comparable to those required in a CEDEN file delivery, including test and control results. For each test result, the mean, associated control performance, calculated percent of control, statistical test results and determination of toxicity, must be included. Test results must specify the control ID used to calculate statistical outcomes.
 - Field data results, including temperature, pH, conductivity, turbidity and flow measurements, any field duplicates or blanks, and field observations.
 - Calculations of un-ionized ammonia concentrations
 - Calculations of total flow and pollutant loading (for nitrate, pesticides if sampled, total ammonia, and turbidity) (include formulas);
- b. Narrative description of typical irrigation runoff patterns;
- c. Location of sampling sites and map(s);
- d. Sampling and analytical methods used;
- e. Specify the method used to obtain flow at each monitoring site during each monitoring event;
- f. Photos obtained from all monitoring sites, clearly labeled with location and date;
- g. Sample chain-of-custody forms do not need to be submitted but must be made available to Central Coast Water Board staff, upon request.

PART 6. IRRIGATION AND NUTRIENT MANAGEMENT PLAN

Monitoring and reporting requirements related to the Irrigation and Nutrient Management Plan (INMP) identified in Part 6.A., and 6.B, apply to Tier 3 Dischargers identified by the Executive Officer that are newly enrolled in Order No. R3-2017-0002, and Tier 3 Dischargers that were subject to Irrigation and Nutrient Management Plan Requirements in Order R3-2012-0011 per MRP Order No. R3-2012-0011-03. Time schedules are shown in Table 5.

A. Irrigation and Nutrient Management Plan Monitoring

1. Tier 3 Dischargers required in Order No. R3-2012-0011 to develop and initiate implementation of an Irrigation and Nutrient Management Plan (INMP) certified by a Professional Soil Scientist, Professional Agronomist, or Crop Advisor certified by the American Society of Agronomy, or similarly qualified professional, are required to update (as necessary) and implement their INMP throughout the term of this Order.
2. The Executive Officer will assess whether an INMP is required for new Tier 3 Dischargers that enroll in Order No. R3-2017-0002 during the term of the Order. The Executive Officer will use the criteria established in Order No. R3-2012-0011 to make this assessment. If a Tier 3 Discharger is required to develop an INMP, the Tier 3 discharger must develop and initiate implementation of an Irrigation and Nutrient Management Plan (INMP) certified by a Professional Soil Scientist, Professional Agronomist, or Crop Advisor certified by the American Society of Agronomy, or similarly qualified professional, **within 18 months** of the Executive Officer's assessment of the INMP requirement.
3. The purpose of the INMP is to budget and manage the nutrients applied to each farm/ranch considering all sources of nutrients, crop requirements, soil types, climate, and local conditions in order to minimize nitrate loading to surface water and groundwater in compliance with this Order. The professional certification of the INMP must indicate that the relevant expert has reviewed all necessary documentation and testing results, evaluated total nitrogen applied relative to typical crop nitrogen uptake and nitrogen removed at harvest, with consideration to potential nitrate loading to groundwater, and conducted field verification to ensure accuracy of reporting.
4. Tier 3 Dischargers required to develop and initiate implementation an (INMP) must include the following elements in the INMP. The INMP is not submitted to the Central Coast Water Board, with the exception of the INMP Effectiveness Report:
 - a. Proof of INMP certification;
 - b. Map locating each farm/ranch;
 - c. Identification of crop nitrogen uptake values for use in nutrient balance calculations;

- d. Record keeping annually by either Method 1 or Method 2:
 - e. To meet the requirement to record total nitrogen in the soil, dischargers may take a nitrogen soil sample (e.g. laboratory analysis or nitrate quick test) or use an alternative method to evaluate nitrogen content in soil, prior to planting or seeding the field or prior to the time of pre-sidedressing, or at an alternative time when it is most effective to determine nitrogen present in the soil that is available for the next crop and to minimize nitrate leaching to groundwater. The amount of nitrogen remaining in the soil must be accounted for as a source of nitrogen when budgeting, and the soil sample or alternative method results must be maintained in the INMP.
 - f. Identification of irrigation and nutrient management practices in progress (identify start date), completed (identify completion date), and planned (identify anticipated start date) to reduce nitrate loading to groundwater to achieve compliance with this Order.
 - g. Description of methods Discharger will use to verify overall effectiveness of the INMP.
5. Tier 3 Dischargers must evaluate the effectiveness of the INMP. Irrigation and Nutrient Management Plan effectiveness monitoring must evaluate reduction in new nitrogen¹ loading potential based on minimized fertilizer use and improved irrigation and nutrient management practices in order to minimize new nitrogen loading to surface water and groundwater. Evaluation methods used may include, but are not limited to analysis of groundwater well monitoring data or soil sample data, or analysis of trends in new nitrogen application data.

B. Irrigation and Nutrient Management Plan Reporting

1. **By March 1, 2019**, Tier 3 Dischargers required to develop and initiate implementation of an INMP must submit an INMP Effectiveness Report to evaluate reductions in nitrate loading to surface water and groundwater based on the implementation of irrigation and nutrient management practices in a format specified by the Executive Officer. Dischargers in the same groundwater basin or subbasin may choose to comply with this requirement as a group by submitting a single report that evaluates the overall effectiveness of the broad scale implementation of irrigation and nutrient management practices identified in individual INMPs to protect groundwater. Group efforts must use data from each farm/ranch (e.g., data from individual groundwater wells, soil samples, or nitrogen application). The INMP

¹ New nitrogen is nitrogen from fertilizers, amendments, and other nitrogen sources applied other than nitrogen present in groundwater.

Effectiveness Report must include a description of the methodology used to evaluate and verify effectiveness of the INMP.

PART 7. WATER QUALITY BUFFER PLAN

Monitoring and reporting requirements related to the Water Quality Buffer Plan identified in Part 7.A. and Part 7.B. apply to Tier 3 Dischargers that have farms/ranches that contain or are adjacent to waterbody identified on the List of Impaired Waterbodies as impaired for temperature, turbidity, or sediment. Time schedules are shown in Table 5.

A. Water Quality Buffer Plan

1. **By 18 months following enrollment in Order No. R3-2017-0002 of a Tier 3 farm/ranch**, Tier 3 Dischargers adjacent to or containing a waterbody identified on the List of Impaired Waterbodies as impaired for temperature, turbidity or sediment must submit a Water Quality Buffer Plan (WQBP) to the Executive Officer that protects the listed waterbody and its associated perennial and intermittent tributaries. The purpose of the Water Quality Buffer Plan is to prevent waste discharge, comply with water quality standards (e.g., temperature, turbidity, sediment), and protect beneficial uses in compliance with this Order and the following Basin Plan requirement:

Basin Plan (Chapter 5, p. V-13, Section V.G.4 – Erosion and Sedimentation, *“A filter strip of appropriate width, and consisting of undisturbed soil and riparian vegetation or its equivalent, must be maintained, wherever possible, between significant land disturbance activities and watercourses, lakes, bays, estuaries, marshes, and other water bodies. For construction activities, minimum width of the filter strip must be thirty feet, wherever possible....”*

2. The Water Quality Buffer Plan must include the following or the functional equivalent, to address discharges of waste and associated water quality impairments:
 - a. A minimum 30 foot buffer (as measured horizontally from the top of bank on either side of the waterway, or from the high water mark of a lake and mean high tide of an estuary);
 - b. Any necessary increases in buffer width to adequately prevent the discharge of waste that may cause or contribute to any excursion above or outside the acceptable range for any Regional, State, or Federal numeric or narrative water quality standard (e.g., temperature, turbidity);

- c. Any buffer less than 30 feet must provide equivalent water quality protection and be justified based on an analysis of site-specific conditions and be approved by the Executive Officer;
 - d. Identification of any alternatives implemented to comply with this requirement, that are functionally equivalent to described buffer;
 - e. Schedule for implementation;
 - f. Maintenance provisions to ensure water quality protection;
 - g. Annual photo monitoring;
2. The WQPB must be submitted using the Water Quality Buffer Plan form, or, if an alternative to the WQBP is submitted, in a format approved by the Executive Officer.
3. **By March 1, 2019**, Tier 3 Dischargers that submitted a WQBP pursuant to Order No. R3-2012-0011 or Order No. R3-2017-0002, are required to update (as necessary) and implement their WQBP, and annually submit a WQBP Status Report of their WQBP implementation using the Water Quality Buffer Plan form, or, if an alternative to the WQBP was submitted, an Alternative to WQBP Status Report, electronically, in a format approved by the Executive Officer.

PART 8. GENERAL MONITORING AND REPORTING REQUIREMENTS

A. Submittal of Technical Reports

1. Dischargers must submit reports in a format specified by the Executive Officer (reports will be submitted electronically, unless otherwise specified by the Executive Officer). A transmittal letter must accompany each report, containing the following penalty of perjury statement signed by the Discharger or the Discharger's authorized agent:

"In compliance with Water Code §13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision following a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".

2. If the Discharger asserts that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure (e.g. trade secrets or secret processes), the Discharger must provide an explanation of how those portions of the reports are exempt from public disclosure. The

Discharger must clearly indicate on the cover of the report (typically an electronic submittal) that the Discharger asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, submit separately (in a separate electronic file) unredacted pages (to be maintained separately by staff). The Central Coast Water Board staff will determine whether any such report or portion of a report qualifies for an exemption from public disclosure. If the Central Coast Water Board staff disagrees with the asserted exemption from public disclosure, the Central Coast Water Board staff will notify the Discharger prior to making such report or portions of such report available for public inspection.

B. Central Coast Water Board Authority

1. Monitoring reports are required pursuant to section 13267 of the California Water Code. Pursuant to section 13268 of the Water Code, a violation of a request made pursuant to section 13267 may subject you to civil liability of up to \$1000 per day.
2. The Water Board needs the required information to determine compliance with Order No.R3-2017-0002. The evidence supporting these requirements is included in the findings of Order No.R3-2017-0002.

John M. Robertson
Executive Officer

Date

Table 1. Major Waterbodies in Agricultural Areas¹

Hydrologic SubArea	Waterbody Name	Hydrologic SubArea	Waterbody Name
30510	Pajaro River	30920	Quail Creek
30510	Salsipuedes Creek	30920	Salinas Reclamation Canal
30510	Watsonville Slough	31022	Chorro Creek
30510	Watsonville Creek ²	31023	Los Osos Creek
30510	Beach Road Ditch ²	31023	Warden Creek
30530	Carnadero Creek	31024	San Luis Obispo Creek
30530	Furlong Creek ²	31024	Prefumo Creek
30530	Llagas Creek	31031	Arroyo Grande Creek
30530	Miller's Canal	31031	Los Berros Creek
30530	San Juan Creek	31210	Bradley Canyon Creek
30530	Tesquisquita Slough	31210	Bradley Channel
30600	Moro Cojo Slough	31210	Green Valley Creek
30910	Alisal Slough	31210	Main Street Canal
30910	Blanco Drain	31210	Orcutt Solomon Creek
30910	Old Salinas River	31210	Oso Flaco Creek
30910	Salinas River (below Gonzales Rd.)	31210	Little Oso Flaco Creek
30920	Salinas River (above Gonzales Rd. and below Nacimiento R.)	31210	Santa Maria River
30910	Santa Rita Creek ²	31310	San Antonio Creek ²
30910	Tembladero Slough	31410	Santa Ynez River
30920	Alisal Creek	31531	Bell Creek
30920	Chualar Creek	31531	Glenn Annie Creek
30920	Espinosa Slough	31531	Los Carneros Creek ²
30920	Gabilan Creek	31534	Arroyo Paredon Creek
30920	Natividad Creek	31534	Franklin Creek

¹ At a minimum, monitoring sites must be included for these waterbodies in agricultural areas, unless otherwise approved by the Executive Officer. Monitoring sites may be proposed for addition or modification to better assess the impacts of waste discharges from irrigated lands to surface water. Dischargers choosing to comply with surface receiving water quality monitoring, individually (not part of a cooperative monitoring program) must only monitor sites for waterbodies receiving the discharge.

² These creeks are included because they are newly listed waterbodies on the 2010 303(d) list of Impaired Waters that are associated with areas of agricultural discharge.

Table 2. Surface Receiving Water Quality Monitoring Parameters

Parameters and Tests	RL ³	Monitoring Frequency ¹
Photo Monitoring		
Upstream and downstream photographs at monitoring location		With every monitoring event
<u>WATER COLUMN SAMPLING</u>		
Physical Parameters and General Chemistry		
Flow (field measure) (CFS) following SWAMP field SOP ⁹	.25	Monthly, including 2 stormwater events
pH (field measure)	0.1	"
Electrical Conductivity (field measure) (µS/cm)	2.5	"
Dissolved Oxygen (field measure) (mg/L)	0.1	"
Temperature (field measure) (°C)	0.1	"
Turbidity (NTU)	0.5	"
Total Dissolved Solids (mg/L)	10	"
Total Suspended Solids (mg/L)	0.5	"
Nutrients		
Total Nitrogen (mg/L)	0.5	Monthly, including 2 stormwater events
Nitrate + Nitrite (as N) (mg/L)	0.1	"
Total Ammonia (mg/L)	0.1	"
Unionized Ammonia (calculated value, mg/L)		"
Total Phosphorus (as P) (mg/L)	0.02	
Soluble Orthophosphate (mg/L)	0.01	"
Water column chlorophyll a (µg/L)	1.0	"
Algae cover, Floating Mats, % coverage	-	"
Algae cover, Attached, % coverage	-	"
Water Column Toxicity Test		
Algae - <i>Selenastrum capricornutum</i> (96-hour chronic; Method 1003.0 in EPA/821/R-02/013)	-	4 times each year, twice in dry season, twice in wet season
Water Flea – <i>Ceriodaphnia dubia</i> (7-day chronic; Method 1002.0 in EPA/821/R-02/013)	-	"
Midge - <i>Chironomus spp.</i> (96-hour acute; Alternate test species in EPA 821-R-02-012)	-	"

Parameters and Tests	RL ³	Monitoring Frequency ¹
Toxicity Identification Evaluation (TIE)	-	As directed by Executive Officer
Pesticides² /Herbicides (µg/L)		
Organophosphate Pesticides		
Azinphos-methyl	0.02	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Chlorpyrifos	0.005	"
Diazinon	0.005	"
Dichlorvos	0.01	"
Dimethoate	0.01	"
Dimeton-s	0.005	"
Disulfoton (Disyton)	0.005	"
Malathion	0.005	"
Methamidophos	0.02	"
Methidathion	0.02	"
Parathion-methyl	0.02	"
Phorate	0.01	"
Phosmet	0.02	"
Neonicotinoids		
Thiamethoxam	.002	"
Imidacloprid	.002	"
Thiacloprid	.002	"
Dinotefuran	.006	"
Acetamiprid	.01	"
Clothianidin	.02	"
Herbicides		
Atrazine	0.05	"
Cyanazine	0.20	"
Diuron	0.05	"
Glyphosate	2.0	"
Linuron	0.1	"
Paraquat	0.20	"
Simazine	0.05	"
Trifluralin	0.05	"
Metals (µg/L)		
Arsenic (total) ^{5,7}	0.3	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Boron (total) ^{6,7}	10	"
Cadmium (total & dissolved) ^{4,5,7}	0.01	"

Parameters and Tests	RL ³	Monitoring Frequency ¹
Copper (total and dissolved) ^{4,7}	0.01	"
Lead (total and dissolved) ^{4,7}	0.01	"
Nickel (total and dissolved) ^{4,7}	0.02	"
Molybdenum (total) ⁷	1	"
Selenium (total) ⁷	0.30	"
Zinc (total and dissolved) ^{4,5,7}	0.10	"
Other (µg/L)		
Total Phenolic Compounds ⁸	5	2 times in 2017, once in spring (April-May) and once in fall (August-September)
Hardness (mg/L as CaCO ₃)	1	"
Total Organic Carbon (ug/L)	0.6	"
SEDIMENT SAMPLING		
Sediment Toxicity - <i>Hyalella azteca</i> 10-day static renewal (EPA, 2000)		2 times each year, once in spring (April-May) and once in fall (August-September)
Pyrethroid Pesticides in Sediment (µg/kg)		
Gamma-cyhalothrin	2	2 times in both 2017 and 2018, once in spring (April-May) and once in fall (August-September) of each year, concurrent with sediment toxicity sampling
Lambda-cyhalothrin	2	"
Bifenthrin	2	"
Beta-cyfluthrin	2	"
Cyfluthrin	2	"
Esfenvalerate	2	"
Permethrin	2	"
Cypermethrin	2	"
Danitol	2	"
Fenvalerate	2	"
Fluvalinate	2	"
Other Monitoring in Sediment		
Chlorpyrifos (µg/kg)	2	"
Total Organic Carbon	0.01%	"
		"
Sediment Grain Size Analysis	1%	"

¹Monitoring is ongoing through all five years of the Order, unless otherwise specified. Monitoring frequency may be used as a guide for developing alternative Sampling and Analysis Plan.

²Pesticide list may be modified based on specific pesticide use in Central Coast Region. Analytes on this list must be reported, at a minimum.

³Reporting Limit, taken from SWAMP where applicable.

⁴ Holmgren, Meyer, Cheney and Daniels. 1993. Cadmium, Lead, Zinc, Copper and Nickel in Agricultural Soils of the United States. J. of Environ. Quality 22:335-348.

⁵ Sax and Lewis, ed. 1987. Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. Zinc arsenate is an insecticide.

⁶ <http://www.coastalagro.com/products/labels/9%25BORON.pdf>; Boron is applied directly or as a component of fertilizers as a plant nutrient.

⁷ Madramootoo, Johnston, Willardson, eds. 1997. Management of Agricultural Drainage Water Quality. International Commission on Irrigation and Drainage. U.N. FAO. SBN 92-6-104058.3.

⁸ <http://cat.inist.fr/?aModele=afficheN&cpsid=14074525>; Phenols are breakdown products of herbicides and pesticides. Phenols can be directly toxic and cause endocrine disruption.

⁹ See SWAMP field measures SOP, p. 17

mg/L – milligrams per liter; ug/L – micrograms per liter; ug/kg – micrograms per kilogram;

NTU – Nephelometric Turbidity Units; CFS – cubic feet per second;

Table 3. Groundwater Monitoring Parameters

Parameter	RL	Analytical Method ³	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10	EPA Method 310.1 or 310.2	mg/L
Total Alkalinity as CaCO ₃	1		
Calcium	0.05	General Cations ¹ EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO ₄)	1.0	General Anions EPA Method 300 or EPA Method 353.2	
Chloride	0.1		
Nitrate + Nitrite (as N) ² or Nitrate as N	0.1		

¹ General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater monitoring and laboratory analysis.

² The MRP allows analysis of “nitrate plus nitrite” to represent nitrate concentrations (as N). The “nitrate plus nitrite” analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate.

³ Dischargers may use alternative analytical methods approved by EPA.

RL – Reporting Limit; µS/cm – micro siemens per centimeter

Table 4A. Individual Discharge Monitoring for Tailwater, Tile drain, and Stormwater Discharges

Parameter	Analytical Method ¹	Maximum PQL	Units	Min Monitoring Frequency
Discharge Flow or Volume	Field Measure	---	CFS	(a) (d)
Approximate Duration of Flow	Calculation	---	hours/month	
Temperature (water)	Field Measure	0.1	° Celsius	
pH	Field Measure	0.1	pH units	

Electrical Conductivity	Field Measure	100	µS/cm	(b) (c) (d)
Turbidity	SM 2130B, EPA 180.1	1	NTUs	
Nitrate + Nitrite (as N)	EPA 300.1, EPA 353.2	0.1	mg/L	
Ammonia	SM 4500 NH3, EPA 350.3	0.1	mg/L	
Chlorpyrifos ²	EPA 8141A, EPA 614	0.02	ug/L	
Diazinon ²				
Ceriodaphnia Toxicity (96-hr acute)	EPA-821-R-02-012	NA	% Survival	
Hyalella Toxicity in Water (96-hr acute)	EPA-821-R-02-012	NA	% Survival	

¹ In-field water testing instruments/equipment as a substitute for laboratory analysis if the method is approved by EPA, meets RL/PQL specifications in the MRP, and appropriate sampling methodology and quality assurance checks can be applied to ensure that QAPP standards are met to ensure accuracy of the test.

² If chlorpyrifos or diazinon is used at the farm/ranch, otherwise does not apply. The Executive Officer may require monitoring of other pesticides based on results of downstream receiving water monitoring.

(a) Two times per year during primary irrigation season for farms/ranches less than or equal to 500 acres, and four times per year during primary irrigation season for farms/ranches greater than 500 acres. Executive Officer may reduce sampling frequency based on water quality improvements.

(b) Once per year during primary irrigation season for farms/ranches less than or equal to 500 acres, and two times per year during primary irrigation season for farms/ranches greater than 500 acres.

(c) Sample must be collected within one week of chemical application, if chemical is applied on farm/ranch;

(d) Once per year during wet season (October – March) for farms/ranches less than or equal to 500 acres, and two times per year during wet season for farms/ranches greater than 500 acres, within 18 hours of major storm events; CFS – Cubic feet per second; NTU – Nephelometric turbidity unit; PQL – Practical Quantitation Limit;

NA – Not applicable

Table 4B. Individual Discharge Monitoring for Tailwater Ponds and other Surface Containment Features

Parameter	Analytical Method ¹	Maximum PQL	Units	Minimum Monitoring Frequency
Volume of Pond	Field Measure	1	Gallons	(a) (d)
Nitrate + Nitrite (as N)	EPA 300.1, EPA 353.2	50	mg/L	

¹ In-field water testing instruments/equipment as a substitute for laboratory analysis if the method is approved by EPA, meets RL/PQL specifications in the MRP, and appropriate sampling methodology and quality assurance checks can be applied to ensure that QAPP standards are met to ensure accuracy of the test.

(a) Four times per year during primary irrigation season; Executive Officer may reduce monitoring frequency based on water quality improvements.

(d) Two times per year during wet season (October – March, within 18 hours of major storm events)

Table 5. Tier 3 - Time Schedule for Key Monitoring and Reporting Requirements (MRPs)

REQUIREMENT	TIME SCHEDULE ¹
Submit Sampling And Analysis Plan and Quality Assurance Project Plan (SAAP/QAPP) for Surface Receiving Water Quality Monitoring (<i>individually or</i>	By March 1, 2018, or as directed by the Executive Officer; satisfied if an approved SAAP/QAPP has been submitted pursuant

<i>through cooperative monitoring program)</i>	to Order No. R3-2012-0011 and associated MRPs
Initiate surface receiving water quality monitoring (<i>individually or through cooperative monitoring program</i>)	Per an approved SAAP and QAPP
Submit surface receiving water quality monitoring data (<i>individually or through cooperative monitoring program</i>)	Each January 1, April 1, July 1, and October 1
Submit surface receiving water quality Annual Monitoring Report (<i>individually or through cooperative monitoring program</i>)	By July 1 2017; annually thereafter by July 1
Initiate monitoring of groundwater wells	First sample from March-June 2017, second sample from September-December 2017
Submit individual surface water discharge SAAP and QAPP	By March 1, 2018 or as directed by the Executive Officer; waived if an approved SAAP and QAPP has been submitted and being implemented pursuant to Order No. R3-2012-0011.
Initiate individual surface water discharge monitoring	As described in an approved SAAP and QAPP
Submit individual surface water discharge monitoring data	March 1, 2018, and every March 1 annually thereafter
Submit electronic Annual Compliance Form	March 1, 2018 and every March 1 annually thereafter
Submit groundwater monitoring results	Within 60 days of the sample collection
Submit Water Quality Buffer Plan or alternative	Within 18 months of enrolling new Tier 3 farm/ranch in Order
Submit Status Report on Water Quality Buffer Plan or alternative	March 1, 2019
<i>Tier 3 Dischargers with farms/ranches growing high risk crops:</i>	
Report total nitrogen applied on the Total Nitrogen Applied form	March 1, 2018 and every March 1 annually thereafter
Submit INMP Effectiveness Report	March 1, 2019

¹ Dates are relative to adoption of this Order, unless otherwise specified.

**STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

**PROPOSED GENERAL WASTE DISCHARGE REQUIREMENTS
FOR
DISCHARGES FROM IRRIGATED LANDS**

ORDER NO. R3-2021-0040

April XX, 2021

ORDER

Table of Contents

Part 1, Section A. Findings.....	1
Background and Purpose	1
Public Participation Process	4
Scope of Order	6
Enforcement for Noncompliance	8
Order Effectiveness Evaluation	9
Additional Findings and Regulatory Considerations	9
Part 2, Section A. Enrollment, Fees, Termination, General Provisions, and Third- Party Programs .	11
Enrollment	11
Fees	13
Termination	13
General Provisions	13
Third-Party Programs	15
Part 2, Section B. Planning, Education, Management Practices, and CEQA.....	18
Farm Water Quality Management Plan (Farm Plan)	18
Continuing Education	19
Management Practice Implementation and Assessment	20
CEQA Mitigation Measure Implementation, Monitoring, and Reporting	20
Part 2, Section C.1. Groundwater Protection.....	20
Phasing	20
Irrigation and Nutrient Management Plan	21
Quantifiable Milestones and Time Schedules	22
Monitoring and Reporting	28
Part 2, Section C.2. Third-Party Alternative Compliance Pathway for Groundwater Protection.....	30
Quantifiable Milestones and Time Schedules	31
Fertilizer Nitrogen Application Targets	31
Nitrogen Discharge Targets	32
Groundwater Protection Areas, Formulas, Values, and Targets	32
Monitoring and Reporting	34
Part 2, Section C.3. Surface Water Protection.....	34
Priority Areas (Individual)	34
Priority Areas (Third-Party Program)	35

Irrigation and Nutrient Management	35
Pesticide Management	35
Sediment and Erosion Management	36
Farm Plan	37
Monitoring and Reporting	38
Part 2, Section D. Additional Requirements and Prohibitions.....	41
Waste Discharge Control and Prohibitions	41
Additional Requirements	45
Tables and Figures related to Part 2, Section C.1. Groundwater Protection	48
Table C.1-1. Groundwater Phase Areas	48
Figure C.1-1: Groundwater Phase Areas	49
Table C.1-2. Compliance Dates for Fertilizer Nitrogen Application Limits	50
Table C.1-3. Compliance Dates for Nitrogen Discharge Targets and Limits	51
Tables and Figures related to Part 2, Section C.2. Third-Party Alternative Compliance Pathway for Groundwater Protection	52
Table C.2-1. Compliance Dates for Fertilizer Nitrogen Application Targets (Alternative Compliance Pathway)	52
Table C.2-2. Compliance Dates for Nitrogen Discharge Targets (Alternative Compliance Pathway)	52
Tables and Figures related to Part 2, Section C.3. Surface Water Protection.....	53
Table C.3-1. Surface Water Priority Areas	53
Figure C-3.1: Surface Water Priority Areas	54
Table C.3-1.3P. Surface Water Priority Areas (Third-Party Program)	55
Figure C-3.1.3P: Surface Water Priority Areas (Third-Party Program)	57
Table C.3-2. Compliance Dates for Nutrient Limits (TMDL areas)	58
Table C.3-3. Compliance Dates for Nutrient Limits (Non-TMDL areas)	62
Figure C.3-2: Nutrient TMDL Areas	63
Table C.3-4. Compliance Dates for Pesticide and Toxicity Limits (TMDL areas)	64
Table C.3.5. Compliance Dates for Pesticide and Toxicity Limits (Non-TMDL areas)	70
Figure C.3-3: Pesticide and Toxicity TMDL Areas	72
Table C.3-6. Compliance Dates for Sediment Limits (TMDL areas)	73
Table C.3-7. Compliance Dates for Turbidity Limits (Non-TMDL areas)	73
Figure C.3-4: Sediment TMDL Areas	74

Attachments

Attachment A – Additional Findings and Regulatory Considerations

Attachment B – Monitoring and Reporting Program (MRP)

Attachment C – Acronyms, Abbreviations, and Definitions

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, CENTRAL COAST REGION FINDS:

Part 1, Section A. Findings

Background and Purpose

1. As described in the Water Quality Control Plan for the Central Coastal Basin (Basin Plan), the central coast region of California represents approximately 7.2 million acres of land. There are approximately 540,000 acres of irrigated land and approximately 3,000 agricultural operations that may be generating wastewater that falls into the category of discharges of waste from irrigated lands.
2. The central coast region has more than 17,000 miles of surface waters (linear streams/rivers) and approximately 4,000 square miles of groundwater basins that are, or may be, affected by discharges of waste from irrigated lands. Of the nine hydrologic regions in the state, the central coast region is the most groundwater dependent region with approximately 86% of its water supply being derived from groundwater.
3. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) are the principal state agencies with primary responsibility for the coordination and control of water quality for the health, safety and welfare of the people of the state pursuant to the Porter-Cologne Water Quality Control Act (Porter-Cologne Act, codified in Water Code Division 7). The legislature, in the Porter-Cologne Act, directed the state, through the Water Boards, to exercise its full power and jurisdiction to protect the quality of the waters in the state from degradation and to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible, and considering precipitation, topography, population, recreation, agriculture, industry, and economic development (Water Code section 13000).
4. Since the issuance of the first Agricultural Order in 2004 and subsequent Agricultural Orders in 2012 and 2017, the California Regional Water Quality Control Board, Central Coast Region (Central Coast Water Board) has compiled additional and substantial empirical data demonstrating that water quality conditions in agricultural areas of the region continue to be severely impaired or polluted by waste discharges from irrigated agricultural operations and activities that impair beneficial uses. The main impacts from irrigated agriculture in the central coast region are nitrate discharges to groundwater and associated drinking water impacts, nutrient discharges to surface water, pesticide discharges

and associated toxicity, sediment discharges, and degradation of riparian and wetland areas and the associated impairment or loss of beneficial uses.

5. The objectives of this Order are:
 - a. Protect and restore beneficial uses and achieve water quality objectives specified in the Basin Plan for commercial irrigated agricultural areas in the central coast region by:
 - i. Minimizing nitrate discharges to groundwater,
 - ii. Minimizing nutrient discharges to surface water,
 - iii. Minimizing toxicity in surface water from pesticide¹ discharges,
 - iv. Protecting riparian and wetland habitat, and
 - v. Minimizing sediment discharges to surface water.
 - b. Effectively track and quantify achievement of 5.a.i through 5.a.v over a specific, defined time schedule.
 - c. Comply with the State's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (NPS Policy), the State Antidegradation Policy, relevant court decisions such as those pertaining to *Coastkeeper et al*/lawsuits, the precedential language in the Eastern San Joaquin Watershed Agricultural Order, and other relevant statutes and water quality plans and policies, including total maximum daily loads in the central coast region.
6. This Order regulates discharges of waste from irrigated lands by requiring individuals subject to this Order to comply with the terms and conditions set forth herein to ensure that such discharges do not cause or contribute to the exceedance of any regional, state, or federal numeric or narrative water quality objectives or impair any beneficial uses in waters of the state and of the United States.
7. Water Code section 13260(a) requires that any person discharging waste or proposing to discharge waste that could affect the quality of the waters of the state, other than into a community sewer system, must file with the appropriate Regional Board a report of waste discharge (ROWD) containing such information and data as may be required by the Central Coast Water Board, unless the Central Coast Water Board waives such requirement.
8. Water Code section 13263(a) requires the Central Coast Water Board to prescribe waste discharge requirements (WDRs), or waive WDRs, for the discharge. The requirements must implement the Basin Plan and must take into

¹ A pesticide is any substance intended to control, destroy, repel, or otherwise mitigate a pest. The term pesticide is inclusive of all pest and disease management products, including insecticides, herbicides, fungicides, nematicides, rodenticides, algicides, etc.

consideration the beneficial uses to be protected and the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Water Code section 13241.

9. Water Code section 13263(b) states that, in prescribing requirements, the Central Coast Water Board need not authorize the utilization of the full waste assimilation capacities of the receiving waters.
10. This Order does not create a vested right to discharge; all discharges are a privilege, not a right, as described in Water Code section 13263(g).
11. Water Code section 13263(i) authorizes the Central Coast Water Board to prescribe general WDRs for a category of discharges if the Central Coast Water Board finds or determines that all the criteria listed below apply to the discharges in that category. Discharges associated with irrigated agricultural operations that will be regulated under this Order are consistent with these criteria and therefore a general order is appropriate.
 - a. The discharges are produced by the same or similar operations.
 - b. The discharges involve the same or similar type of waste.
 - c. The discharges require the same or similar treatment standards.
 - d. The discharges are more appropriately regulated under general WDRs than individual WDRs.
12. Water Code section 13243 authorizes the Central Coast Water Board, in WDRs, to specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted.
13. Water Code section 13267(a) authorizes the Central Coast Water Board to, in establishing or reviewing waste discharge requirements, or in connection with any action to any plan or requirement authorized by the Porter-Cologne Act, investigate the quality of any waters of the state within the region. The monitoring and reporting requirements as set forth in Attachment B are established under Water Code section 13267(b).
14. Water Code section 13267(c) authorizes the Central Coast Water Board or its authorized representatives to, in conducting an investigation of the quality of waters of the state within the region, inspect the facilities of the Discharger upon consent, issuance of a warrant, or in an emergency affecting public health or safety, to ascertain compliance with this Order and to ascertain whether the purpose of the Porter-Cologne Act are being met. Inspections under Water Code section 13267(c) include sampling and monitoring.
15. Water Code section 13304 authorizes the Central Coast Water Board to, upon making the requisite findings, issue a cleanup and abatement order (CAO) that

requires Dischargers to provide emergency and long-term alternative water supplies or replacement water service, including wellhead treatment, to each affected public water supplier or private well owners. A CAO is a separate action from this Order; this Order does not require Dischargers to provide alternative water supplies or replacement water.

Public Participation Process

16. In August 2017, Central Coast Water Board staff held a series of listening sessions throughout the central coast region to solicit stakeholder input on potential improvements to the previous agricultural order. The Central Coast Water Board discussed the input received from stakeholders during the September 2017 board meeting.
17. In February 2018, the Central Coast Water Board published an initial study to begin soliciting input related to environmental review for the California Environmental Quality Act (CEQA), in preparation for developing a draft Environmental Impact Report (EIR). A 73-day public comment period was held for the initial study. In March 2018, Central Coast Water Board staff held a series of public CEQA scoping meetings throughout the region. Input received during the public comment period and public scoping meetings has been considered in the development of the draft EIR.
18. In March and May 2018, Central Coast Water Board meetings included informational items dedicated to a review of water quality conditions associated with agricultural activities and discharges. The March 2018 informational item focused on surface water quality conditions and agricultural discharges and the May 2018 informational item focused on groundwater quality conditions and nitrate impacts to groundwater. Both informational items incorporated presentations from several outside speakers.
19. In September 2018, the Central Coast Water Board's public meeting was dedicated to a workshop for agricultural order stakeholders. Panels of agricultural, environmental, and environmental justice representatives gave presentations to the board in response to a series of questions staff proposed:
 - a. What can growers and the regional board do to demonstrate quantifiable progress to minimize nitrate discharge to groundwater to achieve water quality objectives?
 - b. What can growers and the regional board do to demonstrate quantifiable progress to minimize nutrient discharge to surface waters to achieve water quality objectives?
 - c. What can growers and the regional board do to demonstrate quantifiable progress to minimize toxicity in surface waters from pesticide discharges to achieve water quality objectives?

- d. What can growers and the regional board do to ensure that riparian and wetland habitat is protected due to agricultural activities and discharges?
 - e. What can growers and the regional board do to demonstrate quantifiable progress to minimize sediment discharge to achieve water quality objectives?
 - f. How can the regional board use discharge permit requirements to ensure current and future affordable, safe, and clean water for drinking and environmental uses?
20. In November 2018, the Central Coast Water Board published a set of five conceptual options tables that serve as the Central Coast Water Board's framework to address the questions posed in the September 2018 meeting. The Central Coast Water Board reviewed and discussed the options tables during its public meeting in November, and a 64-day written public comment period was subsequently held to solicit detailed stakeholder input. Central Coast Water Board staff held a series of outreach meetings throughout the region during the comment period.
21. In March 2019, after the 64-day public comment period, the Central Coast Water Board published updated versions of the five conceptual options tables. During the public meetings in March and May 2019, the Central Coast Water Board discussed the updated tables and received additional stakeholder comment.
22. In September 2019, during its public meeting, the Central Coast Water Board held a workshop focused on co-managing food safety and environmental protection, the role of riparian vegetation in water quality and beneficial use protection, and Discharger experiences with food safety challenges.
23. On February 21, 2020, the Central Coast Water Board published the draft Order and draft EIR and began a 45-day public comment period. The comment period was extended twice and closed on June 22, 2020.
24. In June 2020, Central Coast Water Board staff conducted three outreach meetings, which included presentations of the draft Order and draft EIR, and a question and answer session for attendees. These outreach meetings were conducted virtually via the Zoom platform, due to the COVID-19 pandemic.
25. Beginning on September 10, 2020 and continuing to January 8, 2021, the Central Coast Water Board held 10 days of Board meetings to receive oral comments from the public and to discuss the draft Order. During these meetings, three of which were devoted entirely to receiving public comment and Board engagement with stakeholders, the Board deliberated on the draft Order using a consensus-based approach through which they directed staff on the development of a revised Order.

26. On January 26, 2021, the Central Coast Water Board circulated a revised draft Order for a 30-day public comment period that closed on February 25, 2021. Central Coast Water Board staff subsequently considered the public comments and developed a proposed Order for Board consideration during an April 14-16, 2021, public hearing.
27. The Central Coast Water Board, in a public hearing held on April 14-16, 2021, has heard and considered all comments pertaining to the discharge and proposed Order.
28. After considering all comments pertaining to this General Permit during a public hearing on April 14-16, 2021, this Order was found consistent with the findings in this Part 1 and Attachment A.
29. Any person aggrieved by this action of the Central Coast Water Board may petition the State Water Board to review the action in accordance with California Water Code section 13320 and title 23 California Code of Regulations sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., within 30 calendar days of the date of adoption of this Order at the following address, except that if the thirtieth day following the date of adoption falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

Or by email at waterqualitypetitions@waterboards.ca.gov

For instructions on how to file a petition for review, see
[http://www.waterboards.ca.gov/public_notices/petitions/water_quality/wqp
petition_instr.shtml](http://www.waterboards.ca.gov/public_notices/petitions/water_quality/wqp petition_instr.shtml).

Scope of Order

Irrigated Lands and Agricultural Discharges Regulated Under this Order

30. This Order regulates (1) discharges of waste from commercial irrigated lands, including, but not limited to, land planted to row, vineyard, field and tree crops where water is applied for producing commercial crops; (2) discharges of waste from commercial nurseries, nursery stock production, and greenhouse operations with soil floors that do not have point source-type discharges and are not currently operating under individual WDRs; and (3) discharges of waste from

lands that are planted to commercial crops that are not yet marketable, such as vineyards and tree crops.

31. Discharges from irrigated lands regulated by this Order include discharges to surface water and groundwater, through mechanisms such as irrigation return flows, percolation, tailwater, tile drain water, stormwater runoff flowing from irrigated lands, stormwater runoff conveyed in channels or canals resulting from the discharge from irrigated lands, and runoff resulting from frost control or operational spills. These discharges can contain wastes that could affect the quality of waters of the state and impair beneficial uses.
32. This Order also regulates agricultural activities such as the removal or degradation of riparian vegetation resulting in the loss or degradation of instream beneficial uses.

Dischargers Regulated Under this Order

33. This Order regulates both landowners and operators of commercial irrigated lands on or from which there are discharges of waste or activities that could affect the quality of any surface water or groundwater or result in the impairment of beneficial uses (Dischargers). Dischargers are responsible for complying with the conditions of this Order. Both the landowner and the operator of the irrigated agricultural land are Dischargers under this Order. The Central Coast Water Board will hold both the landowner and the operator liable for noncompliance with this Order, regardless of whether the landowner or the operator is the party to enroll under this Order.
34. For the purposes of this Order, irrigated lands producing commercial crops are those operations that have one or more of the following characteristics:
 - a. The landowner or operator has obtained a pesticide use permit from a local County Agricultural Commissioner;
 - b. The crop is sold, including but not limited to 1) an industry cooperative, 2) a harvest crew/company, or 3) a direct marketing location, such as certified Farmers Markets;
 - c. The federal Department of Treasury Internal Revenue Service for 1040 Schedule F Profit or Loss from Farming is used to file federal taxes.
35. The electronic Notice of Intent (eNOI) serves as a report of waste discharge (ROWD) for the purposes of this Order.
36. The Central Coast Water Board recognizes that certain limited resource growers² (as defined by the U.S. Department of Agriculture) may have difficulty achieving

² The term "Limited Resource Farmer or Rancher" means a participant:

compliance with this Order. The Central Coast Water Board will prioritize assistance for these growers, including but not limited to technical assistance, grant opportunities, and necessary flexibility to achieve compliance with this Order (e.g., adjusted monitoring, reporting, or time schedules).

Agricultural Dischargers Not Covered Under this Order and Who Must Apply for Individual Waste Discharge Requirements

37. This Order does not cover point source-type discharges from commercial nurseries, nursery stock production, greenhouses, or other operations. This Order does not cover discharges of waste from fully contained greenhouse operations (i.e., those that have no groundwater discharge due to impermeable floors but may have other discharges associated with the operation). These operations must either eliminate all such discharges of waste or submit a ROWD to apply for individual WDRs as set forth in Water Code section 13260.

Enforcement for Noncompliance

38. The State Water Board's Water Quality Enforcement Policy (Enforcement Policy) describes progressive enforcement action for violations of WDRs when appropriate. However, the Enforcement Policy recommends formal enforcement as a first response to more significant violations. Progressive enforcement is an escalating series of actions that allows for the efficient and effective use of enforcement resources to 1) assist cooperative Dischargers in achieving compliance; 2) compel compliance for repeat violations and recalcitrant violators; and 3) provide a disincentive for noncompliance. Progressive enforcement actions may begin with informal enforcement actions such as a verbal, written, or electronic communication between the Central Coast Water Board and a Discharger. The purpose of an informal enforcement action is to quickly bring the violation to the Discharger's attention and to give the Discharger an opportunity to return to compliance as soon as possible. The highest level of informal enforcement is a Notice of Violation.

39. The Enforcement Policy recommends formal enforcement actions for the highest priority violations, chronic violations, and/or threatened violations. Violations of this Order that will be considered a priority include, but are not limited to:

a. Failure to obtain required regulatory coverage;

-
- With direct or indirect gross farm sales not more than the current indexed value in each of the previous two years, and
 - Who has a total household income at or below the national poverty level for a family of four, or less than 50 percent of county median household income in each of the previous two years.

A Self-Determination Tool is available to the public and may be completed on-line or printed and completed hardcopy at the [USDA website](https://www.usda.gov):

<https://Irftool.sc.egov.usda.gov/DeterminationTool.aspx?fyYear=2020>

- b. Failure to achieve numeric limits;
- c. Falsifying information or intentionally withholding information required by applicable laws, regulations, or an enforcement order;
- d. Failure to monitor or provide complete and accurate information as required;
- e. Failure to pay annual fees, penalties, or liabilities; and
- f. Failure to submit required reports on time.

40. Water Code section 13350 provides that any person who violates WDRs may be 1) subject to administrative civil liability imposed by the Central Coast Water Board or State Water Board in an amount of up to \$5,000 per day of violation, or up to \$10 per gallon of waste discharged; or 2) subject to civil liability imposed by a court in an amount of up to \$15,000 per day of violation, or up to \$20 per gallon of waste discharged. The actual calculation and determination of administrative civil penalties must be consistent with the Enforcement Policy and the Porter-Cologne Act.

Order Effectiveness Evaluation

41. Water Code section 13263(e) states that for WDRs, "Upon application by any affected person, or on its own motion, the regional board may review and revise requirements. All requirements shall be reviewed periodically." It is the expressed intent of the Central Coast Water Board that its staff and, as appropriate, third-party groups or programs provide annual updates to the board during public meetings regarding the implementation of this Order. The purpose of the updates is to evaluate and report out on individual discharger and third-party group compliance; identify successes, challenges, and emerging science and management practices; consider potential Order modifications as may be appropriate at five-year intervals; and generally inform the Board and public regarding the Order's effectiveness towards achieving the stated objectives.

Additional Findings and Regulatory Considerations

42. Attachment A to this Order, incorporated herein, includes additional findings that further describe the Water Board's legal and regulatory authority; compliance with CEQA requirements; applicable plans and policies adopted by the State Water Board and the Central Coast Water Board that contain regulatory conditions that apply to the discharge of waste from irrigated lands; and the rationale for this Order, including descriptions of the environmental and agricultural resources in the central coast region and impacts to water quality and beneficial uses from agricultural discharges.

43. The Central Coast Water Board encourages Dischargers to participate in third-party groups or programs (e.g., certification program, watershed group, water quality coalition, monitoring coalition, or other third-party effort) to facilitate and document compliance with this Order. Third-party programs can be used to

implement outreach and education, monitoring and reporting, management practice and/or water quality improvement projects. Regionally scaled third-party programs addressing multiple Order requirements are preferred to provide economies of scale to reduce Discharger costs, maximize effectiveness, and streamline Water Board oversight; however, watershed- or basin-scale third-party programs of limited scope may be appropriate under certain circumstances and should be coordinated to the extent practicable for consistency and effectiveness. Commodity group certification programs may also be effective in facilitating compliance with this Order. Dischargers participating in an Executive Officer approved third-party program may be subject to permit fee reductions or alternative compliance pathways that substantively comply with this Order.

44. The Central Coast Water Board acknowledges that it will take time to develop meaningful and effective third-party programs that facilitate compliance with this Order. The Order considers this by allowing an initial grace period for the phasing in of various requirements. The phasing in of various requirements is also intended to allow Water Board staff time to develop online reporting tools and templates and to conduct outreach and education to help Dischargers and service providers come up to speed on the new requirements.
45. Third-party programs are discussed in **Part 2, Section A**. The Central Coast Water Board will provide more detailed third-party expectation documents and/or third-party program requests for proposals (RFPs) to inform and solicit third-party program proposals for Executive Officer consideration.
46. The Executive Officer may make non-substantive changes to the Order to correct typographical errors or to maintain consistency within the Order or between the Order and its Attachments, e.g., to conform changes made during the Order development process that were inadvertently not carried through the entire Order. [The Board will provide public notice of the non-substantive changes.]

IT IS HEREBY ORDERED that Order No. R3-2017-0002 is terminated as of the effective date of this Order except for the purposes of enforcement, and that pursuant to Water Code sections 13260, 13263, and 13267, Dischargers enrolled in this Order, their agents, successors, and assigns, must comply with the following terms and conditions to meet the provisions contained in Water Code Division 7 and regulations, plans, and policies adopted thereunder.

Part 2, Section A. Enrollment, Fees, Termination, General Provisions, and Third-Party Programs

1. This Order is effective upon adoption by the Central Coast Water Board.
2. Except where stated otherwise, all requirements of this Order apply to all Dischargers.

Enrollment

3. Enrollment in this Order requires the submittal of the electronic Notice of Intent (eNOI) pursuant to Water Code section 13260. Submittal of all other technical reports pursuant to this Order is required pursuant to Water Code section 13267. Failure to submit technical reports or the attachments in accordance with the time schedules established by this Order or Monitoring and Reporting Program (MRP), or failure to submit a complete technical report (i.e., of sufficient technical quality to be acceptable to the Executive Officer), may subject the Discharger to enforcement action pursuant to Water Code sections 13261, 13268, or 13350. Dischargers must submit technical reports in the format specified by the Executive Officer.
4. Dischargers who are not currently enrolled in the existing agricultural order must submit to the Central Coast Water Board a complete eNOI prior to discharging. Upon submittal of a complete and accurate eNOI, the Discharger is enrolled under this Order, unless otherwise informed by the Executive Officer.
5. Dischargers who were enrolled in Order R3-2017-0002 as of the effective date of this Order are automatically enrolled in this Order.
6. In the case where an operator may be operating for a period of less than 12 months, the landowner must submit the eNOI. In all other cases, either the landowner or the operator must submit the eNOI. Both the landowner and the operator are Dischargers and considered a responsible party for compliance with the requirements of this Order.
7. **Prior to any discharge or commencement of activities that may cause a discharge**, including land preparation prior to crop production, any Discharger proposing to control or own a new operation or ranch that has the potential to

discharge waste that could directly or indirectly reach waters of the state and/or affect the quality of any surface water and/or groundwater must submit an eNOI.

8. **Within 60 days** of any change in operation or ranch information, the Discharger must update the eNOI.
9. **Within 60 days** of any change in control or ownership of an operation, ranch, or land presently owned or controlled by the Discharger, the Discharger must notify the succeeding owner and operator of the existence of this Order.
10. **Within 60 days** of acquiring control or ownership of an existing operation or ranch, the succeeding Discharger must submit an eNOI.
11. Dischargers must submit all the information required in the eNOI form, including but not limited to the following information for the operation and individual ranch:
 - a. Assessor parcel numbers (APNs) covered by enrollment,
 - b. Landowner(s),
 - c. Operator(s),
 - d. Contact information,
 - e. Third-party program membership,
 - f. Location of operation, including specific ranch(es),
 - g. Map with discharge locations and groundwater wells identified,
 - h. Type and number of groundwater wells located on ranch parcels,
 - i. Total and irrigated acreage,
 - j. Crop types grown,
 - k. Irrigation system type,
 - l. Discharge type,
 - m. Chemical use,
 - n. Slope,
 - o. Impermeable surfaces,
 - p. Presence and location of any waterbodies on or adjacent to the ranch.
 - q. Status of drinking water notification to well users
12. Dischargers or groups of Dischargers seeking regulatory requirements tailored to their specific operation, ranch, geographic area, or commodity may submit an ROWD to obtain an individual order or MRP, or request the development of a general order for a specific type of discharge (e.g., commodity-specific general order). This Order remains applicable to those Dischargers until the Central Coast Water Board adopts such an individual order, MRP, or general order, and, if applicable, the Dischargers are enrolled in the general order.
13. Dischargers seeking enrollment in this Order must submit a statement of understanding of the conditions of this Order and MRP signed by the Discharger (landowner or operator) with the eNOI. If the operator signs and submits the

electronic NOI, the operator must provide a copy of the complete NOI form to the landowner(s).

14. Coverage under this Order is not transferable to any person except after the succeeding Discharger's submittal to the Central Coast Water Board of an updated eNOI and approval by the Executive Officer.

Fees

15. Dischargers must pay a fee to the State Water Resources Control Board in compliance with the fee schedule contained in Title 23 California Code of Regulations.
16. Dischargers must pay any relevant third-party program fees (e.g., Surface Water Third-Party Monitoring Program (aka Cooperative Monitoring Program or CMP) necessary to comply with monitoring and reporting conditions of this Order or they must comply with monitoring and reporting requirements individually.
17. For Dischargers who choose to participate in a third-party program, failure to pay third-party program fees voids a selection or notification of the option to participate in the third-party program and hence requires Dischargers to immediately comply with individual groundwater protection and/or surface water protection requirements.

Termination

18. **Immediately**, if a Discharger wishes to terminate coverage under this Order for the operation or an individual ranch, the Discharger must submit a complete Notice of Termination (NOT), in a format specified by the Executive Officer. Termination from coverage is the date the termination request is approved, unless specified otherwise. All discharges must cease before the date of termination, and any discharges on or after the date of termination are violations of this Order, unless covered by other WDRs or waivers of WDRs. All required monitoring and reporting are due **within 60 days of the termination or March 1 following the termination date**, whichever is sooner, unless otherwise directed by the Executive Officer.

General Provisions

19. The unauthorized discharge of any waste not specifically regulated by this Order, is prohibited.
20. The discharge of waste at a location or in a manner different from that described in the eNOI is prohibited.

21. Dischargers must comply with the Monitoring and Reporting Program (MRP), incorporated herein as Attachment B.
22. All forms, reports, documents, and laboratory data must be submitted to the Central Coast Water Board electronically through the State Water Board's database systems (e.g., GeoTracker, CEDEN,³ etc.).
23. Dischargers are defined in this Order as both the landowner and the operator of irrigated agricultural land on or from which there are discharges of waste from irrigated agricultural activities that could affect the quality of any surface water or groundwater. The Central Coast Water Board will hold both the landowner and the operator liable for noncompliance with this Order.
24. The Executive Officer may propose, and the Central Coast Water Board may adopt, individual WDRs for any Discharger at any time.
25. The Central Coast Water Board or the Executive Officer may, at any time, terminate applicability of this Order with respect to an individual Discharger upon written notice to the Discharger.
26. Noncompliance with requirements in this Order is grounds for enforcement action and/or termination of coverage for waste discharges under this Order, subjecting the Discharger to enforcement under the Water Code for further discharges of waste to surface water or groundwater.
27. The fact that it would have been necessary to halt or reduce the permitted discharge activity to maintain compliance with this Order is not a defense for the Discharger's violations of this Order.
28. Provisions of this Order are severable. If any provision of this Order is found invalid, the remainder of this Order will not be affected.
29. Upon the Central Coast Water Board's or Executive Officer's request and within a reasonable timeframe, Dischargers must submit any information required to determine compliance with this Order or to determine whether there is cause for modifying or terminating this Order.
30. Under authority of Water Code section 13267(c), the Discharger must allow the Central Coast Water Board, or an authorized representative, upon consent or other documents as may be required by law, to do the following:
 - a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this Order,

³ CEDEN is the California Environmental Data Exchange Network.

- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order,
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order, and
- d. Collect samples from and monitor waters of the state within or bordering property subject to this Order, at reasonable times for the purposes of assuring compliance with this Order or as otherwise authorized by the Water Code. The sampling and monitoring may include and is not limited to domestic and irrigation wells, surface receiving waters, and edge of field discharges to surface waters.

31. This Order may be reopened to address changes in statutes, regulations, plans, policies, or case law that govern water quality requirements for the discharges regulated herein.

Third-Party Programs

32. Dischargers may comply with portions of this Order by participating in third-party groups or programs (e.g., certification program, watershed group, water quality coalition, monitoring coalition, or other third-party effort) approved by the Executive Officer. In this case, the third-party will assist individual Dischargers in achieving compliance with this Order, including implementing water quality improvement projects and required monitoring and reporting as described in the MRP. Compliance with the requirements of this Order is still required for all members of the third-party program; however, the third-party may propose modified monitoring and reporting for approval by the Executive Officer. Third-party program proposals will be evaluated on a case-by-case basis relative to their ability to document compliance with this Order as part of a request for proposal process and as further informed by a forthcoming third-party expectations document.

33. This Order includes specific provisions and an alternative compliance pathway for third-party programs that will also be subject to a third-party request for proposal process and Executive Officer review and approval. Dischargers participating in a third-party administered alternative compliance pathway program, and that remain in good standing as defined in this Order and/or Executive Officer approved third-party work plan, are subject to the third-party program requirements in lieu of individual requirements as specified. The third-party alternative compliance pathway program's assessment and evaluation for groundwater protection and the regional groundwater quality trend monitoring program described in [Part 2, Section C.1](#) must be closely aligned and coordinated such that they are effectively measuring the objectives the programs are trying to achieve.

34. Third-party program proposals must include and identify specific membership eligibility requirements, for approval by the Executive Officer, to evaluate whether third-party program members are in good standing. Members that are not in good standing with the membership eligibility requirements lose their membership and must immediately comply with individual groundwater protection and/or surface water protection requirements. At a minimum, third-party program proposals must include membership eligibility requirements and follow-up consequences that are triggered, including revocation of membership eligibility, to address the following scenarios where members are no longer in good standing:
 - a. Non-payment of fees
 - b. Non-submittal of information
 - c. Non-participation in education/outreach or site visits
 - d. Failure to implement / adapt management practices
35. Consistent with the Water Board's Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (NPS Policy), the ineffectiveness of a third-party program through which a Discharger participates in nonpoint source control efforts cannot be used as a justification for lack of individual discharger compliance. Dischargers continue to be responsible for complying with this Order individually.
36. Dischargers who elect to join a third-party program to facilitate compliance with this Order must retain their membership with the third-party in good standing. If the Discharger does not meet the requirements of membership in the third-party program, then the Discharger is responsible for complying with all requirements in this Order individually unless the approved third-party administered alternative compliance pathway or approved third-party work plan allows for specific deviations from the individual requirements.
37. Dischargers who elect to join an approved third-party program must notify the approved third-party program administrator of their election to participate in the third-party program within 60 days of: 1) approval of the third-party program, and/or 2) the Discharger's enrollment in this Order, whichever is later.
38. The third-party program administrator must notify the Central Coast Water Board of Dischargers electing to participate within 90 days of the third-party program approval, and then provide member participation updates on a quarterly basis thereafter. At a minimum, participating Discharger information provided to the Central Coast Water Board must include operation enrollment information (e.g., AW numbers and operation names) and ranch enrollment information (e.g., GeoTracker AGL numbers and ranch names) in a format specified by the Executive Officer.
39. Third-party programs must meet the following minimum criteria:

- a. Effectiveness of scale and scope – The program must be of sufficient scale and scope relative to its intended purpose to maximize Discharger participation, implementation effectiveness and Order compliance. Although regionally scaled programs are preferred, watershed- or basin-scale programs will be considered as needed to address localized water quality issues.
- b. Clearly stated goals and objectives – The program must have meaningful and clearly stated goals, objectives, and associated performance metrics relevant to the Order requirements that are the focus of the program.
- c. Management and administration – The program must have a well-defined and robust governance and administrative structure with clearly defined roles and responsibilities.
- d. Capacity and expertise – The program must demonstrate sufficient technical, managerial, and financial capacity to successfully achieve its goals and objectives.
- e. Physical presence – The program should have a physical presence in the central coast region, including staff and a headquarters, that can assist its members on a continual and as-needed basis. If the third-party program administrator does not have or plan to have a physical presence in the region, they must demonstrate they can effectively establish, maintain, and engage with core membership without a headquarters in the central coast region.
- f. Transparency and accountability – The program must provide regular assessments of its performance relative to its stated goals and objective based on meaningful performance metrics. This includes reporting of water quality data and farm-level data as needed to document compliance with this Order.
- g. Membership and fee accounting – The program must track and provide ongoing accounting of its Discharger membership and fees to document Discharger compliance.
- h. Data management – The program must upload data as required by this Order to the Water Boards' various data management systems (e.g., CEDEN, GeoTracker, etc.).
- i. Member requirements – The program must have clearly stated and enforced Discharger membership eligibility requirements and report out on them as needed to document compliance.
- j. Coordination – The program must consider and coordinate with other third-party programs/groups or local entities as may be appropriate to create consistency; leverage the efforts, infrastructure and expertise of others; and streamline the program to maximize effectiveness (e.g., coordination with Groundwater Sustainability Agencies [GSAs], flood control management agencies, watershed restoration and management entities, etc.).
- k. Continuing education – The program must include continuing education opportunities as appropriate either directly through the program or through

coordination with other third-party programs/groups or local entities to ensure its members obtain technical skills and assistance necessary to achieve compliance with the limits established in this Order. In the instance of third-party monitoring programs, membership outreach and education should be implemented to inform members about the monitoring results relative to meeting specific water quality objectives, numeric targets, numeric interim quantifiable milestones, or numeric limits.

- I. Specific project plan documents – The program must have a detailed work plan including a Quality Assurance Project Plan (QAPP) and Sampling and Analysis Plan (SAP) as may be appropriate based on the program goals and objectives and associated Order requirements.

40. The Central Coast Water Board's review of third-party program proposals will consider the criteria outlined above relative to overall program effectiveness, with an emphasis on approving programs that can effectively assist their members in complying with the requirements of this Order.

Part 2, Section B. Planning, Education, Management Practices, and CEQA

Farm Water Quality Management Plan (Farm Plan)

1. Dischargers must develop, implement, and update as necessary a Farm Water Quality Management Plan (Farm Plan) for each ranch. A current copy of the Farm Plan must be maintained by the Discharger and must be submitted to the Central Coast Water Board upon request. At a minimum, the Farm Plan must include the discrete sections listed below. Additional details regarding each section are included in subsequent sections of this Order. Certain elements included in the Farm Plan must be reported on; however, in general, the Farm Plan is a planning and recordkeeping tool used by Dischargers to manage various aspects of their agricultural operation.
 - a. Irrigation and Nutrient Management Plan (INMP)
 - b. Pesticide Management Plan (PMP)
 - c. Sediment and Erosion Management Plan (SEMP)
 - d. Water Quality Education
 - e. CEQA Mitigation Measure Implementation
2. The INMP, PMP, and SEMP sections of the Farm Plan must include information on management practice implementation and assessment. Elements of the INMP are reported on in the Total Nitrogen Applied report or INMP Summary report. Elements of all the sections listed above are reported on in the Annual Compliance Form (ACF). Additional information on the monitoring and reporting requirements related to each of these sections is included in the MRP.

3. Where required by the Executive Officer based on groundwater quality or surface water quality conditions or exceedances of the numeric targets, numeric interim quantifiable milestones, or numeric limits established in this Order, the Farm Plan must incorporate ranch-level groundwater or surface water discharge monitoring information described in the MRP. The ranch-level groundwater and surface water discharge monitoring must be designed and implemented to inform improved management practices to protect groundwater and surface water quality.
4. Dischargers must maintain all records related to compliance with this Order for a minimum of ten years. Records include, but are not limited to, monitoring information, calculations, management practice implementation and assessment, education records, and all required reporting and information used to submit complete and accurate reports. Third parties that have been approved by the Executive Officer to assist Dischargers with complying with this Order, for example in the form of water quality monitoring, must also maintain all records for a minimum of ten years. Records must be submitted to the Central Coast Water Board upon request or as required by this Order or an approved work plan.

Continuing Education

5. Dischargers must attend outreach and education events annually to obtain technical skills and assistance necessary to achieve compliance with the numeric targets, numeric interim quantifiable milestones, and numeric limits established by this Order. Outreach and education events should focus on meeting water quality objectives and protecting beneficial uses by identifying water quality problems, implementing pollution prevention strategies, and implementing management practices and assessment designed to protect water quality and beneficial uses and resolve water quality problems to achieve compliance with this Order. Records of participation in continuing education must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request.
6. Dischargers who exceed the fertilizer nitrogen application targets or limits, nitrogen discharge targets or limits, numeric interim quantifiable milestones, or surface receiving water limits must complete additional relevant water quality education sufficient to fully inform the implementation of additional or improved management practices and assessment to avoid future exceedances.
7. A copy of this Order and MRP must be kept at the ranch for reference by operating personnel. Key operating and site management personnel must be familiar with the content of both documents.

Management Practice Implementation and Assessment

8. Dischargers must implement management practices and assessment, as necessary, to improve and protect water quality, protect beneficial uses, achieve compliance with applicable water quality objectives, achieve the numeric targets, numeric interim quantifiable milestones, and numeric limits established in this Order. Management practices implementation and assessment must be documented in the appropriate section of the Farm Plan (e.g., irrigation and nutrient management practices and assessment must be documented in the INMP section of the Farm Plan). Dischargers must report on management practice implementation and assessment in the ACF, as described in the MRP.

CEQA Mitigation Measure Implementation, Monitoring, and Reporting

9. Impacts and mitigation measures identified in CEQA Mitigation Monitoring and Reporting Program are set forth in the Final Environmental Impact Report (FEIR) at Appendix D, which is incorporated by reference. Mitigation measures identified in the FEIR for this Order and required to be implemented as described in Appendix D, will substantially reduce environmental effects of the project. The mitigation measures included in this Order have eliminated or substantially lessened all significant effects on the environment, where feasible. Where noted, some of the mitigation measures are within the responsibility and jurisdiction of other public agencies. Such mitigation measures can and should be adopted, as applicable, by those other agencies.
10. Dischargers must report on mitigation measure implementation electronically in the Annual Compliance Form (ACF), as described in the MRP. Draft mitigation monitoring and reporting is available for review in the FEIR.

Part 2, Section C.1. Groundwater Protection

1. Dischargers may not be subject to all provisions of **Part 2, Section C.1** if they are members in good standing with the third-party alternative compliance pathway program included within **Part 2, Section C.2**.

Phasing

2. Ranches are assigned the Groundwater Phase Area of the groundwater basin where the ranch is located based on the relative level of water quality and beneficial use impairment and risk to water quality. All ranches are assigned a Groundwater Phase Area of 1, 2, or 3. Groundwater Phase 1 areas represent greater water quality impairment and higher risk to water quality relative to Groundwater Phase 2 and 3 areas.

3. The requirements and implementation schedules for groundwater protection are based on the groundwater phase areas, listed in [Table C.1-1](#) and shown on the maps in [Figure C.1-1](#).
4. In the event that a ranch spans multiple Groundwater Phase areas, the ranch will be assigned the earlier phase. For example, a ranch that spans both Groundwater Phase 1 and Groundwater Phase 2 areas will be assigned to Groundwater Phase 1.
5. The Groundwater Phase Area assigned to each ranch will be displayed on the ranch eNOI in GeoTracker.

Irrigation and Nutrient Management Plan

6. Dischargers must develop and implement an Irrigation and Nutrient Management Plan (INMP) that addresses both groundwater and surface water. This section applies to the groundwater related INMP requirements and the surface water related INMP requirements are contained within [Part 2, Section C.3](#) of this Order. The INMP is a section of the Farm Plan and must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request. Summary information from the INMP must be submitted in the INMP Summary report. At a minimum, the elements of the INMP related to groundwater protection must include:
 - a. Monitoring and recordkeeping necessary to submit complete and accurate reports, including the ACF, Total Nitrogen Applied (TNA) report, and INMP Summary report.
 - b. Planning and management practice implementation and assessment that results in compliance with the fertilizer nitrogen application limits in [Table C.1-2](#) and the nitrogen discharge targets and limits in [Table C.1-3](#).
 - c. Descriptions of all irrigation, nutrient, and salinity management practices implemented and assessed on the ranch.
 - d. When INMP certification is required, e.g., as a follow-up action or as a consequence for not meeting the quantifiable milestones and time schedules below, the INMP certification shall include the following:

The person signing this Irrigation and Nitrogen Management Plan (INMP) certifies, under penalty of law, that the INMP was prepared under his/her direction and supervision, that the information and data reported is to the best of his/her knowledge and belief, true, accurate, and complete, and that he/she is aware that there are penalties for knowingly submitting false information. The qualified professional signing the INMP may rely on the

information and data provided by the Discharger and is not required to independently verify the information and data.

The qualified professional signing the INMP below further certifies that he/she used sound irrigation and nitrogen management planning practices to develop irrigation and nitrogen application recommendations and that the recommendations are informed by applicable training to minimize nitrogen loss to surface water and groundwater. The qualified professional signing the INMP is not responsible for any damages, loss, or liability arising from subsequent implementation of the INMP by the Discharger in a manner that is inconsistent with the INMP's recommendations for nitrogen application. This certification does not create any liability or claims for environmental violations.

Qualified professional certification:

"I, _____, certify this INMP in accordance with the statement above."

_____ (Signature)

The discharger additionally agrees as follows:

"I, _____, Discharger, have provided information and data to the certifier above that is, to the best of my knowledge and belief, true, accurate, and complete, that I understand that the certifier may rely on the information and data provided by me and is not required to independently verify the information and data, and that I further understand that the certifier is not responsible for any damages, loss, or liability arising from subsequent implementation of the INMP by me in a manner that is inconsistent with the INMP's recommendations for nitrogen application. I further understand that the certification does not create any liability for claims for environmental violations."

Quantifiable Milestones and Time Schedules

7. As shown in **Table C.1-2**, the fertilizer nitrogen application limits go into effect during the second year of the this Order (December 31, 2023).
8. As shown in **Table C.1-3**, the nitrogen discharge targets go in to effect during the second year of this Order (December 31, 2023) and nitrogen discharge limits go in to effect during the fifth year of this Order (December 31, 2027).

Fertilizer Nitrogen Application Limits

9. Dischargers must not apply fertilizer nitrogen (A_{FER}) at rates greater than the limits in **Table C.1-2**. Compliance with fertilizer nitrogen application limits is assessed for each specific crop reported in the TNA report or INMP Summary report.

Nitrogen Discharge Targets and Limits

10. This Order requires Dischargers to submit information on nitrogen applied (A) and nitrogen removed (R). This Order also establishes nitrogen discharge targets and limits based on the calculation of nitrogen applied minus nitrogen removed ($A-R$) using the formulas below. Nitrogen must not be discharged at rates greater than the targets and limits in **Table C.1-3**. Compliance with nitrogen discharge targets and limits is assessed annually for the entire ranch in the INMP Summary report through one of the **three compliance pathways** shown below. Compliance with all pathways is not required.

Compliance Pathway 1:

$$A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) + A_{IRR} - R = \text{Nitrogen Discharge}$$

OR

Compliance Pathway 2:

$$A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) = R$$

OR

Compliance Pathway 3:

$$A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) - R = \text{Nitrogen Discharge}$$

In all formulas, $R = R_{HARV} + R_{SEQ} + R_{SCAVENGE} + R_{TREAT} + R_{OTHER}$

- a. A_{FER} is the amount of fertilizer nitrogen applied in pounds per acre.
- b. C is the compost discount factor used to represent the amount of compost nitrogen mineralized during the year that the compost was applied.
- c. A_{COMP} is the total amount of compost nitrogen applied in pounds per acre.
- d. O is the organic fertilizer discount factor used to represent the amount of nitrogen mineralized during the first 12 weeks in the year it was applied.
- e. A_{ORG} is the total amount of organic fertilizer or amendment nitrogen applied in pounds per acre.

- f. **A_{IRR}** is the amount of nitrogen applied in the irrigation water estimated from the volume required for crop evapotranspiration (ET) in pounds per acre.
 - g. **R** is the amount of nitrogen removed from the field through harvest, sequestration, or other removal methods, in pounds per acre.
 - h. **R_{HARV}** is the amount of nitrogen removed from the field through harvest or other removal of crop material.
 - i. **R_{SEQ}** is the amount of nitrogen removed from the field through sequestration in woody materials of permanent or semi-permanent crops.
 - j. **R_{SCAVENGE}** is the amount of nitrogen removed from the field through nitrogen scavenging cover crops and/or nitrogen scavenging high carbon amendments during the wet/rainy season.
 - k. **R_{TREAT}** is the amount of nitrogen removed from the ranch through a quantifiable treatment method (e.g., bioreactor).
 - l. **R_{OTHER}** is the amount of nitrogen removed from the ranch through other methods not previously quantified.
11. The Central Coast Water Board encourages the use of irrigation water nitrogen as a method of reducing the amount of fertilizer nitrogen applied to crops. The use of irrigation water nitrogen is typically referred to as “pump and fertilize” and is incentivized through compliance pathway 2 and 3 in [Table C.1-3](#). The amount of irrigation water nitrogen is not used in the compliance calculation in these compliance pathways. The amount of irrigation water nitrogen must be reported regardless of the compliance pathway.
12. The Central Coast Water Board encourages the use of compost to improve soil health, nutrient and carbon sequestration, and water holding capacity consistent with the state’s Healthy Soils Initiative. All compost nitrogen (**A_{COMP}**) applied to the ranch must be reported in the TNA report or INMP Summary report; however, the use of compost is incentivized through the option for Dischargers to use a compost “discount” factor (**C**). Dischargers may use the compost discount factor provided by the Central Coast Water Board in the MRP or may determine their own discount factor. The discounted compost nitrogen must, at a minimum, represent the amount of compost mineralized during the year the compost was applied to the ranch. If the Discharger uses their own compost discount factor, they must maintain records of the method used to determine the compost discount factor in the Farm Plan, and these records must be submitted to the Central Coast Water Board upon request.
13. The Central Coast Water Board encourages the use of organic fertilizers and amendments to improve soil health, nutrient and carbon sequestration, and water holding capacity consistent with the state’s Healthy Soils Initiative. All organic fertilizer and amendment nitrogen (**A_{ORG}**) applied to the ranch must be reported in the TNA report or INMP Summary report; however, the use of organic fertilizers and amendments is incentivized through the option for Dischargers to

use an organic fertilizer “discount” factor (**O**). Dischargers may use the organic fertilizer discount factor associated with the products C:N ratio, provided by the Central Coast Water Board in the MRP. The discounted organic fertilizer nitrogen must, at a minimum, represent the amount of organic fertilizer mineralized during the first 12 weeks the organic fertilizer was applied to the ranch. The Discharger must maintain records of the organic products used and their associated C:N ratios in the Farm Plan, and these records must be submitted to the Central Coast Water Board upon request. The following products are not eligible to receive an organic fertilizer discount: a) products with no organic compounds (long chain carbon) molecules, such as conventional fertilizer, slow release fertilizers, b) products that do not depend on microbial mineralization to release nitrogen to mineral form to make it available for crop uptake, c) products without C:N ratio information available, and d) organic liquid fertilizers that are in the liquid and/or emulsified form.

14. The amount of **crop material** removed through harvest or other methods (**R_{HARV}**) must be calculated using the formula described below. Dischargers must either use the crop-specific conversion coefficient values found in the MRP or develop their own conversion coefficient values following the approved method in the MRP. If Dischargers develop their own conversion coefficient, they must maintain information on the method used in the Farm Plan, and these records must be submitted to the Central Coast Water Board upon request.

R_{HARV} = Conversion Coefficient x Material Removed

- a. The **Conversion Coefficient** is a crop-specific coefficient used to convert from units of material removed per acre to units of nitrogen removed per acre.
 - b. **Material Removed** is the amount of nitrogen-containing material removed from the field, in units of pounds per acre.
15. The amount of nitrogen removed through **sequestration** in woody material of permanent or semi-permanent crops (**R_{SEQ}**) must be estimated by the Discharger. Dischargers must maintain records detailing how they estimated the amount of nitrogen sequestered in their permanent crops. These records must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request.
16. The Central Coast Water Board encourages Dischargers to implement best management practices that reduce nitrogen leaching in the wet/rainy season. Dischargers may claim a nitrogen scavenging credit (**R_{SCAVENGE}**) provided by the Central Coast Water Board in the MRP, one time per year for each ranch acre where nitrogen scavenging cover crops or nitrogen scavenging high carbon amendments are utilized during the wet/rainy season. The total acres receiving

the nitrogen scavenging credit may not exceed the ranch acres. Dischargers electing to claim the nitrogen scavenging credit must ensure that their cover crop and/or high carbon amendment best management practice meets the definitions of a nitrogen scavenging cover crop and/or nitrogen scavenging high carbon amendment, as noted in the MRP and Definitions. Substantiating records for this credit must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request.

17. The Central Coast Water Board encourages Dischargers to develop and implement innovative methods for removing nitrogen from the environment to improve water quality. Dischargers may use treatment methods (e.g., bioreactors) to remove nitrogen from groundwater or surface water and may count this towards their nitrogen removal (**R**) value if they are able to quantify the amount of nitrogen removed from ranch discharge to groundwater or surface water. This quantified removal through treatment or other innovative methods must be reported as **R_{TREAT}**. Dischargers electing to account for this nitrogen removal must monitor the volume and concentration of water entering and exiting their treatment system and calculate the amount of nitrogen removed. These records must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request.
18. If Dischargers remove additional nitrogen through means other than removing crop material (**R_{HARV}**), sequestration (**R_{SEQ}**), scavenging credit (**R_{SCAVENGE}**), or treatment methods (**R_{TREAT}**), they must quantify and report this additional removal as **R_{OTHER}**. Dischargers must maintain records detailing how they calculated **R_{OTHER}**. These records must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request.
19. The discharge of nitrogen in excess of the nitrogen discharge **targets** in [Table C.1-3](#) may result in additional requirements, including obtaining additional education, INMP certification by a qualified professional, implementing additional or improved management practices, and increased monitoring and/or reporting.
20. The discharge of nitrogen in excess of the nitrogen discharge **limits** in [Table C.1-3](#) may result in additional requirements, including obtaining additional education, INMP certification by a qualified professional, implementing additional or improved management practices, increased monitoring and reporting, and/or progressive enforcement actions.
21. Dischargers who apply more fertilizer nitrogen (**A_{FER}**) than the fertilizer nitrogen application limits in [Table C.1-2](#) to any specific crop **and** who are able to demonstrate compliance with the **final** nitrogen discharge limits, as shown in [Table C.1-3](#), are exempt from the fertilizer nitrogen application limit.

22. Dischargers who can quantifiably demonstrate that their ranches pose no threat to surface water quality or groundwater quality may submit a technical report to the Executive Officer for review. If approved, the Discharger is not required to conduct the nitrogen application (**A**) or removal (**R**) monitoring and reporting or to submit the INMP Summary report, regardless of what Groundwater Phase area the ranch is in. The technical report must demonstrate that nitrogen applied at the ranch does not percolate below the root zone in an amount that could degrade groundwater and does not migrate to surface water through discharges, including drainage, runoff, or sediment erosion. Dischargers must provide the Executive Officer with annual updates to confirm that the exemption is still applicable. Failure to provide sufficient annual updates confirming that the exemption is still applicable will result in an immediate reinstatement of the requirement to submit the INMP Summary report for applicable Dischargers. Dischargers electing to use this approach are still eligible to participate in the third-party alternative compliance pathway for groundwater protection.
23. Dischargers who can quantifiably demonstrate that their ranch is achieving the **final** nitrogen discharge limits, as shown in **Table C.1-3**, are not required to submit the nitrogen removal (**R**) reporting in the INMP Summary report, regardless of what Groundwater Phase area the ranch is in. Example situations where this may apply include participation in an approved third-party program that certifies that the Discharger is meeting the final discharge limit and will continue to do so for the duration of the Discharger's participation in the approved third-party program, or by submitting a technical report, subject to Executive Officer review, that quantifies the amount of nitrogen discharge based on the volume and nitrogen concentration of all discharges from the ranch. In these situations, confirmation of membership in the approved third-party program or Executive Officer approval of a submitted technical report constitute compliance with the nitrogen removed (**R**) reporting requirement in the INMP Summary report. This exemption only applies to removal (**R**) in the INMP Summary report; all other requirements, including the TNA report, still apply as described in this Order. Dischargers must provide the Executive Officer with annual updates to confirm that the exemption is still applicable. Failure to provide sufficient annual updates confirming that the exemption is still applicable will result in an immediate reinstatement of the requirement to submit the nitrogen removal (**R**) reporting information in the INMP Summary report for applicable Dischargers. Dischargers electing to use this approach are still eligible to participate in the third-party alternative compliance pathway for groundwater protection.
24. Dischargers, groups of dischargers or commodity groups who can quantify the amount of nitrogen discharged from their ranch or for specific crops or via specific management practices by directly monitoring it at the points of discharge can propose an alternative monitoring methodology to comply with the nitrogen

discharge targets and limits, in lieu of using the A-R compliance formulas. Example situations where this may apply includes greenhouse, nursery, container production or intensive crop production where irrigation and drain water is captured and allows for direct monitoring of discharges. For these types of situations, it may be easier to monitor nitrogen discharge than to calculate the amount of nitrogen removed at harvest for each one of the many different crops and plants being grown. Dischargers must submit a request to the Executive Officer with a technical report of the methodology proposed to quantify nitrogen discharges. The methodology must include enough information to quantify the amount of nitrogen discharged and confirm compliance with the nitrogen discharge targets and limits, as shown in [Table C.1-3](#) or [Table C.2-2](#) (for Dischargers participating in the Third-Party Alternative Compliance Pathway Program for Groundwater Protection described in [Part 2, Section C.2](#)). Acceptable methodologies must include direct measurements of the volume and nitrogen concentration of the water discharged from each ranch per acre and year. Executive Officer approval of the method(s) must be granted before the discharger begins reporting nitrogen discharge based on the proposed methodology. Dischargers who obtain Executive Officer approval to directly monitor their nitrogen discharge from their ranches will not be required to submit nitrogen removal (R) reporting in the INMP Summary report. Dischargers electing to use this approach are still eligible to participate in the third-party alternative compliance pathway program for groundwater protection.

25. The initial 2027 nitrogen discharge limits, as shown in [Table C.1-3](#) will be re-evaluated based on Discharger reported nitrogen applied and removed data, new science, and management practice implementation and assessment before becoming effective.

Monitoring and Reporting

26. Dischargers must report on management practice implementation and assessment electronically in the **ACF**, as described in the MRP.
27. Dischargers must record and report total nitrogen applied to all crops grown on the ranch, electronically in the TNA report form, as described in the MRP.
28. Dischargers must track and record the following elements of the INMP Summary report that are not included in the TNA report: total nitrogen removed from the ranch and information on irrigation water application and discharge volumes. Dischargers must submit this information electronically in the INMP Summary report form as described in the MRP.
29. The INMP Summary report contains the same nitrogen application information as the TNA report, plus additional information related to nitrogen removed and irrigation management. **Therefore, the INMP Summary report satisfies the**

TNA report requirement and an additional TNA report is not required to be submitted when the INMP Summary report is submitted to the Central Coast Water Board.

30. Dischargers must conduct **irrigation well monitoring and reporting prior to the start of groundwater quality trend monitoring and reporting**, either individually or as part of a third-party effort, as described in the MRP.
31. Dischargers must conduct **on-farm domestic well monitoring and reporting**, either individually or as part of a third-party effort, as described in the MRP.
32. Dischargers must conduct **groundwater quality trend monitoring and reporting**, either individually or as part of a third-party effort, as described in the MRP. This requirement applies to all Dischargers enrolled in this Order, regardless of how many wells are currently present on their ranch.
 - a. Dischargers who elect to perform groundwater quality trend monitoring and reporting as part of a **third-party** effort must form or join a third-party. The third-party must submit a work plan for Executive Officer review by the dates and covering the areas specified in the MRP unless it is associated with the Third-Party Alternative Compliance Pathway for Groundwater Protection described in **Part 2, Section C.2**. The work plan must be approved by the Executive Officer prior to implementation. Once approved by the Executive Officer, the work plan must be implemented.
 - b. Dischargers who elect to perform groundwater quality trend monitoring and reporting individually must submit a work plan for Executive Officer review, by the date specified in the MRP, based on their ranch location. The work plan must be approved by the Executive Office prior to implementation. The work plan must describe how the ranch-level groundwater quality trend monitoring program will evaluate groundwater quality trends over time and assess the impacts of agricultural discharges on groundwater quality. Once approved by the Executive Officer, the work plan must be implemented. Dischargers without a well on their property may comply with individual ranch-level groundwater quality trend monitoring and reporting requirements by implementing one of the options specified in the MRP.
33. When required by the Executive Officer based on groundwater quality data or significant and repeated exceedance of the nitrogen discharge targets or limits, Dischargers must complete **ranch-level groundwater discharge monitoring and reporting**, either individually or as part of a third-party effort as described in the MRP. Water Board staff will coordinate with Dischargers prior to the Executive Officer invoking this requirement to determine if non-compliance is the result of unforeseen or uncontrollable circumstances and to provide the Discharger with 90-day advanced notice of the forthcoming requirement. When ranch-level groundwater discharge monitoring and reporting is required, a work

plan, including a SAP and QAPP, must be submitted for Executive Officer review prior to implementation. Once approved by the Executive Officer, the work plan must be implemented. Ranch-level groundwater discharge monitoring may be discontinued with the approval of the Executive Officer when the Discharger comes into compliance with the nitrogen discharge targets or limits, or the discharge has otherwise ceased.

Part 2, Section C.2. Third-Party Alternative Compliance Pathway for Groundwater Protection

1. Dischargers that are members in good standing in the third-party alternative compliance pathway program are subject to the provisions of this **Part 2, Section C.2**, unless otherwise stated. For purposes of this section, such Dischargers are referred to as “participating Dischargers.”

Participating dischargers:

- a. Are not subject to fertilizer nitrogen application limits in **Table C.1-2**, which are enforceable by the Central Coast Water Board.
 - b. Are not subject to nitrogen discharge limits in **Table C.1-3**, which are enforceable by the Central Coast Water Board.
 - c. Are subject to targets, which if exceeded result in consequences outlined in this **Part 2, Section C.2**.
 - d. Are not subject to ranch-level groundwater discharge monitoring and reporting.
 - e. Are generally provided more time to achieve fertilizer nitrogen application targets and nitrogen discharge targets, relative to non-participating dischargers.
2. Prior to the initiation of the work plan process outlined below and in the MRP for this third-party alternative compliance pathway program, entities wishing to implement the third-party alternative compliance pathway program described in this **Part 2, Section C.2** must submit a third-party alternative compliance pathway program proposal consistent with the third-party program requirements outlined in **Part 2, Section A** of this Order, as well as the request for proposal process and associated third-party program expectations document forthcoming after Order adoption. For purposes of this section, the entity approved to implement the third-party alternative compliance pathway is referred to as the approved third-party alternative compliance pathway program administrator.
 3. Participating Dischargers must develop and implement an Irrigation and Nutrient Management Plan (INMP) that addresses groundwater. The INMP is a section of the Farm Plan and must be maintained in the Farm Plan and submitted to the Central Coast Water Board upon request. Summary information from the INMP must be submitted in the INMP Summary report. At a minimum, the elements of

the INMP related to groundwater and surface water protection for participating Dischargers in a third-party program must include:

- a. Monitoring and recordkeeping necessary to submit complete and accurate reports, including the Annual Compliance form (ACF), Total Nitrogen Applied (TNA) report, and INMP Summary report.
- b. Planning and management practice implementation and assessment that results in compliance with the fertilizer nitrogen application targets in [Table C.2-1](#), the nitrogen discharge targets in [Table C.2-2](#), and groundwater protection area targets to be determined and approved by the Executive Officer.
- c. Descriptions of all irrigation, nutrient, and salinity management practices implemented and assessed on the ranch.

Quantifiable Milestones and Time Schedules

4. As shown in [Table C.2-1](#), the fertilizer nitrogen application targets go in to effect during the third year of the this Order (December 31, 2024) for participating Dischargers in the third-party alternative compliance pathway.
5. As shown in [Table C.2-2](#), the nitrogen discharge targets go in to effect during the third year of this Order (December 31, 2024) for participating Dischargers in the third-party alternative compliance pathway.

Fertilizer Nitrogen Application Targets

6. Participating Dischargers must not apply fertilizer nitrogen (A_{FER}) at rates greater than the **targets** in [Table C.2-1](#). Compliance with fertilizer nitrogen application targets is assessed annually for each specific crop reported in the TNA report or INMP Summary report.
7. Participating Dischargers that apply fertilizer nitrogen (A_{FER}) at rates greater than the **targets** in [Table C.2-1](#) one year after the compliance date are subject to follow-up by the approved third-party program administrator, which could include additional education and/or implementation of additional or improved management practices.
8. Participating Dischargers that apply fertilizer nitrogen (A_{FER}) at rates greater than the **targets** in [Table C.2-1](#) for a two-year running average after the compliance date, are no longer eligible to participate in the third-party alternative compliance pathway program and must comply with the individual groundwater protection requirements in [Part 2, Section C.1](#). Water Board staff will coordinate with participating Dischargers prior to the Executive Officer invoking this requirement to determine if non-compliance is the result of unforeseen or uncontrollable

circumstances and to provide the Discharger with 90-day advanced notice of the forthcoming individual groundwater protection requirements.

Nitrogen Discharge Targets

9. Participating Dischargers must not discharge nitrogen at rates greater than the **targets** in **Table C.2-2**. Compliance with nitrogen discharge targets is assessed annually for the entire ranch using INMP Summary report information. Participating Dischargers must comply with at least one of the nitrogen discharge compliance pathways described in **Part 2, Section C.1** by the compliance date.
10. The final year 2028 nitrogen discharge **targets**, as shown in **Table C.2-2** will be re-evaluated based on discharger reported nitrogen applied and removed data, new science, management practice effectiveness assessment and evaluation, and groundwater protection area collective numeric interim and final targets before becoming effective.
11. Participating Dischargers that discharge nitrogen in excess of the nitrogen discharge **targets** in **Table C.2-2** one year after the compliance date are subject to follow-up by the approved third-party alternative compliance pathway program administrator, which could include additional education and/or implementation of additional or improved management practices.
12. Participating Dischargers that discharge nitrogen in excess of the nitrogen discharge **targets** in **Table C.2-2** for a two-year running average, must obtain annual INMP certification by a qualified professional until nitrogen discharge targets are achieved for a two-year running average. The INMP certification must include the certification language outlined in **Part 2, Section C.1**.
13. Participating Dischargers that discharge nitrogen in excess of the final nitrogen discharge target in **Table C.2-2** for a three-year running average after the compliance date, are no longer eligible to participate in the third-party alternative compliance pathway program and must comply with individual groundwater protection requirements in **Part 2, Section C.1**. Water Board staff will coordinate with participating Dischargers prior to the Executive Officer invoking this requirement to determine if non-compliance is the result of unforeseen or uncontrollable circumstances and to provide the Discharger with 90-day advanced notice of the forthcoming individual groundwater protection requirements.

Groundwater Protection Areas, Formulas, Values, and Targets

14. The approved third-party alternative compliance pathway program administrator, on behalf of its participating Dischargers, must develop and submit incremental 35%, 70%, and 100% work plans for Executive Officer approval, as described in

the MRP. The 35% and 70% work plans will be subject to Executive Officer approval following a 30-day written public period and a public meeting to receive public comments and board input.

15. The incremental draft and final work plans must include the following:

- a. Clearly defined objectives and scientific justification for all proposed groundwater protection (GWP) areas, formulas, values, and collective numeric interim and final targets.
- b. Scientific justification in support of the proposed GWP areas with respect to, but not limited to, geology, hydrogeology, groundwater basin and subbasin areas, recharge areas, land uses, cropping patterns, and potential membership coverage by acreage and number of members. The proposed GWP areas, formula, values, and collective interim and final targets must be tied together and scaled in a way that will allow for the effective evaluation of water quality and beneficial use protection and compliance with GWP interim and final targets on both a collective and individual basis.
- c. A program to assess and evaluate the performance and effectiveness of the third-party alternative compliance pathway program's collective numeric interim and final targets in achieving tangible groundwater quality improvements over time at the individual GWP area scale. The assessment and evaluation program must be scaled – spatially and temporally – in coordination with the regional groundwater quality trend monitoring program described in **Part 2, Section C.1** of the third-party program over time.
- d. Criteria and associated follow-up actions or consequences that the third-party alternative compliance pathway program administrator will implement if participating Dischargers do not meet collective numeric interim and final targets, and third-party program membership eligibility requirements including membership probation and revocation to address recalcitrant participating Dischargers.

16. The final work plans must be approved by the Executive Officer prior to implementation. Once approved by the Executive Officer, the work plans must be implemented.

17. Compliance with the collective numeric interim and final targets for a GWP area shall be determined by aggregating data from participating Dischargers within a GWP area to determine if the combined nitrogen discharge is achieving collective compliance with the GWP Area numeric interim and final targets.

18. Although compliance with GWP collective numeric interim and final targets is assessed using the combined nitrogen discharge of participating Dischargers in a GWP area, GWP collective numeric interim and final targets must be designed such that there is a clear and quantifiable means of assessing individual ranch level contribution to the success or failure of complying with the GWP area collective numeric interim and final targets.
19. Participating Dischargers in a GWP area that exceed the GWP collective numeric interim and final targets by 20% or more, as evaluated individually and on an annual basis, are subject to follow-up by the approved third-party alternative compliance pathway program administrator, which could include additional education or implementation of additional or improved management practices.
20. All participating Dischargers in a GWP area that exceeds the collective numeric interim and final GWP targets by 20% or more for a 3-year running average after the compliance date, are no longer eligible to participate in the third-party alternative compliance pathway program and must comply with the individual groundwater protection requirements in [Part 2, Section C.1](#).

Monitoring and Reporting

21. Participating Dischargers must submit ACF, TNA, and INMP Summary information according to requirements outlined in [Part 2, Section C.1](#), and as described in the MRP.
22. Participating Dischargers must submit ACF, TNA, and INMP Summary information according to the groundwater phase assigned to each ranch. Groundwater phases are outlined in [Part 2, Section C.1](#).
23. Participating Dischargers must submit groundwater monitoring and reporting information according to requirements outlined in [Part 2, Section C.1](#) and as described in the MRP, either individually or as part of a third-party program.

Part 2, Section C.3. Surface Water Protection

Priority Areas (Individual)

1. Ranches are assigned the Surface Water Priority area of the HUC-8 watershed where the ranch is located based on the relative level of water quality, beneficial use impairment and risk to water quality. All ranches are assigned a Surface Water Priority of 1, 2, 3, or 4. Surface Water Priority Area 1 areas represent greater water quality impairment and higher risk to water quality relative to Surface Water Priority Areas 2, 3, and 4.

2. The follow-up surface receiving water implementation requirements for surface water protection are based on the surface water priority areas, listed in [Table C.3-1](#) and shown on the map in [Figure C.3-1](#).
3. In the event that a ranch spans multiple Surface Water Priority areas, the ranch will either be assigned the earlier priority or will be assigned the priority of the watershed or drainage unit that the ranch drains or discharges to, if specific discharge information is provided to the Central Coast Water Board.
4. The Surface Water Priority assigned to each ranch will be displayed in the ranch eNOI in GeoTracker.

Priority Areas (Third-Party Program)

5. Ranches that are enrolled as part of an approved third-party follow-up surface receiving water implementation program are assigned the third-party program Surface Water Priority of high priority, medium priority, or low priority where the ranch is located, as shown in [Table C.3-1.3P](#) and the map shown in [Figure C-3.1. 3P](#).
6. In the event that a ranch spans multiple third-party program Surface Water Priority areas, the ranch will either be assigned the earlier priority or will be assigned the priority of the watershed or drainage unit that the ranch drains or discharges to, if specific discharge information is provided to the Central Coast Water Board.
7. The third-party program Surface Water Priority assigned to each ranch will be displayed in the ranch eNOI in GeoTracker.

Irrigation and Nutrient Management

8. Dischargers must develop and implement an Irrigation and Nutrient Management Plan (INMP) that addresses both groundwater and surface water. This section applies to the surface water related INMP requirements and the groundwater related INMP requirements are contained within [Part 2, Section C.1](#) of this Order. The INMP is a section of the Farm Plan, must be maintained in the Farm Plan (see [Part 2, Section B](#) and Farm Plan paragraph 14 below), and submitted to the Central Coast Water Board upon request. Summary information from the INMP must be submitted in the ACF, as described in the MRP.

Pesticide Management

9. Dischargers must develop and implement a Pesticide Management Plan (PMP). The PMP is a section of the Farm Plan, must be maintained in the Farm Plan (see [Part 2, Section B](#) and Farm Plan paragraph 14 below), and submitted to

the Central Coast Water Board upon request. Summary information from the PMP must be submitted in the ACF, as described in the MRP.

Sediment and Erosion Management

10. Dischargers must develop and implement a Sediment and Erosion Management Plan (SEMP). The SEMP is a section of the Farm Plan, must be maintained in the Farm Plan (see **Part 2, Section B** and Farm Plan paragraph 14 below), and submitted to the Central Coast Water Board upon request. Summary information from the SEMP must be submitted in the ACF, as described in the MRP.

Impermeable Surfaces

11. Ranches with either 50 to 100 percent of fields covered by impermeable surfaces (defined in Attachment C of this Order), or with greater than or equal to 22,500 square feet (0.5 acre) of impermeable surfaces must manage stormwater discharge duration, rate, and volume as described below.
 - a. Stormwater discharge intensity from fields with impermeable surfaces must not exceed the stormwater discharge intensity from equivalent permeable field area for any storm event up to and including the 10-year storm event. The *Santa Barbara Urban Hydrograph Method*⁴ and the *Rational Method*⁵ are two methods for determining the stormwater discharge intensity match, however other similar methods to determine stormwater discharge intensity may be used.
 - b. Stormwater discharge volume from fields with impermeable surfaces must not exceed the stormwater discharge volume from equivalent permeable field area for any storm event up to and including the 95th percentile, 24-hour storm event. The *Curve Number Method*⁶ is a method for determining the stormwater discharge volume match, however other similar methods to determined stormwater discharge volume may be used.
 - c. Description and time schedules of management practices, treatment, and/or control measures implemented to meet design storm requirements and mitigate for increased stormwater runoff from impermeable surfaces must be kept in the Farm Plan. Methods for assessing the effectiveness of each management practice, treatment, and/or control measure include calculation of peak and runoff volumes, visual inspection, photo documentation, and local precipitation event data, however other storm event measurement

⁴ The Santa Barbara Urban Hydrograph Method is based on the curve number approach and is useful for sheet flow over a plane surface, called overland flow.

⁵ The Rational Method is used to determine peak discharge from runoff in a given area.

⁶ The Curve Number Method was developed by the Soil Conservation Service to estimate runoff from rainfall on agricultural fields and provides runoff depth that can be used to calculate runoff volume.

types and recordkeeping that determine the effectiveness of management practices may be used.

Farm Plan

12. At a minimum, the elements of the Farm Plan related to surface water protection must include:
 - a. Monitoring and recordkeeping necessary to submit complete and accurate reports, including the ACF.
 - b. Planning and management practice implementation and assessment that results in compliance with the surface water limits in [Table C.3-2](#) (TMDL areas) and [Table C.3-3](#) (non-TMDL areas) for nutrients, [Table C.3-4](#) (TMDL areas) and [Table C.3.5](#) (non-TMDL areas) for pesticides and toxicity, and [Table C.3-6](#) (TMDL areas) for sediment and [Table C.3-7](#) (non-TMDL areas) for turbidity that apply to a ranch based on the ranch location.
 - c. Descriptions of all management practices implemented on the ranch, as follows:
 - i. All irrigation, nutrient, and salinity management practices (i.e., INMP).
 - ii. All pesticide management practices (i.e., PMP), including pesticide application characteristics (e.g., timing, formulations, wind, and rainfall monitoring, etc.) and any integrated pest management (IPM) practices implemented (e.g., scouting, beneficial insects, etc.).
 - iii. All sediment, erosion, irrigation, stormwater, road, agricultural drainage pump, and impermeable surface management practices (i.e., SEMP).

Quantifiable Milestones and Time Schedules

13. Dischargers in an area **with an established TMDL** ([Figure C.3-2](#) for Nutrient TMDL areas, [Figure C.3-3](#) for Pesticide and Toxicity TMDL areas, and [Figure C.3-4](#) for Sediment TMDL areas) for a pollutant must not cause or contribute to an exceedance of the pollutant's surface receiving water limit in [Table C.3-2](#) for nutrients, [Table C.3-4](#) for pesticides and toxicity, and [Table C.3-6](#) for sediment in accordance with the compliance dates specified in the applicable table.
14. Dischargers in an area **without an established TMDL** for a pollutant must not cause or contribute to an exceedance of the pollutant's surface receiving water limit in [Table C.3-3](#) for nutrients, [Table C.3.5](#) for pesticides and toxicity, and [Table C.3-7](#) for turbidity in accordance with the compliance dates specified in the applicable table.

15. The surface receiving water limits in [Table C.3-3](#) for nutrients, [Table C-3.5](#) for pesticides and toxicity, and [Table C.3-7](#) for turbidity, apply to all Dischargers unless a specific surface receiving water limit based on a TMDL in [Table C.3-2](#) for nutrients, [Table C.3-4](#) for pesticides and toxicity, and [Table C.3-6](#) for sediment applies to a Discharger.
16. Dischargers in areas where the water quality for a pollutant is better (i.e., of higher quality) than the applicable limit in [Table C.3-2](#) (TMDL areas) and [Table C.3-3](#) (non-TMDL areas) for nutrients, [Table C.3-4](#) (TMDL areas) and [Table C-3.5](#) (non-TMDL areas) for pesticides and toxicity, and [Table C.3-6](#) (TMDL areas) for sediment and [Table C.3-7](#) (non-TMDL areas) for turbidity must not cause or contribute to an increase of that pollutant in receiving waters, except as consistent with the antidegradation findings of this Order.
17. The discharge of pollutants from a ranch that cause or contribute to an exceedance of the applicable limits after the compliance date in [Table C.3-2](#) (TMDL areas) and [Table C.3-3](#) (non-TMDL areas) for nutrients, [Table C.3-4](#) (TMDL areas) and [Table C-3.5](#) (non-TMDL areas) for pesticides and toxicity, and [Table C.3-6](#) (TMDL areas) for sediment and [Table C.3-7](#) (non-TMDL areas) for turbidity may result in additional requirements, including obtaining additional education, implementing additional or improved management practices, follow-up monitoring and reporting, ranch-level surface discharge monitoring and reporting, and progressive enforcement actions.

Monitoring and Reporting

18. Dischargers must complete **surface receiving water monitoring and reporting** as described in the MRP, either individually or through a third-party monitoring program approved by the Executive Officer. Dischargers, either individually or through a third-party monitoring program, must submit a work plan, including a SAP and QAPP as described the MRP, for Executive Officer review prior to implementation. Once approved by the Executive Officer, the work plan must be implemented. The work plan must include applicable monitoring for the pollutants in [Table C.3-2](#) (TMDL areas) and [Table C.3-3](#) (non-TMDL areas) for nutrients, [Table C.3-4](#) (TMDL areas) and [Table C-3.5](#) (non-TMDL areas) for pesticides and toxicity, and [Table C.3-6](#) (TMDL areas) for sediment and [Table C.3-7](#) (non-TMDL areas) for turbidity and must describe the actions that will be taken to achieve the limits in the tables.
19. Dischargers must develop a **follow-up surface receiving water implementation work plan**, either individually or through a third-party program. The work plans per the MRP requirements are subject to Executive Officer approval following a 30-day period to receive written public comments. The work plan due date is based on the Surface Water Priority of the ranch.

- a. Individual Dischargers that are not part of a third-party program approved to develop and implement follow-up surface receiving water implementation work plan(s) must submit an individual work plan by the dates specified below, based on the ranch's Surface Water Priority Area defined in **Table C.3-1** of the Order:
 - i. March 1, 2023 for Surface Water Priority 1 areas
 - ii. March 1, 2024 for Surface Water Priority 2 areas
 - iii. March 1, 2025 for Surface Water Priority 3 areas
 - iv. March 1, 2026 for Surface Water Priority 4 areas
- b. Third-party program(s) approved to develop and implement follow-up surface receiving water implementation work plan(s) on behalf of participating Dischargers must submit work plan(s) by the dates specified below, based on the third-party program surface water priority area. Third-party program surface water priority areas are defined in **Table C.3-1.3P** of the Order:
 - i. March 1, 2024 for High Priority areas
 - ii. March 1, 2026 for Medium Priority areas
 - iii. March 1, 2028 for Low Priority and All Other areas
- c. The work plan must include numeric interim quantifiable milestones and follow-up actions, such as outreach, education, and management practice implementation and assessment, and, where applicable for pollutant source identification and abatement, additional surface receiving water monitoring locations. The work plan must include a SAP and QAPP. The work plan must describe the implementation measures that will be taken to reduce the discharge of relevant pollutants and achieve the applicable surface water numeric limits by the compliance dates in **Table C.3-2** (TMDL areas) and **Table C.3-3** (non-TMDL areas) for nutrients, **Table C.3-4** (TMDL areas) and **Table C.3-5** (non-TMDL areas) for pesticides and toxicity, and **Table C.3-6** (TMDL areas) for sediment and **Table C.3-7** (non-TMDL areas) for turbidity. The work plan must be submitted for Executive Officer review prior to implementation. Once approved, the work plan must be implemented.
- d. Prior to the applicable compliance dates in **Table C.3-2** (TMDL areas) and **Table C.3-3** (non-TMDL areas) for nutrients, **Table C.3-4** (TMDL areas) and **Table C.3-5** (non-TMDL areas) for pesticides and toxicity, and **Table C.3-6** (TMDL areas) for sediment and **Table C.3-7** (non-TMDL areas) for turbidity, Dischargers who elect to participate in a third-party program to develop and implement their work plan will not be subject to ranch-level surface discharge monitoring and reporting.
- e. Work plans must take into consideration the level of water quality impairment identified through surface receiving water monitoring. Work plans for areas with persistent exceedances of the surface water limits in **Table C.3-2**

(TMDL areas) and [Table C.3-3](#) (non-TMDL areas) for nutrients, [Table C.3-4](#) (TMDL areas) and [Table C.3-5](#) (non-TMDL areas) for pesticides and toxicity, and [Table C.3-6](#) (TMDL areas) for sediment and [Table C.3-7](#) (non-TMDL areas) for turbidity must identify follow-up actions to restore degraded areas and meet surface receiving water limits (e.g., numeric interim quantifiable milestones, outreach, education, management practice implementation and assessment) and additional surface receiving water monitoring locations for pollutant source identification and abatement. Work plans for areas that are already achieving the surface water limits in [Table C.3-2](#) (TMDL areas) and [Table C.3-3](#) (non-TMDL areas) for nutrients, [Table C.3-4](#) (TMDL areas) and [Table C.3-5](#) (non-TMDL areas) for pesticides and toxicity, and [Table C.3-6](#) (TMDL areas) for sediment and [Table C.3-7](#) (non-TMDL areas) for turbidity must identify actions to be taken to protect the high-quality areas (e.g., numeric interim quantifiable milestones, outreach and education).

- f. Dischargers who elect to develop their work plan individually and whose ranches are located in areas where surface receiving water monitoring shows an exceedance of an applicable surface water limit in [Table C.3-2](#) (TMDL areas) and [Table C.3-3](#) (non-TMDL areas) for nutrients, [Table C.3-4](#) (TMDL areas) and [Table C.3-5](#) (non-TMDL areas) for pesticides and toxicity, and [Table C.3-6](#) (TMDL areas) for sediment and [Table C.3-7](#) (non-TMDL areas) for turbidity after the applicable compliance deadline may be subject to ranch-level surface discharge monitoring and reporting.

20. When required by the Executive Officer, based on surface receiving water quality data or significant and repeated exceedance of the surface water quality limits in [Table C.3-2](#) (TMDL areas) and [Table C.3-3](#) (non-TMDL areas) for nutrients, [Table C.3-4](#) (TMDL areas) and [Table C.3-5](#) (non-TMDL areas) for pesticides and toxicity, and [Table C.3-6](#) (TMDL areas) for sediment and [Table C.3-7](#) (non-TMDL areas) for turbidity, Dischargers must complete **ranch-level surface discharge monitoring and reporting** as described in the MRP. Dischargers can complete this requirement either individually or as part of a third-party program effort. Water Board staff will coordinate with Dischargers prior to the Executive Officer invoking this requirement to determine if non-compliance is the result of unforeseen or uncontrollable circumstances and to provide the Discharger with 90-day advanced notice of the forthcoming requirement. When ranch-level surface discharge monitoring and reporting is required, a work plan, including a SAP and QAPP, must be submitted for Executive Officer review prior to implementation. Once approved by the Executive Officer, the work plan must be implemented. Ranch-level surface discharge monitoring may be discontinued with the approval of the Executive Officer when the Discharger comes into compliance with the surface receiving water limits, or the discharge has otherwise ceased.

21. Dischargers must report on nutrient, pesticide, and sediment and erosion control management practice implementation and assessment electronically in the ACF, as described in the MRP.
22. Dischargers whose ranches have impermeable surfaces must report on stormwater management practice implementation and assessment electronically in the ACF, as described in the MRP.
23. Dischargers with waterbodies within or bordering their ranch must measure and report the current riparian area (average width and length, in feet) in the ACF, as described in the MRP.

Part 2, Section D. Additional Requirements and Prohibitions

Waste Discharge Control and Prohibitions

1. Except in compliance with this Order, Dischargers must not cause or contribute to exceedances of applicable water quality objectives, as defined in Attachment A, must protect all beneficial uses for inland surface waters, enclosed bays, and estuaries, and for groundwater, as outlined in sections 3.3.2 and 3.3.4 of the Basin Plan, and must prevent nuisance as defined in Water Code section 13050.
2. Dischargers must achieve applicable Total Maximum Daily Load (TMDL) Load Allocations (LAs) by achieving the surface water receiving limits established in this Order. Dischargers must incorporate planning elements from applicable TMDLs into the appropriate section of their Farm Plan and, as appropriate, into their follow-up surface receiving water implementation work plan(s).
3. Dischargers that anticipate exceeding a limit or condition of the Order after the final compliance date has passed may request a time schedule order pursuant to Water Code section 13300 for the Central Coast Water Board's consideration. A time schedule order must be requested 18 months in advance of a Discharger or a group of Dischargers anticipating that they will not be able to achieve the receiving water limit by the compliance date. At a minimum, the request for a time schedule order must include information outlined in Attachment A (Additional Findings). Dischargers may either individually request a time schedule order or may jointly request a time schedule order with other Dischargers subject to the same groundwater or surface receiving water limit.
4. The discharge of rubbish, refuse, trash, irrigation tubing or tape, or other solid wastes into surface waters is prohibited. The placement of such materials where they discharge or have the potential to discharge to surface waters is prohibited.
5. The discharge of chemicals such as fertilizers, fumigants, pesticides, herbicides, or rodenticides down a groundwater well casing is prohibited.

6. The discharge of chemicals, including those used to control wildlife (such as bait traps or poison), directly into surface waters or groundwater is prohibited. The placement of chemicals in a location where they may be discharged to surface waters or groundwater is prohibited.
7. Dischargers who apply fertilizers, fumigants, pesticides, herbicides, rodenticides, or other chemicals through an irrigation system must have functional and properly maintained backflow prevention devices installed at the well or pump to prevent pollution of groundwater and surface water that comply with any applicable DPR requirements or local ordinances. Backflow prevention devices used to protect water quality must be those approved by the United States Environmental Protection Agency (USEPA), DPR, California Department of Public Health (CDPH), or the local public health or water agency.
8. Dischargers must properly destroy all abandoned groundwater wells, exploration holes or test holes, as defined by Department of Water Resources (DWR) Bulletin 74-81 and revised in 1988, in such a manner that they will not produce water or act as a conduit for mixing or otherwise transfer groundwater or waste pollutants between permeable zones or aquifers. Well destruction must be performed in compliance with any applicable DWR requirements or local ordinances (including local well destruction permitting requirements).
9. This Order does not authorize the discharge of pollutants from point sources to waters of the United States, including wetlands. Where required, Dischargers must obtain authorization for such discharges by obtaining a Clean Water Act (CWA) section 402 National Pollutant Discharge Elimination System (NPDES) permit or a CWA section 404 dredge and fill permit.
10. Dischargers who utilize containment structures (such as retention ponds or reservoirs) to achieve treatment or control of the discharge of waste must manage, construct, and maintain such containment structures to avoid discharges of waste to groundwater and surface water that cause or contribute to exceedances of water quality objectives or impairment of beneficial uses. Dischargers may choose the method of compliance appropriate for the individual ranch, which may include, but is not limited to:
 - a. Implementing chemical treatment (such as enzymes);
 - b. Implementing biological treatment (such as wood chips);
 - c. Recycling or reusing contained water to minimize infiltration or discharge of waste;
 - d. Minimizing the volume of water in the containment structure to minimize percolation of waste; and/or
 - e. Minimizing percolation of waste via a synthetic, concrete, clay, or low permeability soil liner.

11. Dischargers must implement proper handling, storage, disposal, and management of fertilizers, fumigants, pesticides, herbicides, rodenticides, and other chemicals to prevent or control the discharge of waste to waters of the state that causes or contributes to exceedances of water quality standards. All chemical storage areas must have appropriate secondary containment structures to protect water quality and prevent discharge through spillage, mixing, or seepage.
12. Dischargers must implement water quality protective management practices (such as source control or treatment) to prevent erosion, reduce stormwater runoff quantity and velocity, and hold fine particles in place.
13. Dischargers must minimize the presence of bare soil vulnerable to erosion and soil runoff to surface waters and implement erosion control, sediment, and stormwater management practices in non-cropped areas, such as unpaved roads and other heavy use areas.
14. Dischargers who utilize agricultural drainage pumps must implement management practices to dissipate flow and prevent channel and/or streambank erosion resulting in increased sediment transport and turbidity within surface water.
15. Dischargers must comply with any applicable stormwater permits.
16. Dischargers must implement best practicable treatment and control (BPTC) measures for the construction and maintenance of farm roads to minimize erosion and sediment discharges that contribute to nonpoint source pollution.
17. Dischargers must ensure that all farm roads are, to the extent possible, hydrologically disconnected from waters of the state by installing disconnecting drainage features, increasing the frequency of (inside) ditch drain relief as needed, constructing out-sloped roads, constructing energy dissipating structures, avoiding concentrating flows in unstable areas, and performing inspection and maintenance as needed to optimize access road performance.
18. Dischargers must ensure that farm road surfacing, especially within a segment leading to waters of the state, minimizes sediment delivery to waters of the state and maximizes road integrity.
19. Dischargers must ensure that farm roads are out-sloped whenever possible to promote even drainage of the farm road surface, prevent the concentration of stormwater flow within an inboard or inside ditch, and to prevent disruption of the natural sheet flow pattern off a hill slope to waters of the state.

20. Farm road stormwater drainage structures must not discharge onto unstable slopes, earthen fills, or directly into waters of the state. Drainage structures must discharge onto stable areas with straw bales, slash, vegetation, and/or rock riprap.
21. If used, chemical toilets or holding tanks must be maintained in a manner appropriate for the frequency and conditions of usage, sited in stable locations, and located outside of areas bordering surface waterbodies.
22. Dischargers who produce and apply compost in-house must comply with the following requirements:
 - a. Materials and activities on-site must not cause, threaten to cause, or contribute to conditions of pollution, contamination, or nuisance;
 - b. Activities must be set back at least 100 feet from the nearest surface waterbody and/or the nearest water supply well;
 - c. Dischargers must implement practices to minimize or eliminate the discharge of waste that may adversely impact the quality or beneficial uses of waters of the state;
 - d. Dischargers must manage the application of water to compost (including from precipitation events) to reduce the generation of wastewater;
 - e. Working surfaces must be designed to prevent, to the greatest extent possible, ponding, infiltration, inundation, and erosion, notwithstanding precipitation events, equipment movement, and other aspects of the facility operations;
 - f. Dischargers must maintain the following records in the Farm Plan. These records must be submitted to the Central Coast Water Board upon request.
 - i. Total operational footprint of compost activities (in acres), including ancillary activities;
 - ii. Compost operation records to provide background information on the composting operation history and a description of methods and operation used, including the following: feedstock types, volumes, sources, and suppliers. Description of the method of composting (e.g., windrow, static, forced air, mechanical). Description of how residuals are removed from the feedstocks and managed and/or disposed of.
 - iii. Description of water supply.
 - iv. Map detailing the location and size (in acres) of the working surface used for the storage of incoming feedstocks, additives, and amendments (receiving area); active and curing composting; final product; drainage patterns; location of any groundwater monitoring wells and water supply wells within and/or near the property boundary; location and distance (in feet) to nearby water supply wells (e.g., municipal supply, domestic supply, agricultural wells) from the nearest property boundary of the operation; identification of all surface waterbodies, including streams, ditches, canals, and other drainage

- courses; and distances from the nearest property boundary of the operation to these surface waterbody areas.
- v. Records of appropriate monitoring (dependent on method of composting) for composting to develop final product (temperature, turning, air flow, etc.).
 - vi. Records of final product use, including locations and volumes.
23. Disturbance (e.g., removal, degradation, or destruction) of existing, naturally occurring, and established native riparian vegetative cover (e.g., trees, shrubs, and grasses), unless authorized (e.g., Clean Water Act [CWA] section 404 permit and CWA section 401 certification, WDRs, waivers of WDRs, a California Department of Fish and Wildlife [CDFW] Lake and Streambed Alteration Agreement, or municipal ordinance), is prohibited. Dischargers must avoid disturbance in riparian areas to minimize waste discharges and protect water quality and beneficial uses.
24. In the case where disturbance of riparian areas is authorized, Dischargers must implement appropriate and practicable measures to avoid, minimize, and mitigate erosion and discharges of waste.

Additional Requirements

25. Upon the Central Coast Water Board's request, Dischargers must submit information regarding compliance with any DPR adopted or approved surface water or groundwater protection requirements to the Central Coast Water Board.
26. Upon the Central Coast Water Board's request, Dischargers must submit proof of an approved Lake and Streambed Alteration Agreement or other authorization or release from the CDFW to the Central Coast Water Board for any work conducted within the bed, bank, and channel, including riparian areas, of parcels enrolled in this order, that has the potential to result in erosion and discharges of waste to waters of the State.
27. Upon the Central Coast Water Board's request, Dischargers must submit proof of a Clean Water Act section 404 dredge and fill permit from the United States Army Corps of Engineers (USACE) for any work that has the potential to discharge wastes considered "fill" material, such as sediment, to waters of the United States to the Central Coast Water Board.
28. Dischargers must comply with DWR Bulletin 74-81 and supplement 74-90, Water Code sections 13700 through 13755, and any local permitting requirements associated with installation of new wells.
29. This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in

the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the federal Endangered Species Act (16 U.S.C. sections 1531 to 1544). If a "take" will result from any act authorized under this Order, the Dischargers must obtain authorization for an incidental take prior to taking action. Dischargers are responsible for meeting all applicable requirements of the California and federal Endangered Species Acts for the discharge authorized by this Order.

30. Dischargers or a representative authorized by the Discharger must sign technical reports submitted to the Central Coast Water Board to comply with this Order. Any person signing or submitting a document must provide the following certification, whether written or implied:

"In compliance with Water Code section 13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision, following a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

CERTIFICATION

I, Matthew T. Keeling, Executive Officer, do hereby certify that this General Order with all its attachments is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, Central Coast Region on April XX, 2021.

Matthew T. Keeling, Executive Officer

Tables and Figures

Tables and Figures related to Part 2, Section C.1. Groundwater Protection

Table C.1-1. Groundwater Phase Areas

Groundwater Basin¹	Groundwater Phase
Gilroy-Hollister Valley - Llagas Area	Phase 1, Phase 2
Salinas Valley - Forebay Aquifer	Phase 1, Phase 2
Salinas Valley - Upper Valley Aquifer	Phase 1, Phase 2
Santa Maria River Valley - Santa Maria	Phase 1, Phase 2
Santa Ynez River Valley	Phase 1, Phase 3
Corralitos - Pajaro Valley	Phase 2
Gilroy Hollister Valley - North San Benito	Phase 2
Salinas Valley - 180/400 Foot Aquifer	Phase 2
Salinas Valley - East Side Aquifer	Phase 2
San Luis Obispo Valley	Phase 2
All Other Basins and Areas Outside of Basins	Phase 3

¹As defined in the 2019 California Department of Water Resources Bulletin 118.

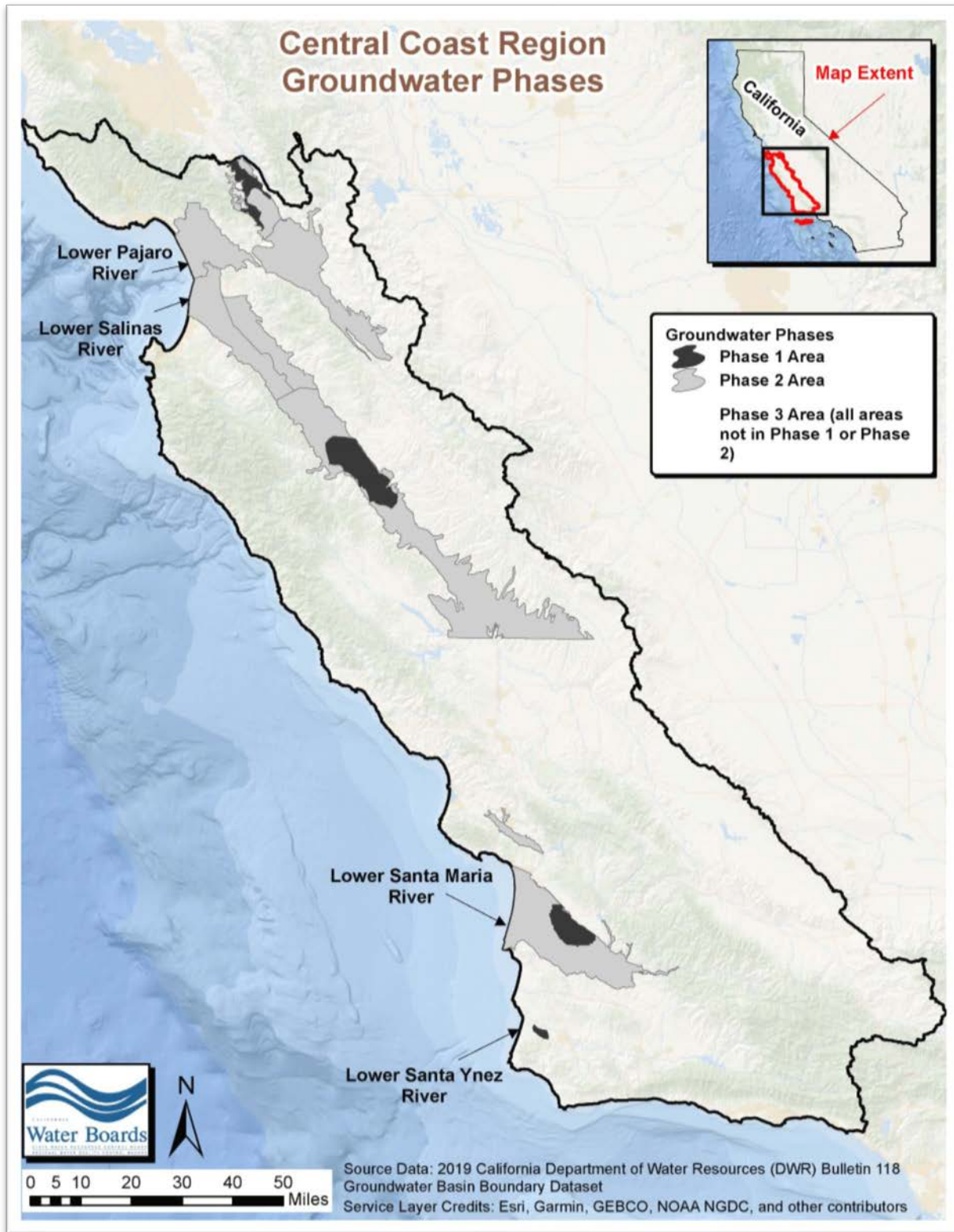


Figure C.1-1: Groundwater Phase Areas

Table C.1-2. Compliance Dates for Fertilizer Nitrogen Application Limits

Crop	90th Percentile A_{FER} =	Compliance Date	85th Percentile A_{FER} =	Compliance Date
Broccoli	295	12/31/2023	280	12/31/2025
Cauliflower	310		285	
Celery	360		330	
Lettuce	275		255	
Spinach	245		230	
Strawberry	320		295	
All Other Crops	500		480	

Note: For crops grown for less than one year (e.g., broccoli, lettuce, etc.), units are in pounds of nitrogen per acre per crop. In the situation where a Discharger grows a crop more than once during the year, e.g. grows a spring lettuce and a fall lettuce, the application limit applies to each of the crops separately: no more than 275 pounds of nitrogen per acre can be applied to the spring lettuce crop and no more than 275 pounds of nitrogen per acre can be applied to the fall lettuce crop. The two lettuce crops can be reported on separately or can be averaged together. For crops grown for more than one year (e.g., grapes, trees, etc.), units are in pounds of nitrogen per acre per year. The 90th and 85th percentile fertilizer nitrogen application limits were determined by using year 2014 to 2019 total nitrogen applied (TNA) reporting information.

Table C.1-3. Compliance Dates for Nitrogen Discharge Targets and Limits

Compliance Pathway 1 $A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) + A_{IRR} - R =$	Compliance Date		
	Target	500	12/31/2023
	Target	400	12/31/2025
	Limit	300	12/31/2027
	Limit	200	12/31/2031
	Limit	150	12/31/2036
	Limit	100	12/31/2041
	Limit	50	12/31/2051
OR			
Compliance Pathway 2 $A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) = R$	Compliance Date		
	Target	A = R	12/31/2023
	Target	A = R	12/31/2025
	Limit	A = R	12/31/2027
	Limit	A = R	12/31/2031
	Limit	A = R	12/31/2036
	Limit	A = R	12/31/2041
	Limit	A = R	12/31/2051
OR			
Compliance Pathway 3 $A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) - R =$	Compliance Date		
	Target	300	12/31/2023
	Target	200	12/31/2025
	Limit	100	12/31/2027
	Limit	0	12/31/2031
	Limit	-50	12/31/2036
	Limit	-100	12/31/2041
	Limit	-150	12/31/2051

Note: All units are in pounds of nitrogen per acre per year and represent all crops grown and harvested on the entire ranch. The initial 2027 nitrogen discharge limits will be re-evaluated based on discharger reported nitrogen applied and removed data, new science, and management practice implementation and assessment before becoming effective.

A_{FER} is the amount of fertilizer nitrogen applied in pounds per acre.

C is the compost discount factor used to represent the amount of compost nitrogen mineralized during the year that the compost was applied.

A_{COMP} is the total amount of compost nitrogen applied in pounds per acre.

A_{IRR} is the amount of nitrogen applied in the irrigation water estimated from the volume required for crop evapotranspiration (ET) in pounds per acre.

O is the organic fertilizer discount factor used to represent the amount of nitrogen mineralized during the first 12 weeks in the year it was applied.

A_{ORG} is the total amount of organic fertilizer or amendment nitrogen applied in pounds per acre.

R is the amount of nitrogen removed from the field through harvest, sequestration, or other removal methods, in pounds per acre.

Note: Report due dates to confirm compliance with the fertilizer application limits and nitrogen discharge targets and limits are included in the MRP.

Tables and Figures related to Part 2, Section C.2. Third-Party Alternative Compliance Pathway for Groundwater Protection

Table C.2-1. Compliance Dates for Fertilizer Nitrogen Application Targets (Alternative Compliance Pathway)

Crop	90 th Percentile A _{FER} =	Compliance Date	85 th Percentile A _{FER} =	Compliance Date
Broccoli	295	12/31/2024	280	12/31/2026
Cauliflower	310		285	
Celery	360		330	
Lettuce	275		255	
Spinach	245		230	
Strawberry	320		295	
All Other Crops	500		480	

Note: For crops grown for less than one year (e.g., broccoli, lettuce, etc.), units are in pounds of nitrogen per acre per crop. In the situation where a Discharger grows a crop more than once during the year, e.g. grows a spring lettuce and a fall lettuce, the application limit applies to each of the crops separately: no more than 275 pounds of nitrogen per acre can be applied to the spring lettuce crop and no more than 275 pounds of nitrogen per acre can be applied to the fall lettuce crop. The two lettuce crops can be reported on separately or can be averaged together. For crops grown for more than one year (e.g., grapes, trees, etc.), units are in pounds of nitrogen per acre per year. The 90th and 85th percentile fertilizer nitrogen application targets were determined by using year 2014 to 2019 total nitrogen applied (TNA) reporting information.

Table C.2-2. Compliance Dates for Nitrogen Discharge Targets (Alternative Compliance Pathway)

Compliance Pathway 1 $A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) + A_{IRR} - R =$	Target	Compliance Date
	500	12/31/2024
	400	12/31/2026
	300	12/31/2028
OR		
Compliance Pathway 2 $A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) = R$	Target	Compliance Date
	A = R	12/31/2024
	A = R	12/31/2026
	A = R	12/31/2028
OR		
Compliance Pathway 3 $A_{FER} + (C \times A_{COMP}) + (O \times A_{ORG}) - R =$	Target	Compliance Date
	300	12/31/2024
	200	12/31/2026
	100	12/31/2028

Notes: All units are in pounds of nitrogen per acre per year and represent all crops grown and harvested on the entire ranch. All compliance pathway variables are defined above under [Table C.1-3](#). The final 2028 nitrogen discharge targets will be re-evaluated based on discharger reported nitrogen applied and removed data, new science, management practice implementation and assessment, and third-party GWP collective numeric interim and final targets before becoming effective.

Tables and Figures related to Part 2, Section C.3. Surface Water Protection

Table C.3-1. Surface Water Priority Areas

HUC-8 Number¹	HUC-8 Name	Surface Water Priority
18060008	Santa Maria	Priority 1
18060005	Salinas	Priority 2
18060002	Pajaro	Priority 3
18060015	Monterey Bay	Priority 3
18060010	Santa Ynez	Priority 3
18050003	Coyote	Priority 4
18050006	San Francisco Coastal South	Priority 4
18060004	Estrella	Priority 4
18060006	Central Coastal	Priority 4
18060003	Carrizo Plain	Priority 4
18060007	Cuyama	Priority 4
18060009	San Antonio	Priority 4
18060013	Santa Barbara Coastal	Priority 4
18060014	Santa Barbara Channel Islands	Priority 4
18070101	Ventura	Priority 4

¹As defined by the National Hydrography Dataset Plus Watershed Boundary Dataset

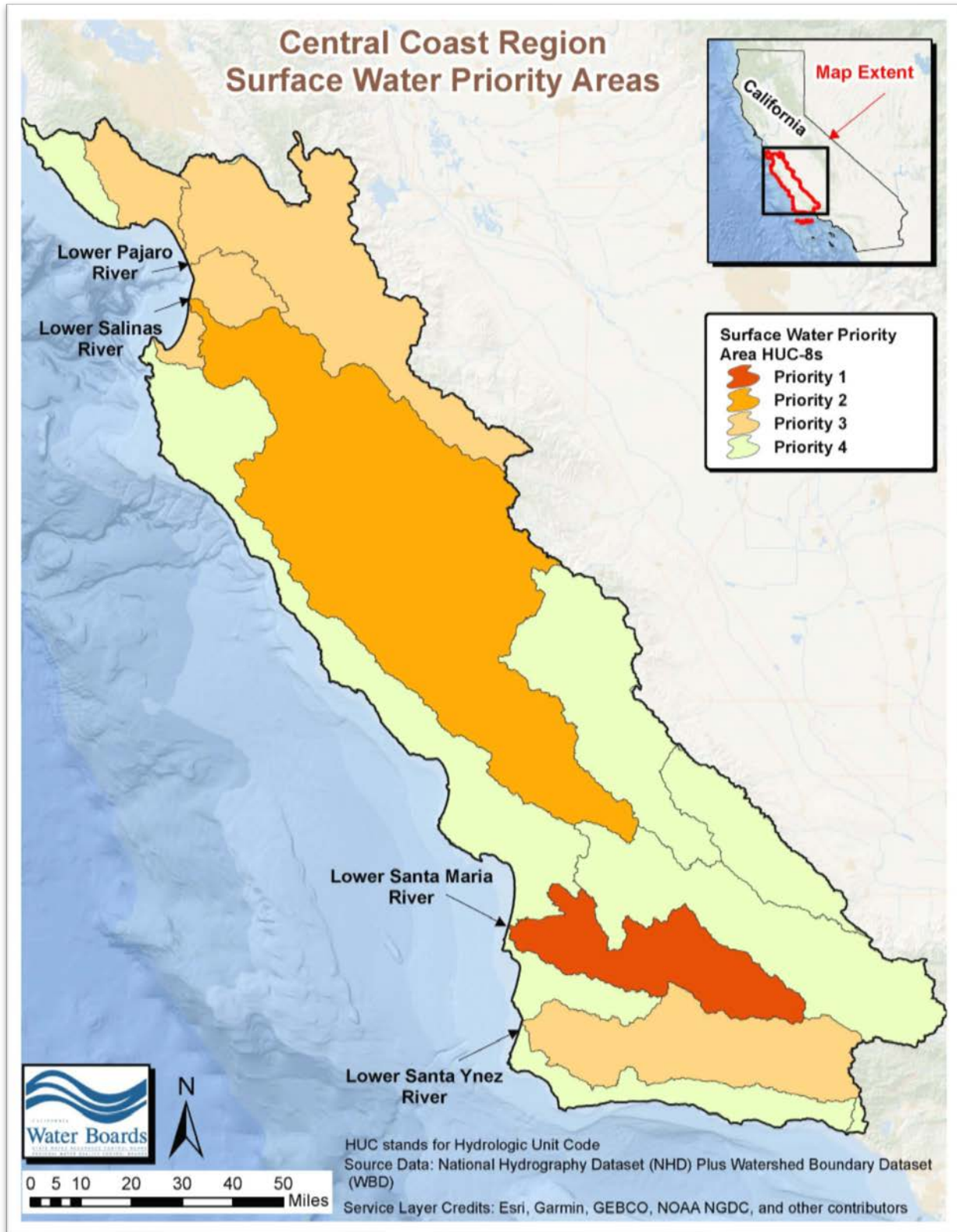


Figure C-3.1: Surface Water Priority Areas

Table C.3-1.3P. Surface Water Priority Areas (Third-Party Program)

High Priority	
305FUF	Furlong Creek at Frazier Lake Road
309ALG	Salinas Reclamation Canal at La Guardia
309CCD	Chualar Creek west of Highway 101
309CRR	Chualar Creek North Branch east of Highway 101
309ESP	Espinosa Slough upstream from Alisal Slough
309JON	Salinas Reclamation Canal at San Jon Road
309MER	Merrit Ditch upstream of Highway 183
309NAD	Natividad Creek upstream of Salinas Reclamation Canal
309OLD	Old Salinas River at Monterey Dunes Way
309QUI	Quail Creek at culvert on east side of Highway 101
309TEH	Tembladero Slough at Haro Street
312BCC	Bradley Canyon Creek at Culvert
312BCJ	Bradley Channel at Jones Street
312GVS	Green Valley at Simas
312MSD	Main Street Canal upstream of Ray Road at Highway 166
312OFC	Oso Flaco Creek at Oso Flaco Lake Road
312ORC	Orcutt Solomon Creek upstream of Santa Maria River
312ORI	Orcutt Solomon Creek at Highway 1
312SMA	Santa Maria River at Estuary
Medium Priority	
305BRS	Beach Road Ditch at Shell Road
305CAN	Carnadero Creek upstream of Pajaro River
305CHI	Pajaro River at Chittenden Gap
305FRA	Pajaro River Millers Canal at Frazier Lake Road
305LCS	Llagas Creek at Southside Avenue
305PJP	Pajaro River at Main Street
305SJA	San Juan Creek at Anzar Road
305TSR	Tequisquita Slough upstream of Pajaro River at Shore Road
305WCS	Watsonville Creek at Elkhorn Road / Hudson Landing
309ASB	Alisal Slough at White Barn
309BLA	Blanco Drain below Pump
309GAB	Gabilan Creek at Boronda Road
309MOR	Moro Cojo Slough at Highway 1
309RTA	Santa Rita Creek at Santa Rita Creek Park
310LBC	Los Berros Creek at Century Road
310PRE	Prefumo Creek at Calle Joaquin
310USG	Arroyo Grande Creek at old USGS Gauge
310WRP	Warden Creek at Wetlands Restoration Preserve
312OFN	Little Oso Flaco Creek
312SMI	Santa Maria at Highway 1
313SAE	San Antonio Creek at San Antonio Road east
314SYN	Santa Ynez River at 13 th
315BEF	Bell Creek at Winchester Canyon Park
315FMV	Franklin Creek at Mountain View Lane
315GAN	Glenn Annie Creek
315LCC	Los Carneros Creek at Calle Real

Low Priority	
305COR	Salsipuedes Creek downstream of Corralitos Creek upstream of HWY 129
305WSA	Watsonville Slough at San Andreas Road
309GRN	Salinas River (Mid) at Elm Road in Greenfield
309SAC	Salinas River at Chualar
309SAG	Salinas River at Gonzales River Road Bridge
309SSP	Salinas River (Lower) at Spreckles Gauge
310CCC	Chorro Creek upstream of Chorro Flats
314SYF	Santa Ynez River at Flordale
314SYL	Santa Ynez River at River Park
315APF	Arroyo Paredon Creek at Foothill Bridge
All Other Areas	Low priority also includes all other areas not in high or medium priority areas

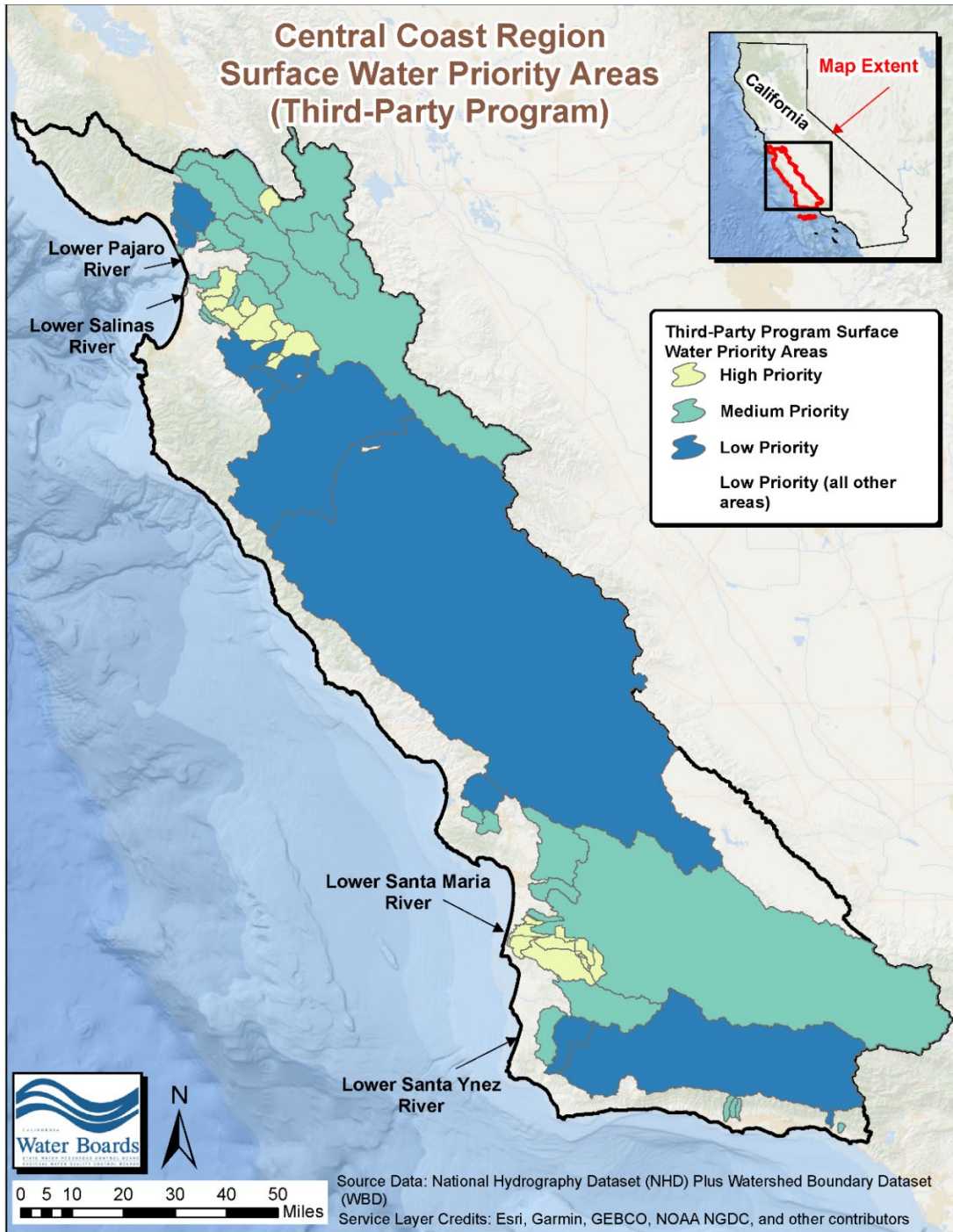


Figure C-3.1.3P: Surface Water Priority Areas (Third-Party Program)

Table C.3-2. Compliance Dates for Nutrient Limits (TMDL areas)

TMDL Project Name	Constituent	Matrix	Limit¹	Units²	Compliance Date
Arroyo Paredon Nitrate TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032
Bell Creek Nitrate TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032
Franklin Creek Nutrients TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032
Franklin Creek Nutrients TMDL	Total Nitrogen, as N	Water Column	Wet Season: 8.0	mg/L	3/4/2034
Franklin Creek Nutrients TMDL	Total Phosphorous	Water Column	Wet Season: 0.3	mg/L	3/4/2034
Franklin Creek Nutrients TMDL	Total Nitrogen, as N	Water Column	Dry Season: 1.1	mg/L	3/4/2044
Franklin Creek Nutrients TMDL	Total Phosphorous	Water Column	Dry Season: 0.075	mg/L	3/4/2044
Glen Annie Canyon, Tecolotito Creek, & Carneros Creek Nitrate TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032
Los Berros Creek Nitrate TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032
Los Osos Creek, Warden Creek, and Warden Lake Wetland Nutrient TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032

TMDL Project Name	Constituent	Matrix	Limit¹	Units²	Compliance Date
Lower Salinas River Watershed Nutrient TMDL	Ammonia (Un-ionized), as N ³	Water Column	0.025	mg/L	12/31/2032
Lower Salinas River Watershed Nutrient TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032
Lower Salinas River Watershed Nutrient TMDL	Total Nitrogen, as N ⁴	Water Column	Wet Season: 8.0	mg/L	5/7/2034
Lower Salinas River Watershed Nutrient TMDL	Nitrate, as N	Water Column	Wet Season: 8.0	mg/L	5/7/2034
Lower Salinas River Watershed Nutrient TMDL	Orthophosphate, as P	Water Column	Wet Season: 0.3	mg/L	5/7/2034
Lower Salinas River Watershed Nutrient TMDL	Total Nitrogen, as N ⁴	Water Column	Dry Season: 1.7	mg/L	5/7/2044
Lower Salinas River Watershed Nutrient TMDL	Nitrate, as N	Water Column	Dry Season: 1.4 – 6.4 ¹	mg/L	5/7/2044
Lower Salinas River Watershed Nutrient TMDL	Orthophosphate, as P	Water Column	Dry Season: 0.07 – 0.13 ¹	mg/L	5/7/2044

TMDL Project Name	Constituent	Matrix	Limit¹	Units²	Compliance Date
Pajaro River Watershed Nutrient TMDL	Ammonia (Un-ionized), as N ³	Water Column	0.025	mg/L	12/31/2032
Pajaro River Watershed Nutrient TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032
Pajaro River Watershed Nutrient TMDL	Total Nitrogen, as N	Water Column	Wet Season: 8.0	mg/L	12/31/2032
Pajaro River Watershed Nutrient TMDL	Nitrate, as N	Water Column	Wet Season: 8.0	mg/L	12/31/2032
Pajaro River Watershed Nutrient TMDL	Orthophosphate, as P	Water Column	Wet Season: 0.3	mg/L	12/31/2032
Pajaro River Watershed Nutrient TMDL	Total Nitrogen, as N ⁵	Water Column	Dry Season: 1.1 – 2.1 ¹	mg/L	7/12/2041
Pajaro River Watershed Nutrient TMDL	Nitrate, as N	Water Column	Dry Season: 1.8 – 3.9 ¹	mg/L	7/12/2041
Pajaro River Watershed Nutrient TMDL	Orthophosphate, as P	Water Column	Dry Season: 0.04 – 0.14 ¹	mg/L	7/12/2041
San Luis Obispo Creek Nitrate TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032

TMDL Project Name	Constituent	Matrix	Limit¹	Units²	Compliance Date
Santa Maria River Watershed Nutrients TMDL	Ammonia (Un-ionized), as N ³	Water Column	0.025	mg/L	12/31/2032
Santa Maria River Watershed Nutrients TMDL	Nitrate, as N	Water Column	10.0	mg/L	12/31/2032
Santa Maria River Watershed Nutrients TMDL	Nitrate, as N	Water Column	Wet Season or Year-Round: 5.7 – 8.0 ¹	mg/L	5/22/2034
Santa Maria River Watershed Nutrients TMDL	Orthophosphate, as P	Water Column	Wet Season or Year-Round: 0.08 – 0.3 ¹	mg/L	5/22/2034
Santa Maria River Watershed Nutrients TMDL	Nitrate, as N	Water Column	Dry Season: 4.3	mg/L	5/22/2044
Santa Maria River Watershed Nutrients TMDL	Orthophosphate, as P	Water Column	Dry Season: 0.19	mg/L	5/22/2044

¹The Lower Salinas River Watershed Nutrient TMDL, Pajaro River Watershed Nutrient TMDL, and Santa Maria River Watershed Nutrient TMDL include load allocations for specific waterbody reaches within the TMDL project area. The limits for those TMDLs are summarized in this table as ranges; however, the exact load allocation values for each reach apply as described in the TMDL and Basin Plan and will be assessed as numeric limits for the purposes of this Order.

²mg/L is milligrams per liter

³Calculated using total ammonia and onsite instream measurements (field measurements) of pH and water temperature.

⁴Total nitrogen TMDL load allocation applies to Moro Cojo Slough only.

⁵Total nitrogen TMDL load allocation applies to the following sloughs: Watsonville, Harkins, Gallighan, and Struve.

Table C.3-3. Compliance Dates for Nutrient Limits (Non-TMDL areas)

Constituent Group	Constituent	Matrix	Limit	Units¹	Compliance Date
Nutrients	Nitrate, as Nitrogen	Water Column	10.0	mg/L	12/31/2032
Nutrients	Ammonia (un-ionized), as Nitrogen ²	Water Column	0.025	mg/L	12/31/2032

¹mg/L is milligrams per liter

²Calculated using total ammonia and onsite instream measurements (field measurements) of pH and water temperature.

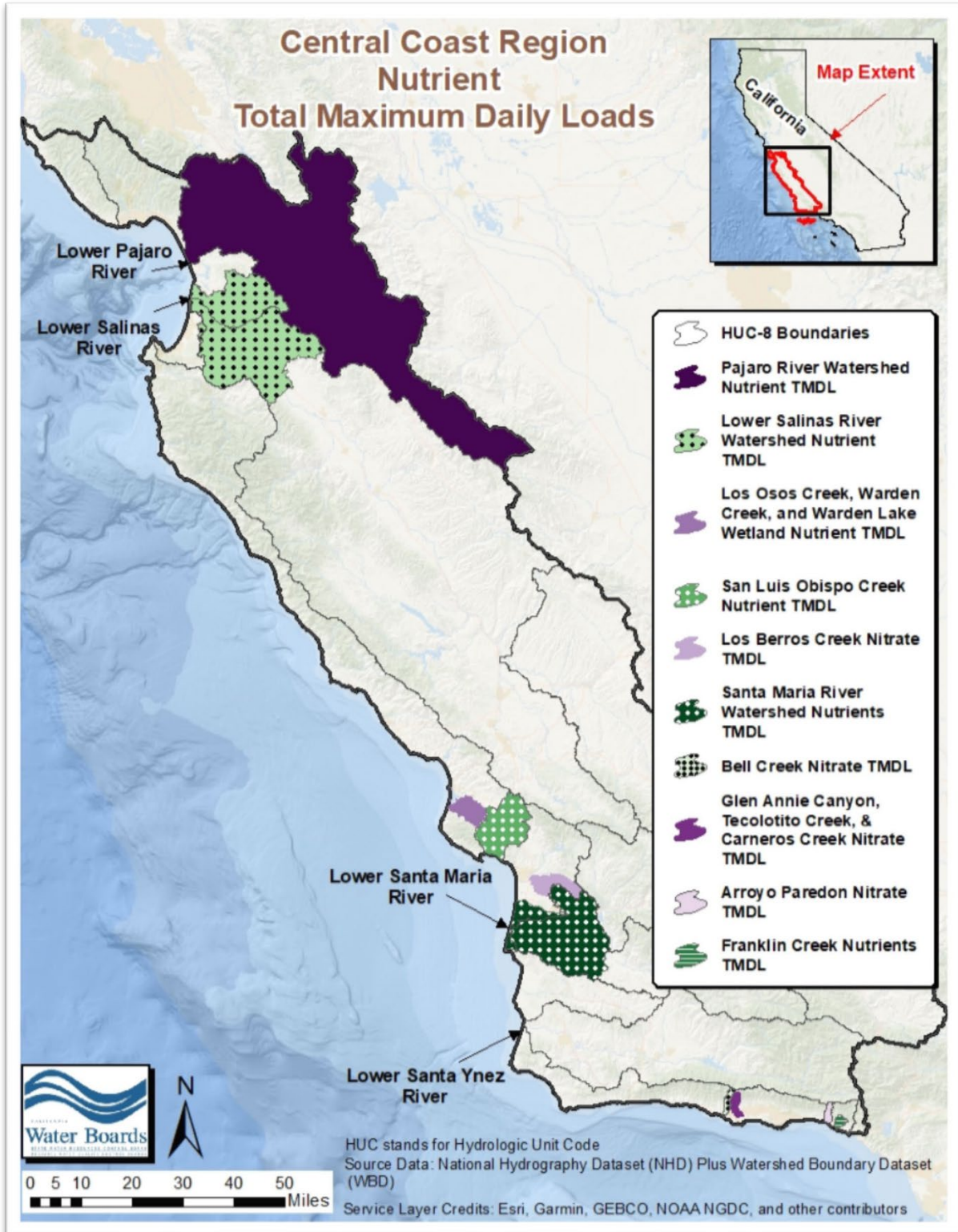


Figure C.3-2: Nutrient TMDL Areas

Table C.3-4. Compliance Dates for Pesticide and Toxicity Limits (TMDL areas)

TMDL Project Name	Constituent¹	Matrix	Limit²	Units³	Compliance Date
Arroyo Paredon Diazinon TMDL	Additive Toxicity (Chlorpyrifos and Diazinon)	Water Column	Sum of Additive Toxicity, TU ≤ 1.0	TU	12/31/2032
Arroyo Paredon Diazinon TMDL	Diazinon	Water Column	CCC: 0.10 CMC: 0.16	µg/L	12/31/2032
Lower Salinas River Watershed Chlorpyrifos and Diazinon TMDL	Chlorpyrifos ⁴	Water Column	CCC: 0.015 CMC: 0.025	µg/L	12/31/2032
Lower Salinas River Watershed Chlorpyrifos and Diazinon TMDL	Diazinon ⁴	Water Column	CCC: 0.10 CMC: 0.16	µg/L	12/31/2032
Lower Salinas River Watershed Chlorpyrifos and Diazinon TMDL	Additive Toxicity (Chlorpyrifos and Diazinon)	Water Column	Sum of Additive Toxicity, TU ≤ 1.0	TU	12/31/2032

TMDL Project Name	Constituent¹	Matrix	Limit²	Units³	Compliance Date
Lower Salinas River Watershed Sediment Toxicity and Pyrethroids in Sediment TMDL	Additive Toxicity (Pyrethroids)	Sediment	Sum of Pyrethroid TU < 1.0	TU	12/31/2032
Lower Salinas River Watershed Sediment Toxicity and Pyrethroids in Sediment TMDL	Aquatic Toxicity	Sediment	No significant toxic effect, 10-day, chronic exposure with <i>Hyalella azteca</i>	Survival endpoint	12/31/2032
Pajaro River Watershed Chlorpyrifos and Diazinon TMDL	Additive Toxicity (Chlorpyrifos and Diazinon)	Water Column	Sum of Additive Toxicity, TU ≤ 1.0	TU	12/31/2032
Pajaro River Watershed Chlorpyrifos and Diazinon TMDL	Chlorpyrifos	Water Column	CCC: 0.015 CMC: 0.025	µg/L	12/31/2032
Pajaro River Watershed Chlorpyrifos and Diazinon TMDL	Diazinon	Water Column	CCC: 0.10 CMC: 0.16	µg/L	12/31/2032

TMDL Project Name	Constituent¹	Matrix	Limit²	Units³	Compliance Date
Pajaro River Watershed Chlorpyrifos and Diazinon TMDL	Aquatic Toxicity	Sediment	No significant toxic effect, 10-day, chronic exposure with <i>Hyalella azteca</i>	Survival and reproduction endpoints	12/31/2032
Pajaro River Watershed Chlorpyrifos and Diazinon TMDL	Aquatic Toxicity	Water Column	No significant toxic effect, 7-day, chronic exposure with <i>Ceriodaphnia dubia</i>	Survival and reproduction endpoints	12/31/2032
Santa Maria River Watershed Toxicity and Pesticide TMDL	Additive Toxicity (Chlorpyrifos and Diazinon)	Water Column	Sum of Additive Toxicity, TU ≤ 1.0	TU	12/31/2032
Santa Maria River Watershed Toxicity and Pesticide TMDL	Chlorpyrifos	Water Column	CCC: 0.015 CMC: 0.025	µg/L	12/31/2032
Santa Maria River Watershed Toxicity and Pesticide TMDL	Diazinon	Water Column	CCC: 0.10 CMC: 0.16	µg/L	12/31/2032

TMDL Project Name	Constituent¹	Matrix	Limit²	Units³	Compliance Date
Santa Maria River Watershed Toxicity and Pesticide TMDL	Malathion	Water Column	CCC: 0.028 CMC: 0.17	µg/L	12/31/2032
Santa Maria River Watershed Toxicity and Pesticide TMDL	Additive Toxicity (Pyrethroids)	Sediment	Sum of Pyrethroid TU ≤ 1.0	TU	12/31/2032
Santa Maria River Watershed Toxicity and Pesticide TMDL	Aquatic Toxicity	Sediment	No significant toxic effect, 10-day, chronic exposure with <i>Hyalella azteca</i>	Survival endpoint	Not Defined ⁵
Santa Maria River Watershed Toxicity and Pesticide TMDL	Aquatic Toxicity	Water Column	No significant toxic effect, 6-8 day, chronic exposure with <i>Ceriodaphnia dubia</i>	Survival and reproduction endpoints	Not Defined ⁵
Santa Maria River Watershed Toxicity and Pesticide TMDL	4,4'-DDT (p,p-DDT)	Sediment	6.5	µg/kg o.c.	10/29/2044

TMDL Project Name	Constituent¹	Matrix	Limit²	Units³	Compliance Date
Santa Maria River Watershed Toxicity and Pesticide TMDL	4,4'-DDE (p,p-DDE)	Sediment	5.5	µg/kg o.c.	10/29/2044
Santa Maria River Watershed Toxicity and Pesticide TMDL	4,4'-DDD (p,p-DDD)	Sediment	9.1	µg/kg o.c.	10/29/2044
Santa Maria River Watershed Toxicity and Pesticide TMDL	Total DDT (Sediment)	Sediment	10.0	µg/kg o.c.	10/29/2044
Santa Maria River Watershed Toxicity and Pesticide TMDL	Chlordane	Sediment	1.7	µg/kg o.c.	10/29/2044
Santa Maria River Watershed Toxicity and Pesticide TMDL	Dieldrin	Sediment	0.14	µg/kg o.c.	10/29/2044
Santa Maria River Watershed Toxicity and Pesticide TMDL	Endrin	Sediment	550.0	µg/kg o.c.	10/29/2044

TMDL Project Name	Constituent ¹	Matrix	Limit ²	Units ³	Compliance Date
Santa Maria River Watershed Toxicity and Pesticide TMDL	Toxaphene	Sediment	20.0	µg/kg o.c.	10/29/2044

¹Toxic units and/or additive toxicity units are calculated using the relevant biological indicators, as described in the applicable TMDL, e.g. LC50, CCC, or CMC.

²CCC is Criterion Continuous Concentration or chronic (4-day (96-hour) average), not to be exceeded more than once in a three year period; CMC is Criterion Maximum Concentration or acute (1- hour average) not to be exceeded more than once in a three year period; the sum of additive toxicity is calculated by dividing each measured chemical concentration by that chemical's criterion (CCC or CMC) and summing those values as defined in the staff report for the respective TMDL project.

³µg/L is micrograms per liter; µg/kg is micrograms per kilogram; ng/g is nanograms per gram; o.c. means normalized for sediment organic carbon content; ppb is parts per million.

⁴Apply only when one of the two compounds (chlorpyrifos or diazinon) is present.

⁵A time schedule for aquatic toxicity was not identified in the Santa Maria River Watershed Toxicity and Pesticide TMDL; therefore, Dischargers in this area must comply with the aquatic toxicity compliance date defined in Table C.3-2.

Table C-3.5. Compliance Dates for Pesticide and Toxicity Limits (Non-TMDL areas)

Constituent Group	Constituent	Matrix	Limit¹	Units²	Compliance Date
Pesticides	Acetamiprid	Water Column	2.10	µg/L	12/31/2032
Pesticides	Atrazine	Water Column	60.0	µg/L	12/31/2032
Pesticides	Bifenthrin	Sediment	0.52	µg/g o.c.	12/31/2032
Pesticides	Chlorpyrifos	Water Column	0.023	µg/L	12/31/2032
Pesticides	Chlorpyrifos	Sediment	1.77	µg/g o.c.	12/31/2032
Pesticides	Clothianidin	Water Column	0.05	µg/L	12/31/2032
Pesticides	Cyanazine	Water Column	27.0	µg/L	12/31/2032
Pesticides	Cyfluthrin	Sediment	1.08	µg/g o.c.	12/31/2032
Pesticides	Cypermethrin	Sediment	0.38	µg/g o.c.	12/31/2032
Pesticides	Danitol (fenpropathrin)	Sediment	1.10	µg/g o.c.	12/31/2032
Pesticides	Demeton-s-methyl sulfoxide (oxydemeton-methyl)	Water Column	46	µg/L	12/31/2032
Pesticides	Diazinon	Water Column	0.105	µg/L	12/31/2032
Pesticides	Dichlorvos	Water Column	0.0058	µg/L	12/31/2032
Pesticides	Dimethoate	Water Column	0.50	µg/L	12/31/2032
Pesticides	Dinotefuran	Water Column	23.5	µg/L	12/31/2032
Pesticides	Disulfoton (Disyton)	Water Column	0.01	µg/L	12/31/2032
Pesticides	Diuron	Water Column	80.0	µg/L	12/31/2032
Pesticides	Esfenvalerate	Sediment	1.54	µg/g o.c.	12/31/2032
Pesticides	Fenvalerate	Sediment	1.54	µg/g o.c.	12/31/2032
Pesticides	Glyphosate	Water Column	26,600	µg/L	12/31/2032
Pesticides	Imidacloprid	Water Column	0.01	µg/L	12/31/2032
Pesticides	Cyhalothrin, lambda	Sediment	0.45	µg/g o.c.	12/31/2032
Pesticides	Linuron	Water Column	0.09	µg/L	12/31/2032
Pesticides	Malathion	Water Column	0.049	µg/L	12/31/2032
Pesticides	Methamidophos	Water Column	4.50	µg/L	12/31/2032
Pesticides	Methidathion	Water Column	0.66	µg/L	12/31/2032

Constituent Group	Constituent	Matrix	Limit ¹	Units ²	Compliance Date
Pesticides	Paraquat	Water Column	< 36.9	µg/L	12/31/2032
Pesticides	Parathion-methyl	Water Column	0.25	µg/L	12/31/2032
Pesticides	Permethrin	Sediment	10.83	µg/g o.c.	12/31/2032
Pesticides	Phorate	Water Column	0.21	µg/L	12/31/2032
Pesticides	Phosmet	Water Column	0.80	µg/L	12/31/2032
Pesticides	Simazine	Water Column	40.0	µg/L	12/31/2032
Pesticides	Thiacloprid	Water Column	0.97	µg/L	12/31/2032
Pesticides	Thiamethoxam	Water Column	0.74	µg/L	12/31/2032
Pesticides	Trifluralin	Water Column	2.40	µg/L	12/31/2032
Toxicity	Sediment Toxicity	Sediment	No significant effect based on chronic or acute toxicity to applicable test organism	Survival, growth, and reproduction endpoints ³	12/31/2032
Toxicity	Water Column Toxicity	Water Column	No significant effect based on chronic or acute toxicity to applicable test organism	Survival, growth, and reproduction endpoints ³	12/31/2032
Toxicity	Toxic Units	Sediment	Sum of additive toxicity ≤ 1	Toxic Unit (TU) ⁴	12/31/2032
Toxicity	Toxic Units	Water Column	Sum of additive toxicity ≤ 1	Toxic Unit (TU) ⁴	12/31/2032

¹Attachment A to this Order describes the sources of the limits established in this table.

²µg/L is micrograms per liter; µg/kg is micrograms per kilogram; ng/g is nanograms per gram; o.c. means normalized for sediment organic carbon content; ppb is parts per million.

³Toxicity determinations will be pass/fail based on a comparison of the test organism's response (survival, growth, and reproduction) to the water sample compared to the control using the Test of Significant Toxicity (TST statistical approach), or a statistical t-test, based on the toxicity provisions in the State Water Board *Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries in California* (in draft). If a sample is declared "fail" (i.e., toxic) for any endpoint, then the limit is not met. The most sensitive test species for each constituent must be used when evaluating toxicity.

⁴Toxic units (TU) and/or additive toxicity units are calculated using the relevant biological indicators, e.g. LC50, CCC, or CMC as follows: Calculate additive toxicity for organophosphate pesticides in non-TMDL watersheds as defined in the TMDL for Chlorpyrifos and Diazinon in the Lower Salinas River Watershed; and calculate TUs for pyrethroid pesticides in non-TMDL watersheds as defined in the TMDL for Sediment Toxicity and Pyrethroids in the Lower Salinas River Watershed.

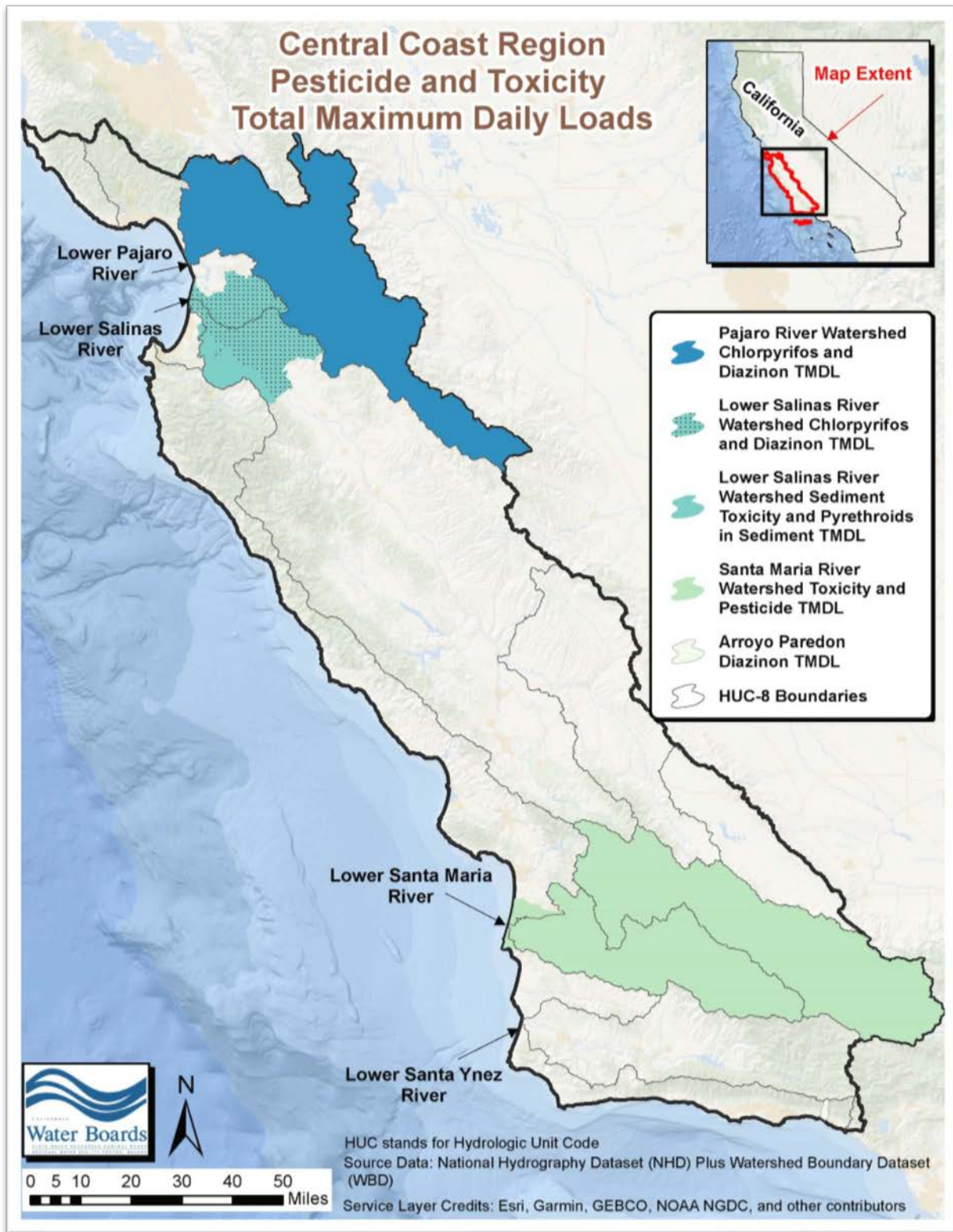


Figure C.3-3: Pesticide and Toxicity TMDL Areas

Table C.3-6. Compliance Dates for Sediment Limits (TMDL areas)

TMDL Project Name	Constituent	Limit¹	Units	Compliance Date
Morro Bay Sediment TMDL	Sediment	285 – 6,662	Tons of sediment per year	12/3/2053
Pajaro River Watershed Sediment TMDL	Sediment	447 – 4,114	Tons of sediment per year	11/27/2051

¹The Morro Bay Sediment TMDL and Pajaro River Watershed Sediment TMDL include load allocations for specific waterbody reaches within the TMDL project area. The limits for those TMDLs are summarized in this table as ranges; however, the exact load allocation values for each reach apply as described in the TMDL and Basin Plan and will be assessed as numeric limits for the purposes of this Order.

Table C.3-7. Compliance Dates for Turbidity Limits (Non-TMDL areas)

Constituent Group	Constituent	Beneficial Use	Limit	Units¹	Compliance Date
Physical Parameters and General Chemistry	Turbidity	WARM	40.0	NTU	12/31/2032
Physical Parameters and General Chemistry	Turbidity	COLD	25.0	NTU	12/31/2032

¹NTU is nephelometric turbidity units

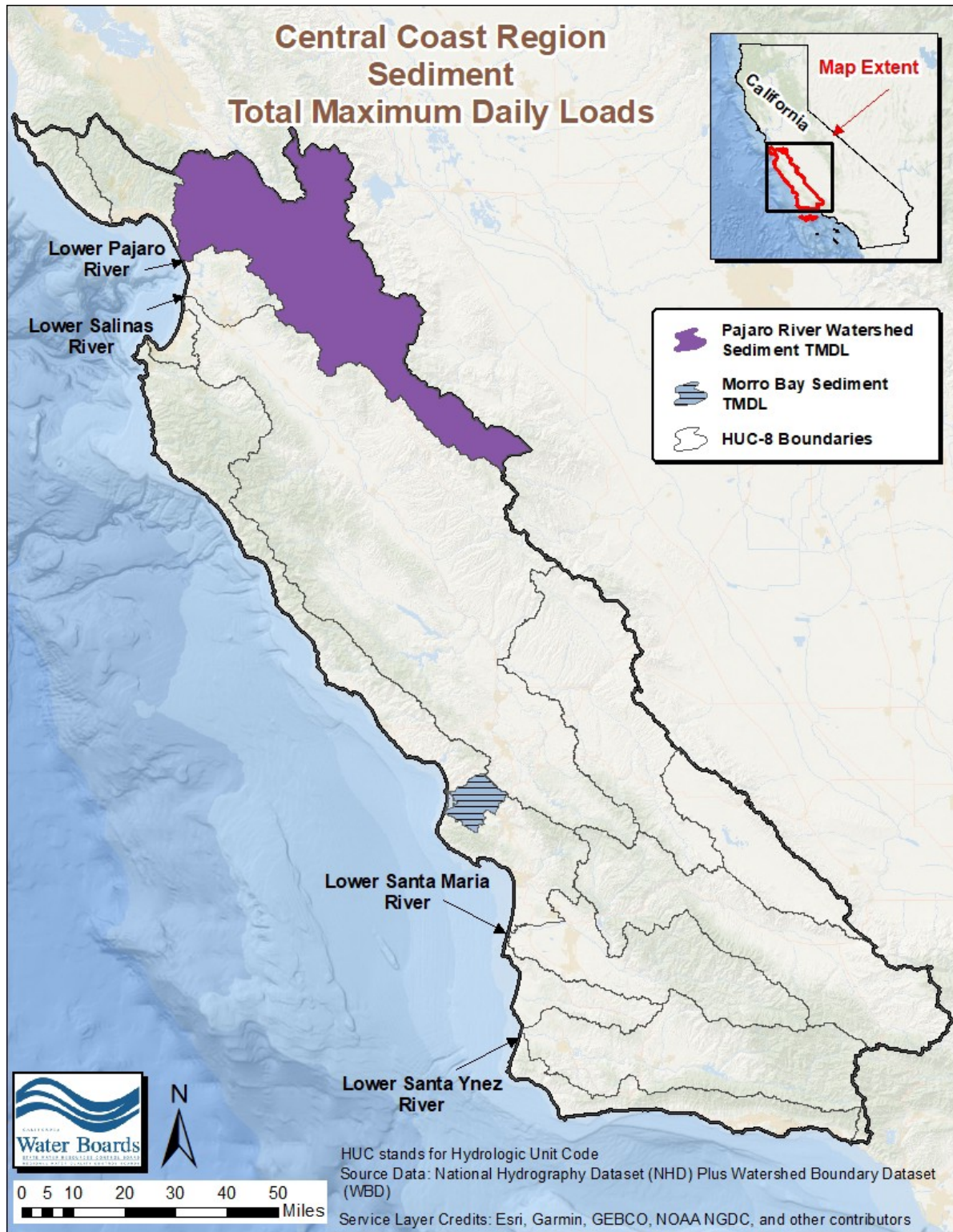


Figure C.3-4: Sediment TMDL Areas

Chapter 7
Appendix 7-F

Interconnected Surface Water Monitoring Network

APPENDIX 7F

INTERCONNECTED SURFACE WATER MONITORING NETWORK

The interconnected surface water (ISW) monitoring network in the Salinas Valley Groundwater Basin is based on the approach recommended by the Environmental Defense Fund (EDF, 2018), which uses groundwater elevations as surrogates for streamflow depletion rates. EDF notes that the change in hydraulic gradient between stream stage and surrounding groundwater elevations is representative of variance in interconnection between surface water and groundwater. Thus, monitoring the gradient also monitors interconnection. The gradient will be monitored by measured shallow groundwater elevations.

The ISW monitoring network focuses on adding wells near USGS stream gauges and MCWRA River Series measurement sites, as shown in Figure 1. Existing wells from the MCWRA's groundwater elevation monitoring programs will be used for the ISW monitoring network. Criteria for selecting an existing monitoring well include (1) a total well depth of approximately 200 feet or less, and (2) recent (post-2014) measured groundwater elevations that are shallow (generally about 30 feet below land surface). SVBGSA has identified 11 existing monitoring wells that fit these criteria, shown in Figure 1. Where possible, an individual monitoring well should be located between the ISW and any pumping centers, and at a distance away from the Salinas River and its tributaries so groundwater levels are not strongly driven by surface water flows (EDF, 2018). However, active pumping wells are distributed throughout the Salinas Valley, including in close proximity to ISW locations and existing monitoring wells. Distance from the Salinas River was considered when selecting existing monitoring wells, and review of historical groundwater level and streamflow measurements indicate that groundwater elevations in the selected wells are not strongly driven by surface water flows. Additionally, the lateral and vertical extent of the Salinas Valley Aquitard (SVA) was considered in the selection of existing wells to add to the ISW monitoring network, as the monitoring network only applies to surface water connected to principal aquifers. The SVA separates the shallow sediments from the principal aquifers in most of the 180/400-Foot Aquifer Subbasin and becomes intermittent towards the Monterey and Eastside Aquifer Subbasins. In the 180/400-Foot Aquifer Subbasin, connection is likely between the shallow sediments and the 180-Foot Aquifer where the potential existing monitoring wells are located, based in part on limited lithologic information available from the DWR's Online System for Well Completion Reports. These existing wells provide the best available tools for establishing an initial network for monitoring impacts on ISW from groundwater pumping. SVBGSA is in the process of establishing this monitoring network, and the network will be adjusted during GSP implementation as needed, particularly if any wells are determined to be ineffective or inaccessible for this purpose.

Table 1 provides a summary of the 11 selected wells, their corresponding USGS gauge or MCWRA River Series measurement site, and distance to the Salinas River or its tributaries. SVBGSA will request access from MCWRA to each well’s groundwater elevation records and permission to add to the ISW monitoring network.

Table 1. Potential Existing Interconnected Surface Water Monitoring Wells

Well Name	Well Depth (ft)	Reference Point (ft)	Corresponding USGS Stream Gauge/ MCWRA River Series Measurement Site	Subbasin
16S/02E-02D01	106*	285.0	USGS Gauge in El Toro Creek near Spreckels	Monterey – Corral De Tierra
16S/04E-08H01	175	75.4	USGS Gauge in Salinas River near Chualar	180/400-Foot
16S/05E-31P02	115	118.2	River Series Site at Gonzalez	180/400-Foot
17S/06E-33R02	120	194.6	USGS Gauge in Salinas River at Soledad	Forebay
			USGS Gauge in Arroyo Seco below Reliz Creek near Soledad	
18S/06E-03P01	195	189.0	USGS Gauge in Salinas River at Soledad	Forebay
			USGS Gauge in Arroyo Seco below Reliz Creek near Soledad	
18S/07E-32G02	150	252.0	River Series Site at Greenfield	Forebay Aquifer
19S/07E-14H01	200	261.0	N/A (in Upper Valley near border with Forebay)	Upper Valley
20S/08E-07F01	189	292.4	River Series Site at King City	Upper Valley
21S/09E-16E01	100	358.0	River Series Site at San Lucas	Upper Valley
22S/10E-16P01	178	425.0	N/A (in between Bradley USGS Gauge and San Lucas River Series Site)	Upper Valley
23S/10E-14D01	142	462.7	USGS Gauge in Salinas River near Bradley	Upper Valley

*No well depth available, instead the depth of the bottom of screen interval is provided.

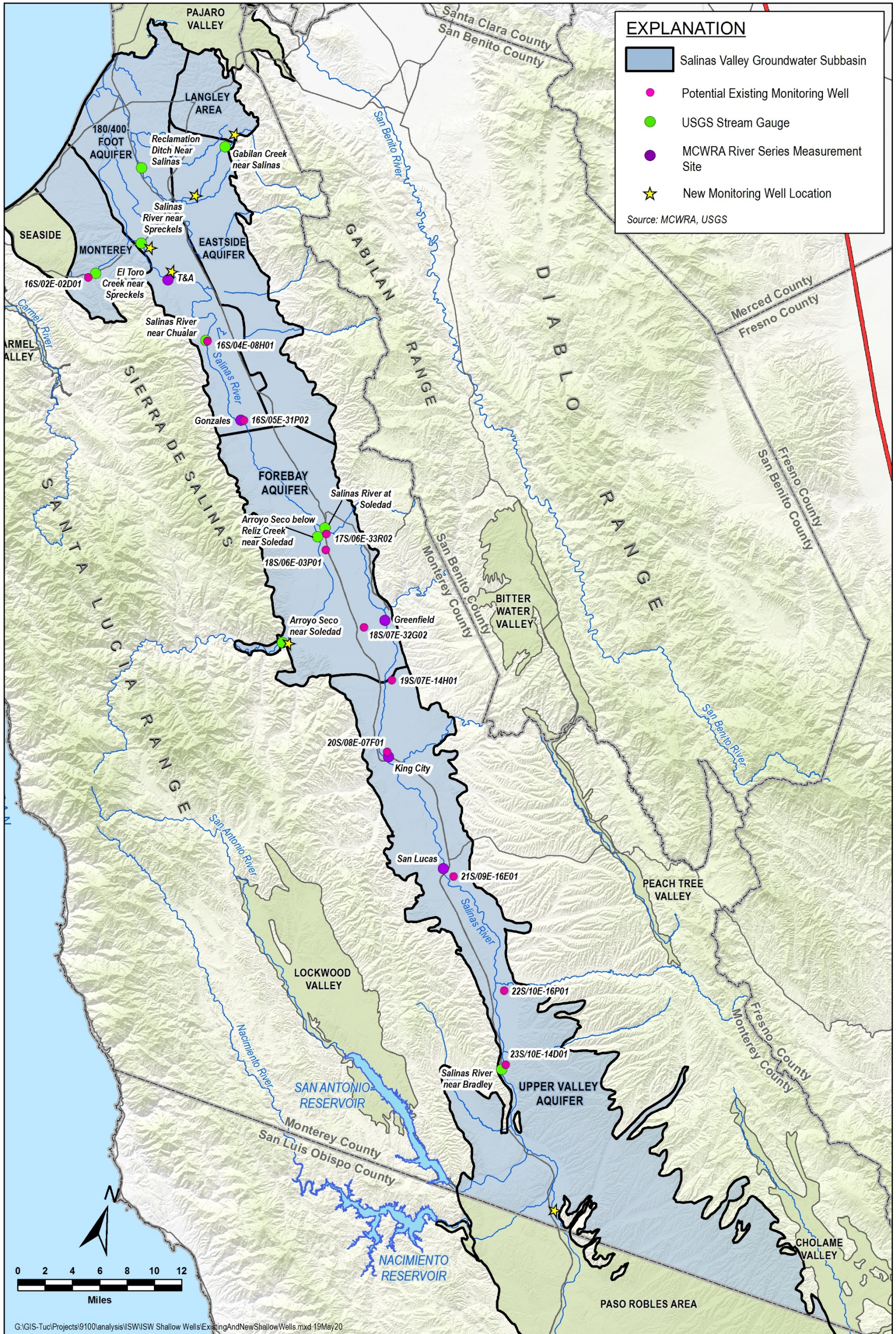


Figure 1. Locations of USGS Stream Gauges, MCWRA River Series Measurement Sites, Potential Existing Interconnected Surface Water Monitoring Wells, and Proposed New Interconnected Surface Water Monitoring Wells

Data gaps in the ISW monitoring network exist despite the identification of 11 existing monitoring wells. The SVBGSA will install new wells to fill these data gaps, as shown in Figure 1. As mentioned in the 180/400-Foot Aquifer Subbasin GSP, SVBGSA will drill and install up to two new wells for ISW monitoring in the Subbasin. SVBGSA will also drill one new shallow groundwater elevation monitoring well in each of the Langley Area, Eastside Aquifer, Forebay Aquifer, and Upper Valley Aquifer Subbasins:

- Langley Area Subbasin: Located along Gabilan Creek, which has a USGS gage located nearby in the Eastside Aquifer Subbasin.
- Eastside Aquifer Subbasin: Located nearby the identified ISW location within the City of Salinas on Natividad Creek, as shown in Chapter 8. This is the only potential location of ISW in the Eastside Subbasin.
- Forebay Aquifer Subbasin: Located along the upper Arroyo Seco, near the USGS gage on the Arroyo Seco. This area is a potential steelhead refugia.
- Upper Valley Aquifer Subbasin: Located along the Salinas River near the southern boundary of the basin, upstream of the San Antonio and Nacimiento Rivers.

If feasible, the new ISW monitoring wells will be installed in conjunction with the new wells needed to fill the data gaps in the groundwater elevation monitoring networks in the 180/400-Foot Aquifer, Langley Area, and Upper Valley Aquifer Subbasins that are discussed in Chapter 7.

Chapter 8
Appendix 8-A

Hydrographs with Minimum Thresholds and Measurable
Objectives

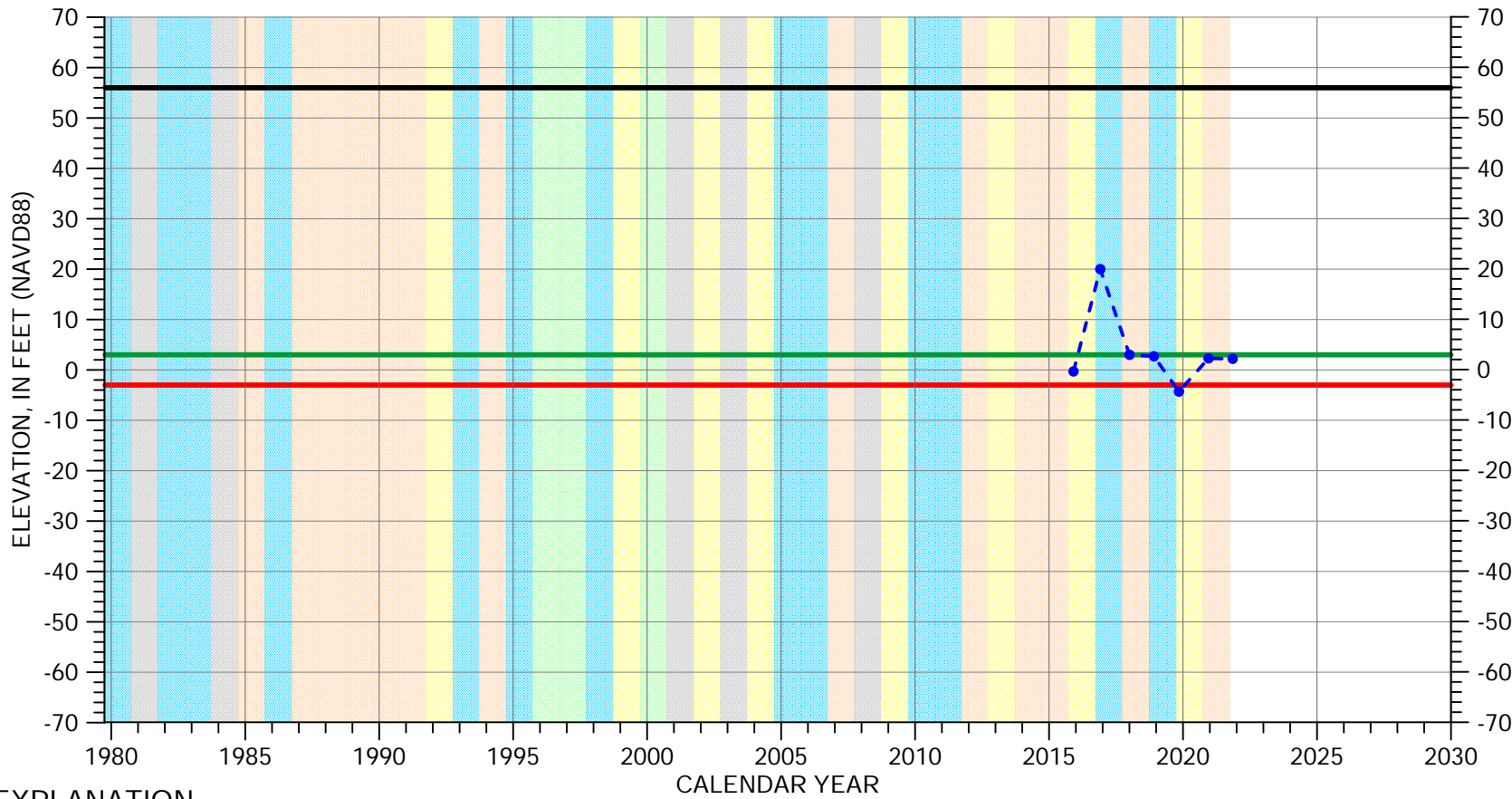
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HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 12S/02E-33H02

180/400-Foot Aquifer Subbasin

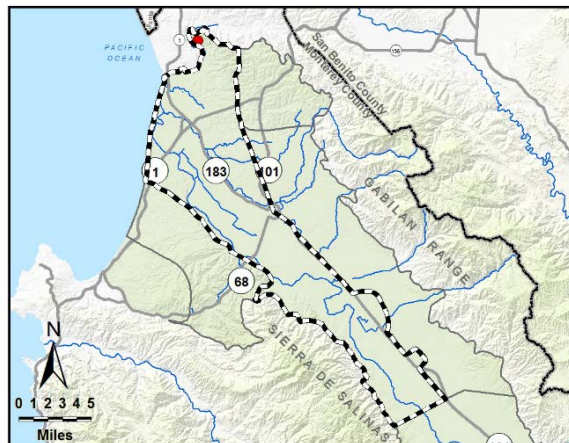


EXPLANATION

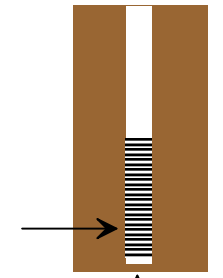
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- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

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| Yellow box | DRY - NORMAL | Cyan box | WET |
| Grey box | NORMAL | | |



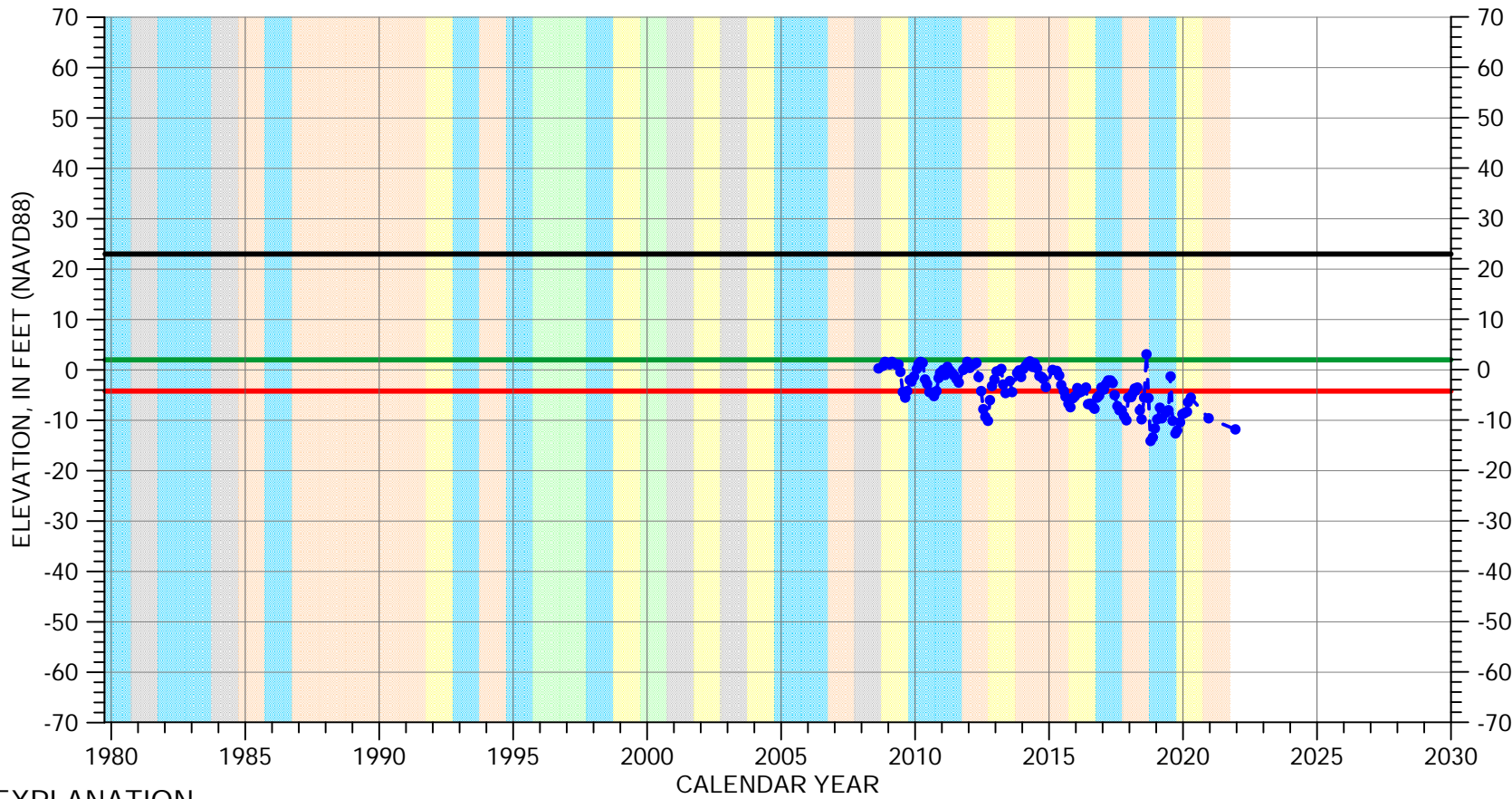
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Well bottom
-524 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/01E-36J02

180/400-Foot Aquifer Subbasin

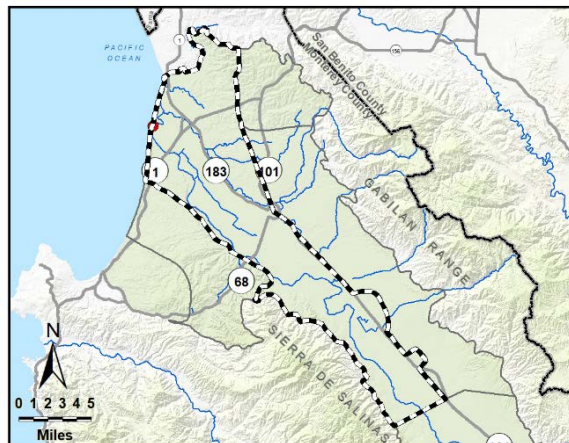


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
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| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



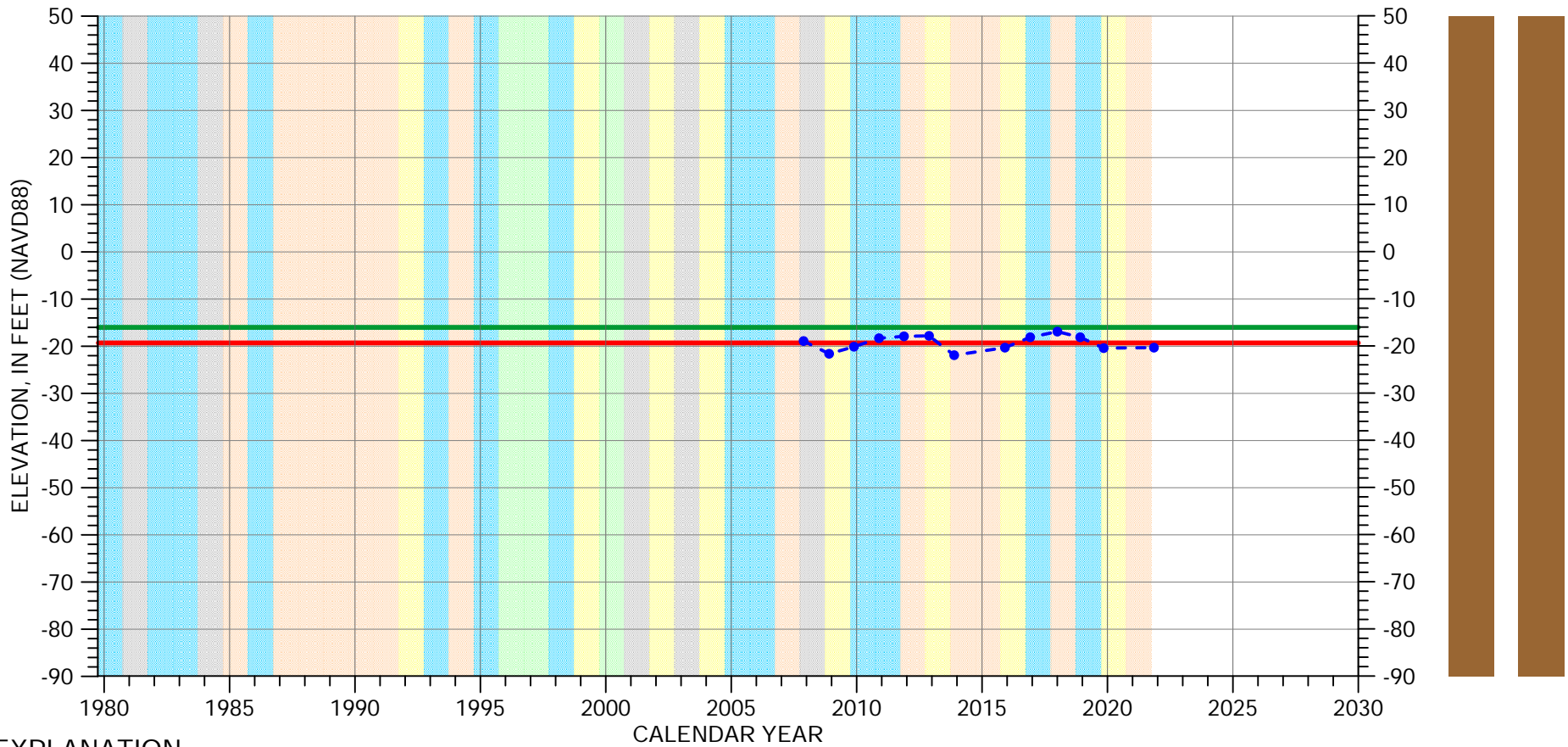
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Well bottom
-1341 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-10K01

180/400-Foot Aquifer Subbasin

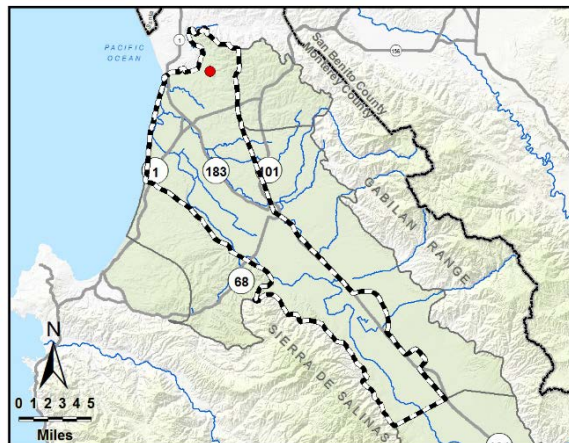


EXPLANATION

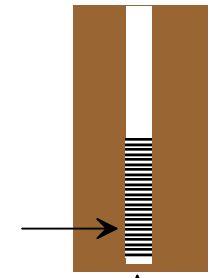
- - • - Groundwater Elevation
- - Suspect Measurement
- - Land Surface (100 FT MSL)
- - Measurable Objective
- - Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------------|--------------|
| Orange | DRY | Light Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Cyan | WET |
| Grey | NORMAL | | |



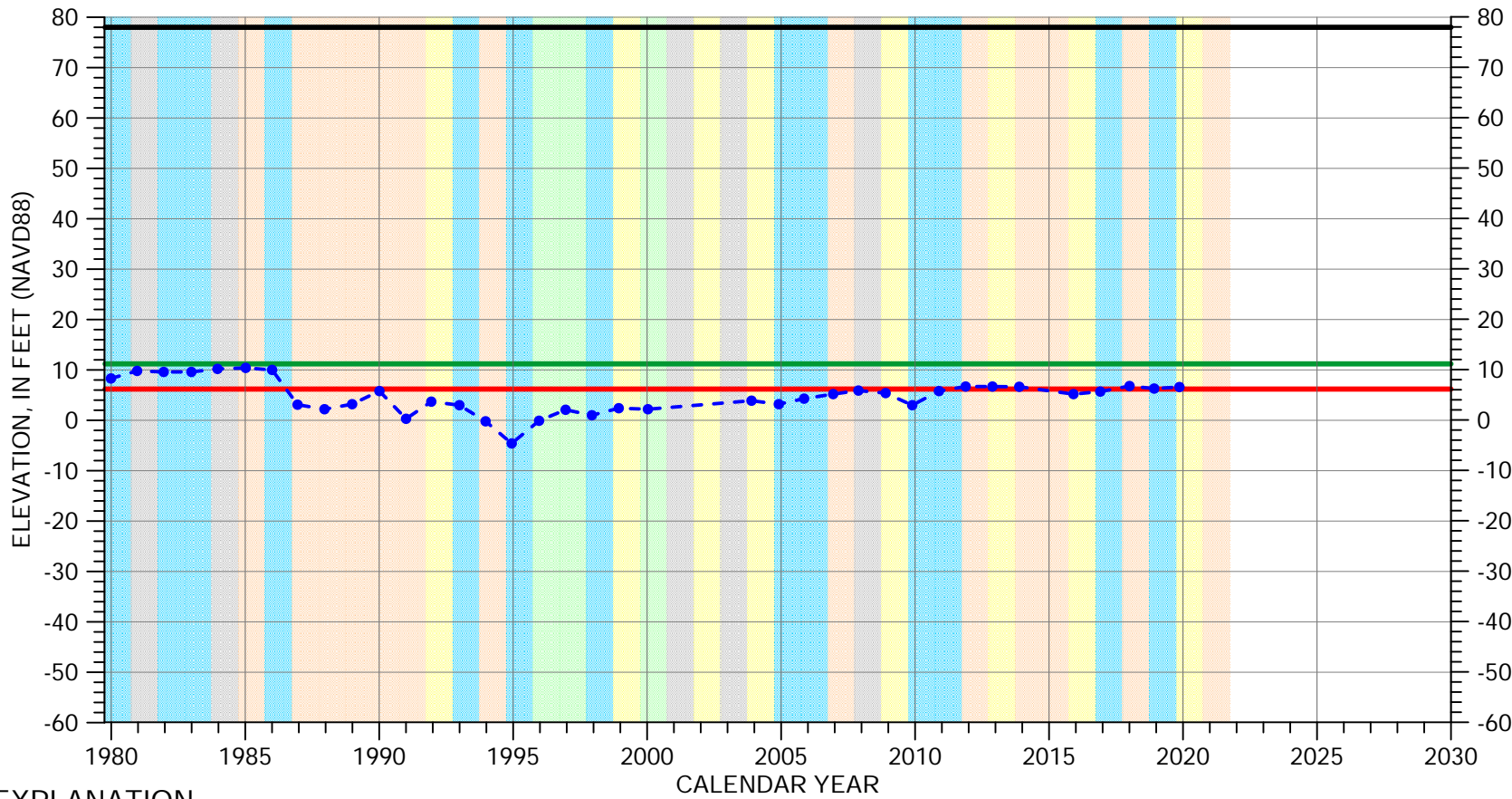
Perforated from -280 to -560 feet msl



Well bottom -560 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-13N01

180/400-Foot Aquifer Subbasin

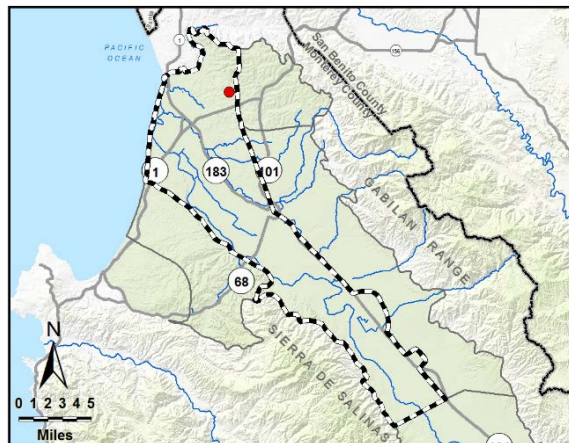


EXPLANATION

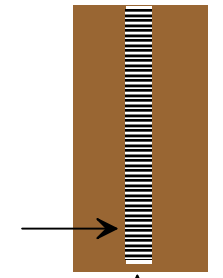
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--------------|--------------|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



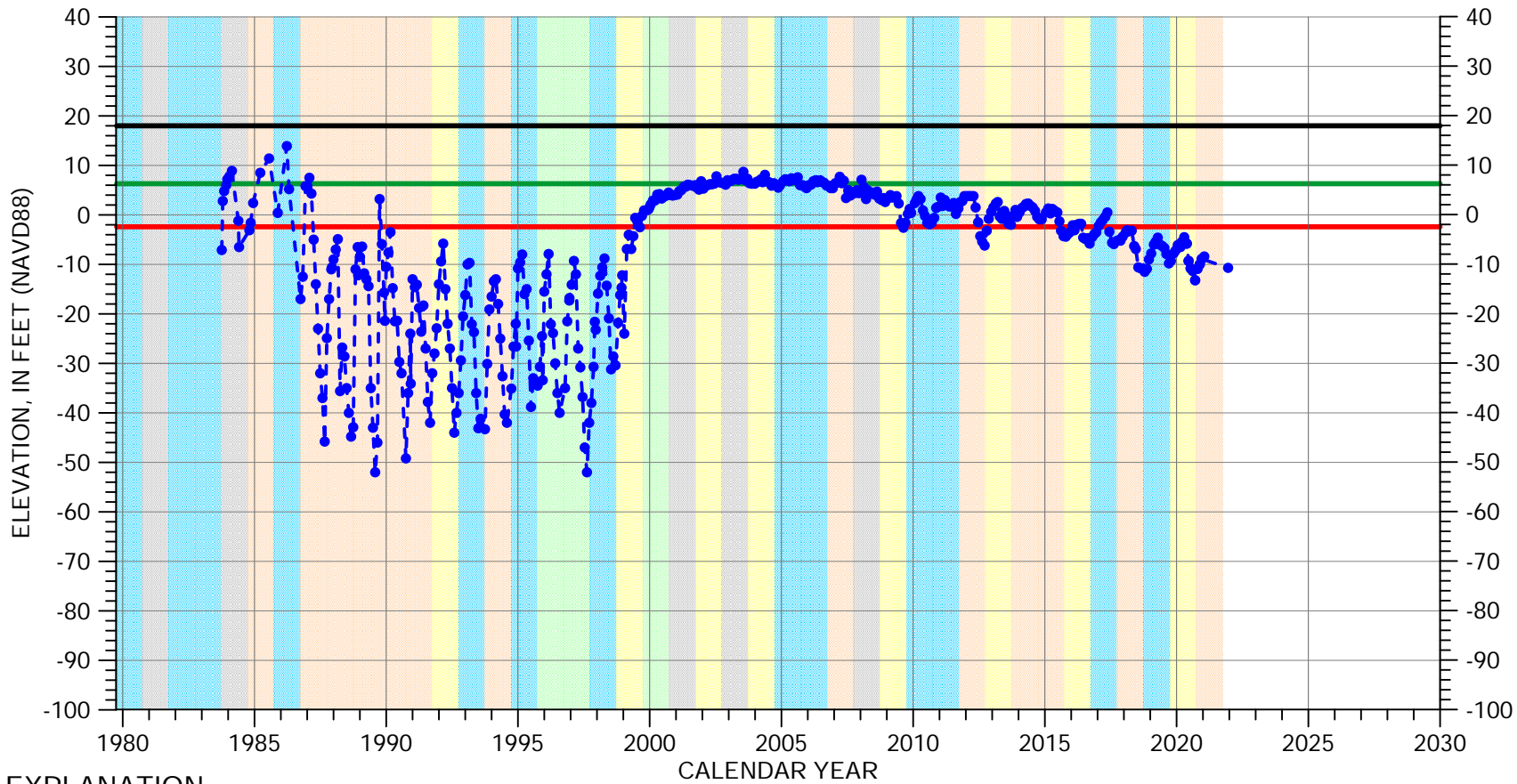
Perforated from
-54 to -114 feet msl



Well bottom
-122 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-19Q03

180/400-Foot Aquifer Subbasin

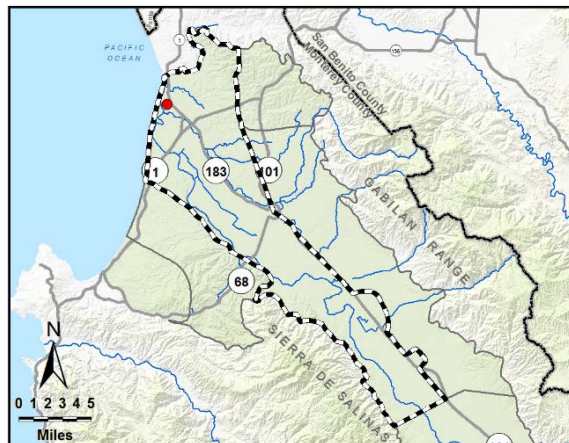


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------|--------------|
| Orange | DRY | Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Cyan | WET |
| Grey | NORMAL | | |



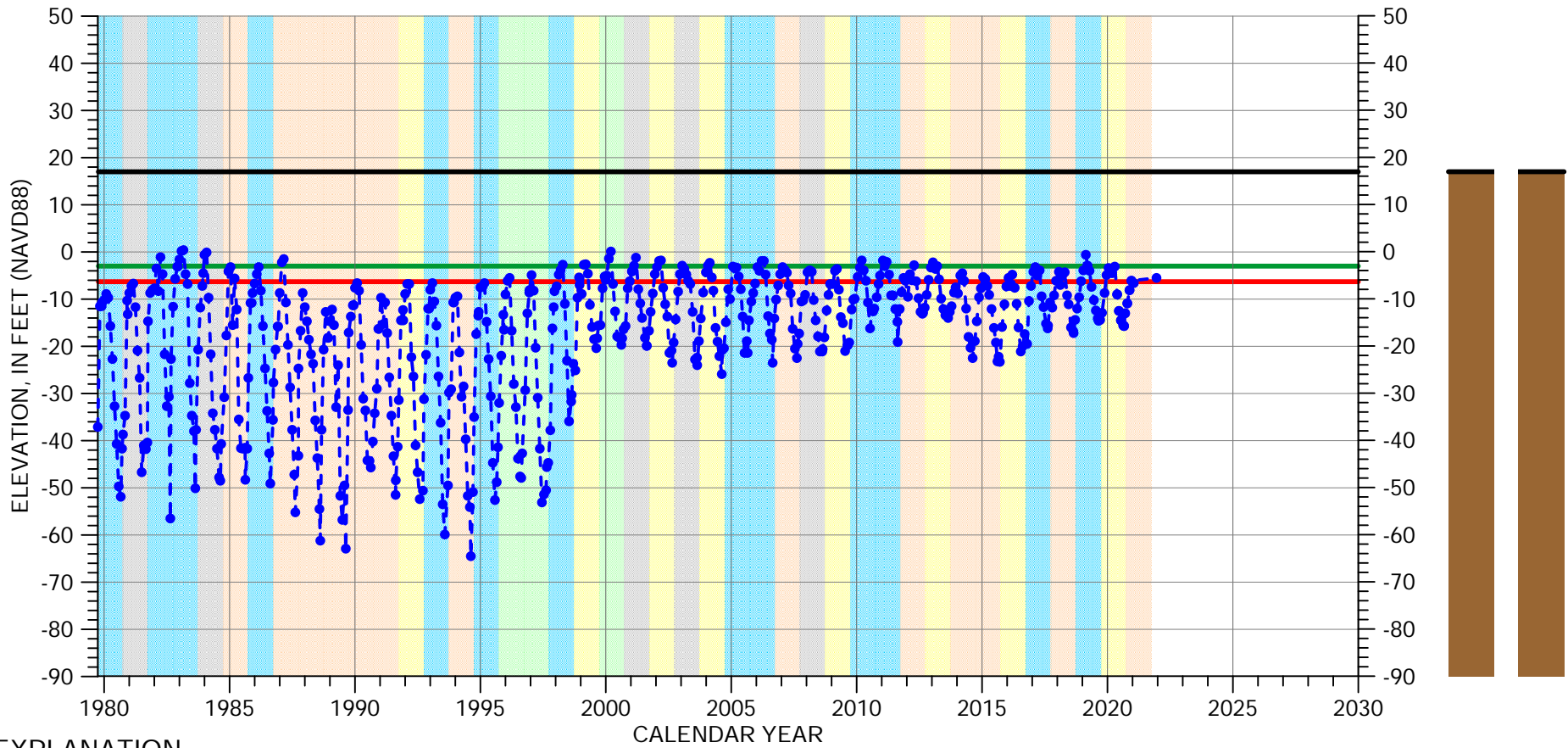
Perforated from
-1202 to -1532 feet msl



Well bottom
-1544 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-21N01

180/400-Foot Aquifer Subbasin

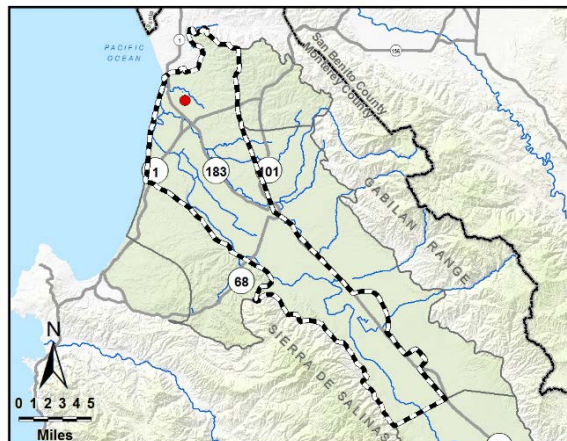


EXPLANATION

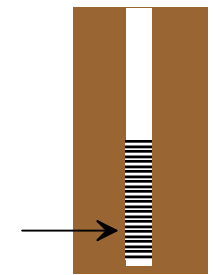
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|------------|--------------|-----------------|--------------|
| Orange box | DRY | Light Green box | WET - NORMAL |
| Yellow box | DRY - NORMAL | Cyan box | WET |
| Grey box | NORMAL | | |



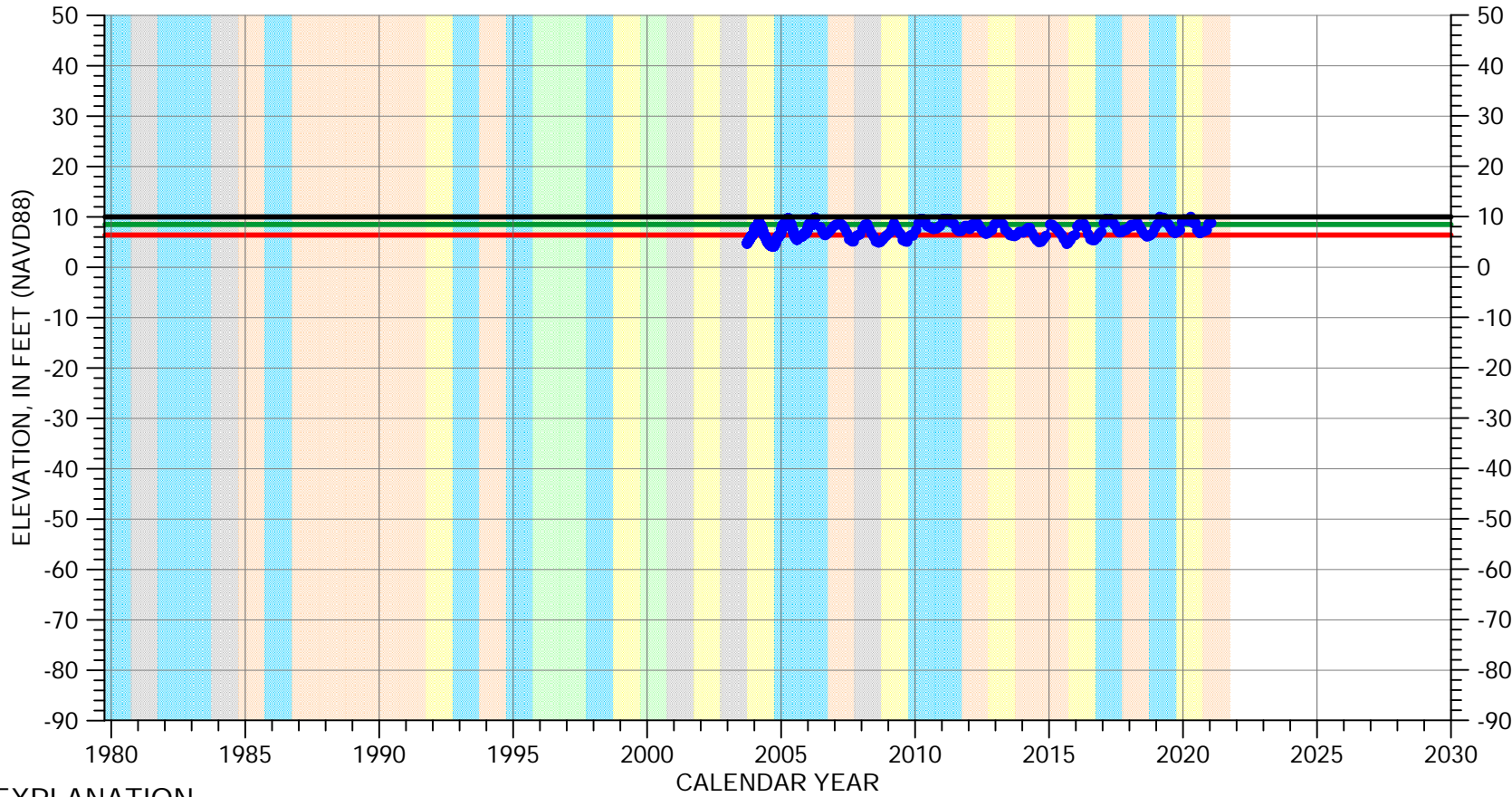
Perforated from
-352 to -533 feet msl



Well bottom
-533 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-21Q01

180/400-Foot Aquifer Subbasin

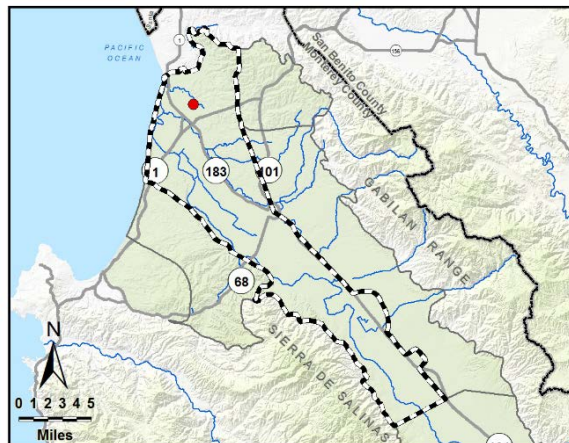


EXPLANATION

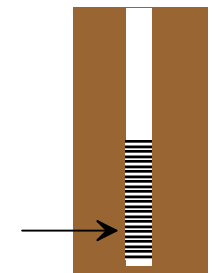
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



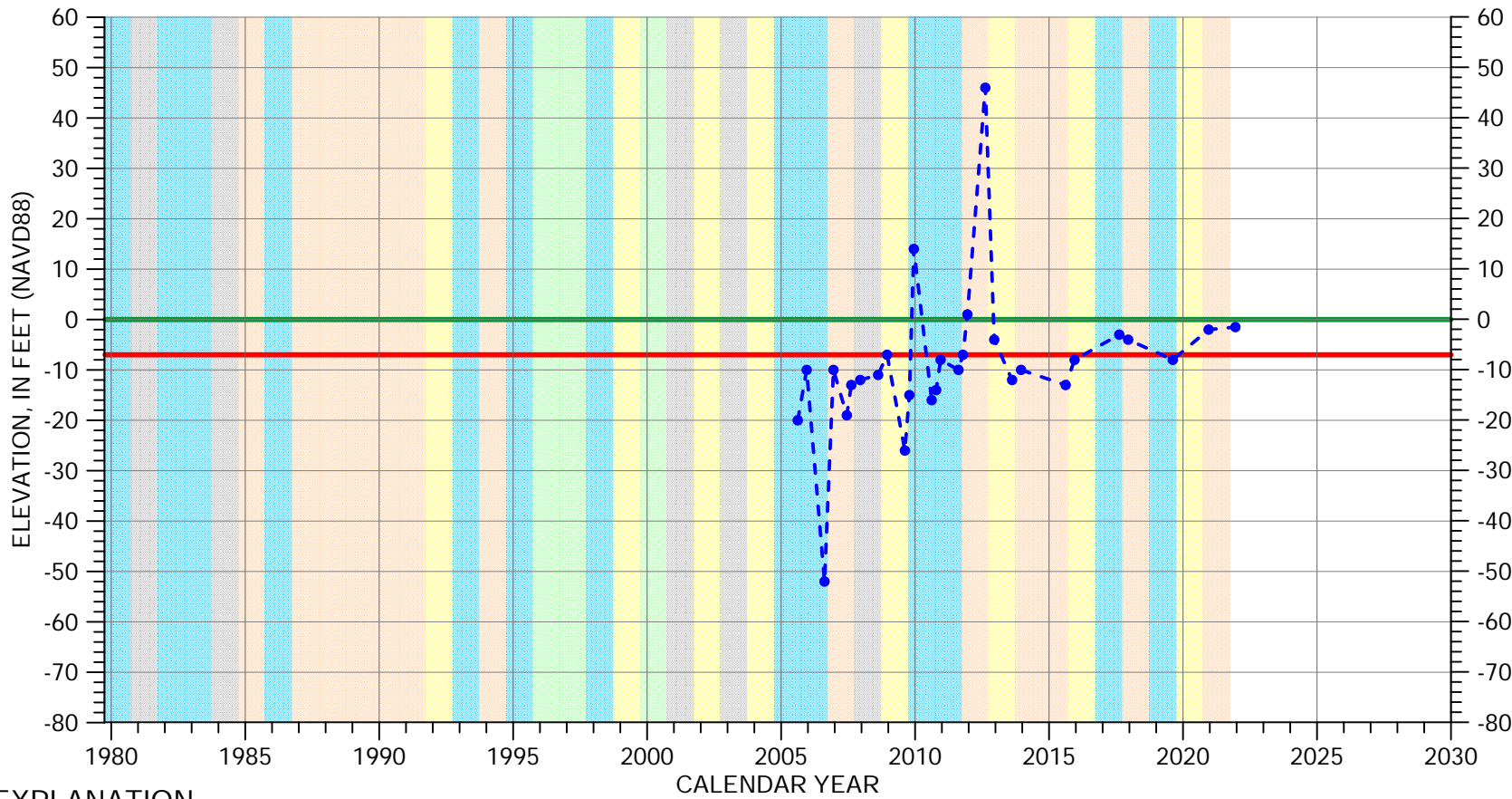
Perforated from
-95 to -145 feet msl



Well bottom
-147 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-24N01

180/400-Foot Aquifer Subbasin

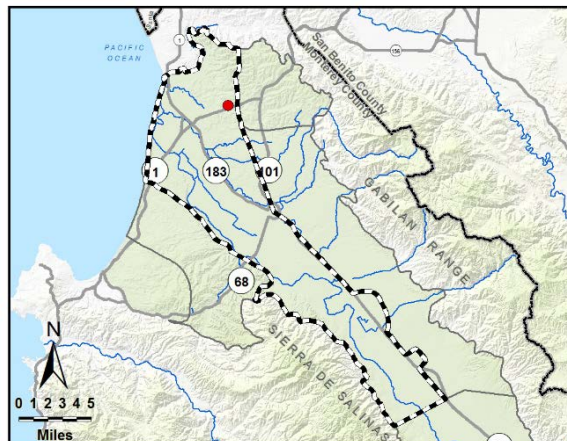


EXPLANATION

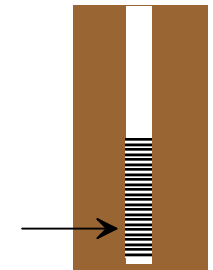
- Groundwater Elevation
- Suspect Measurement
- Land Surface (162 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



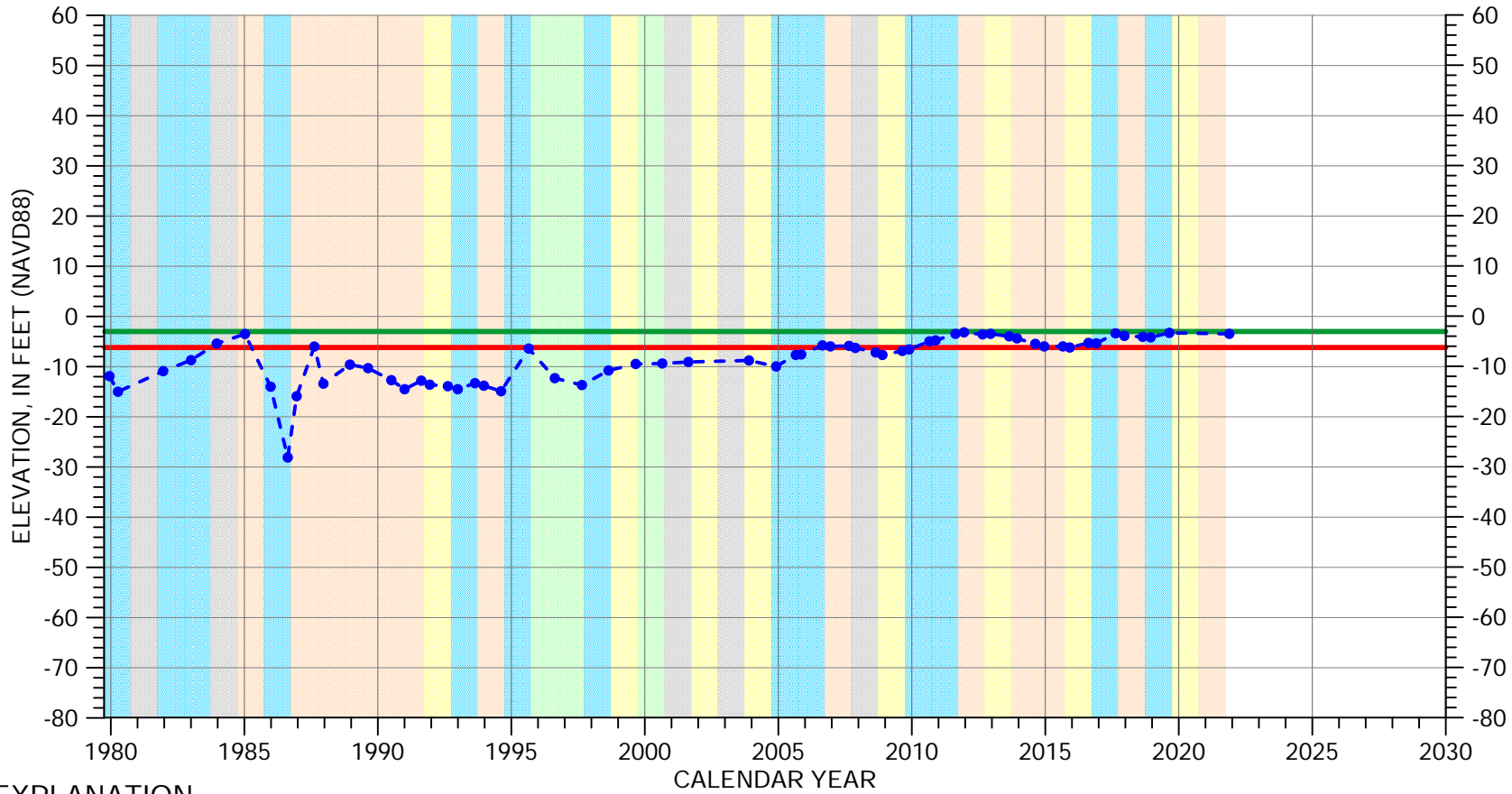
Perforated from
-138 to -438 feet msl



Well bottom
-438 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-26L01

180/400-Foot Aquifer Subbasin

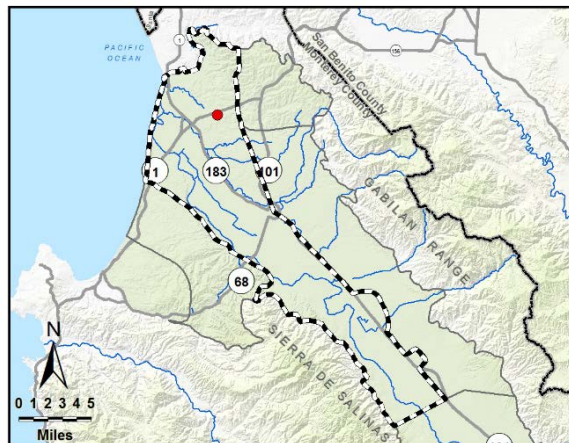


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface (109 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



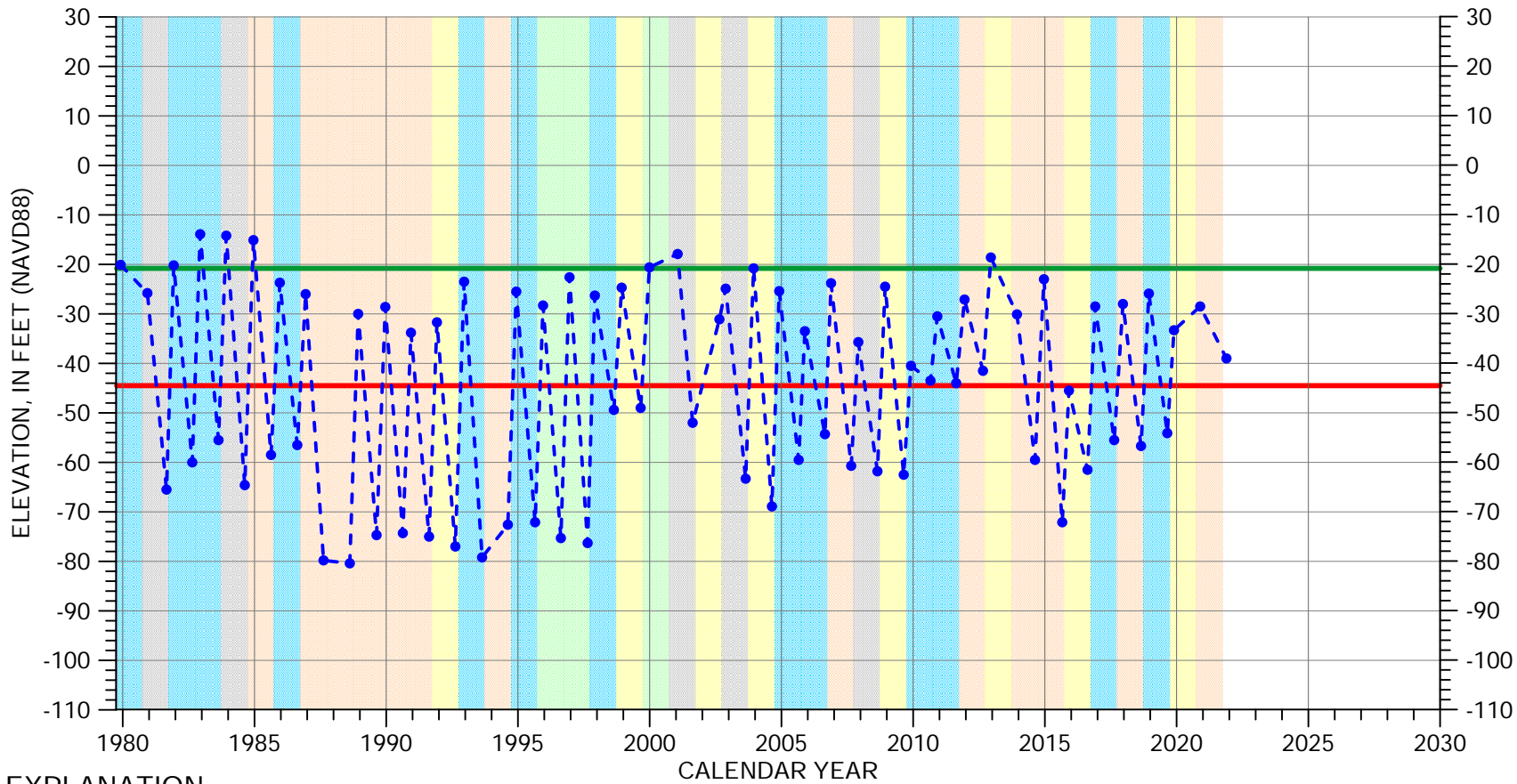
Perforated interval
unknown



Well bottom
-141 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-27P01

180/400-Foot Aquifer Subbasin

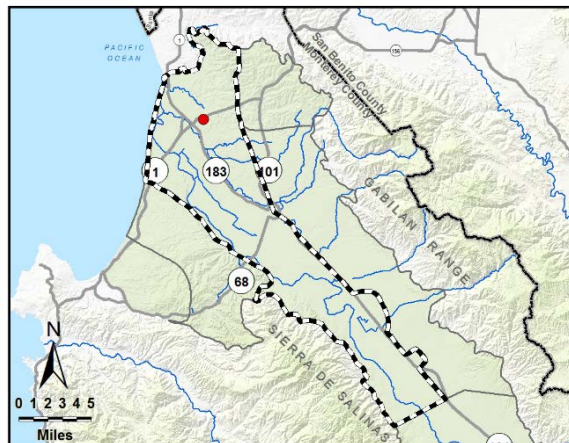


EXPLANATION

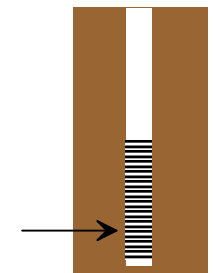
- Groundwater Elevation
- Suspect Measurement
- Land Surface (55 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



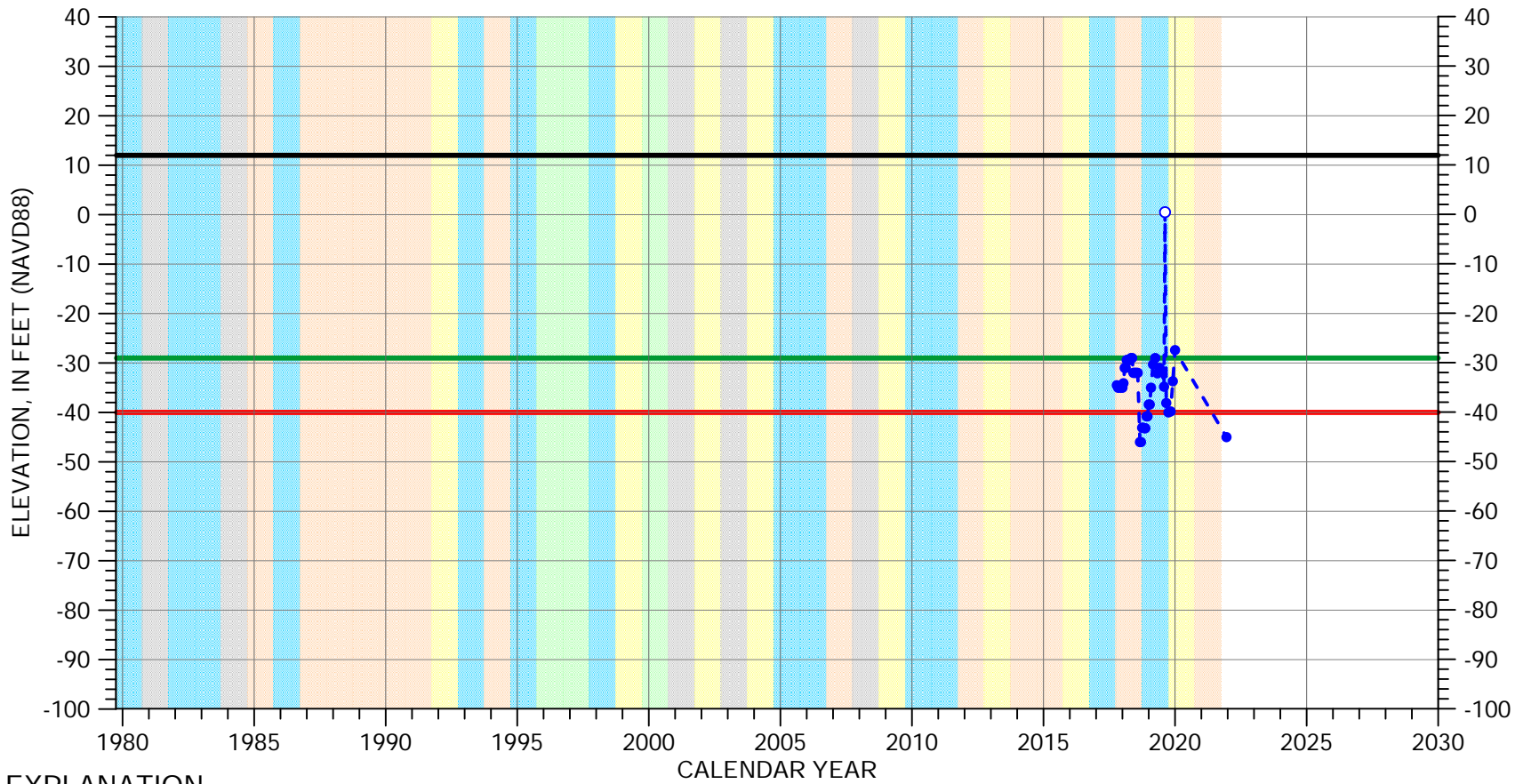
Perforated from
-361 to -521 feet msl



Well bottom
-555 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-28L03

180/400-Foot Aquifer Subbasin

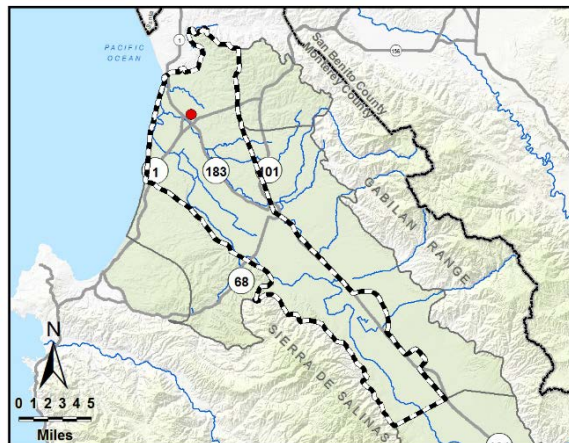


EXPLANATION

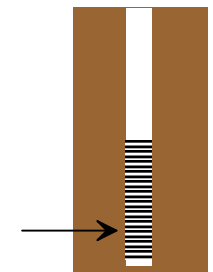
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------|--------------|
| Orange | DRY | Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Blue | WET |
| Grey | NORMAL | | |



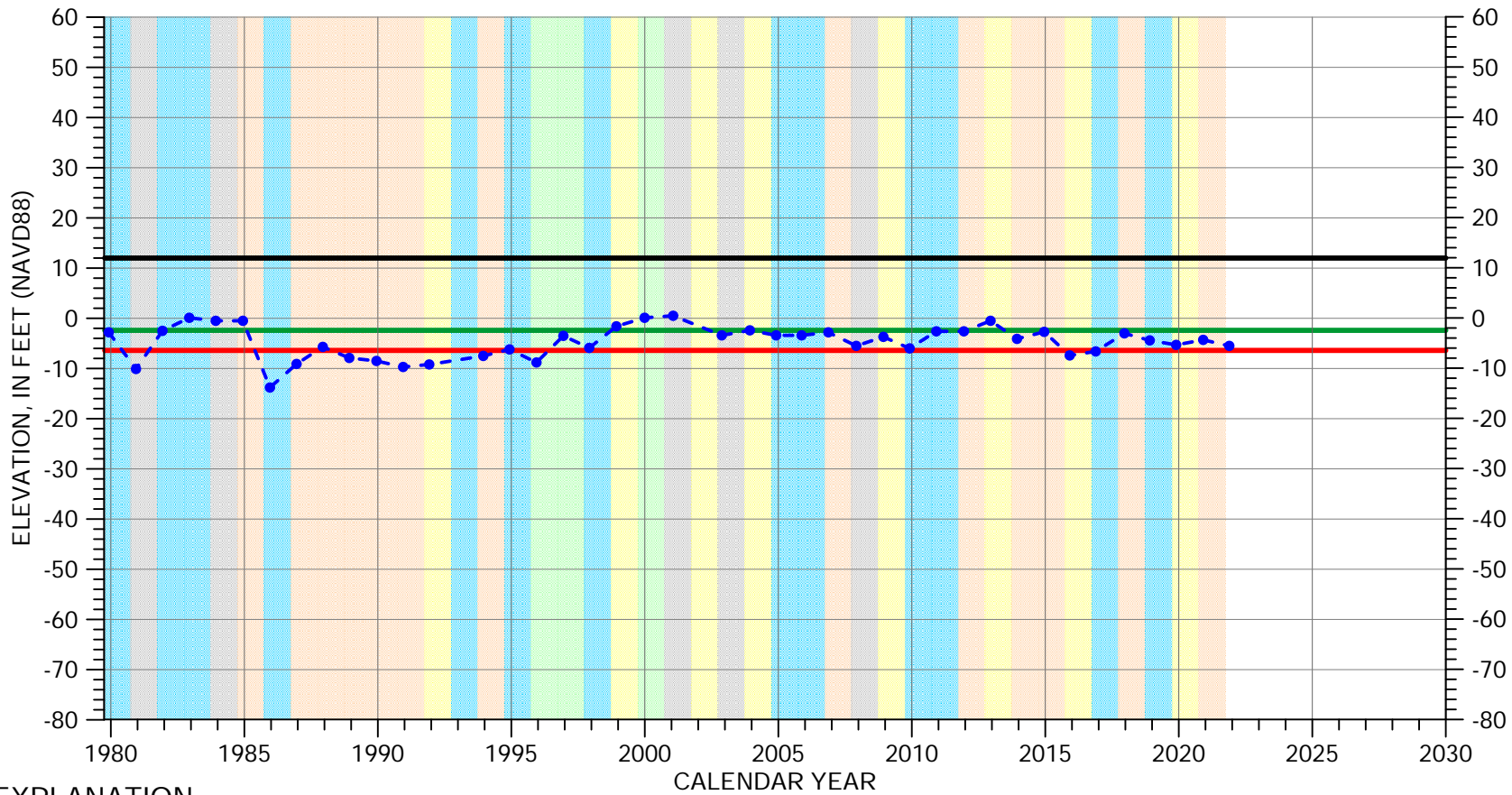
Multiple perforated intervals from -1068 to -1438 feet msl



Well bottom -1448 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-29D03

180/400-Foot Aquifer Subbasin

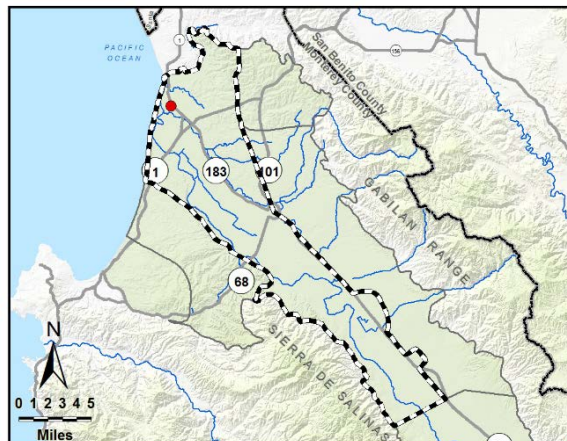


EXPLANATION

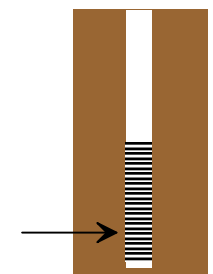
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



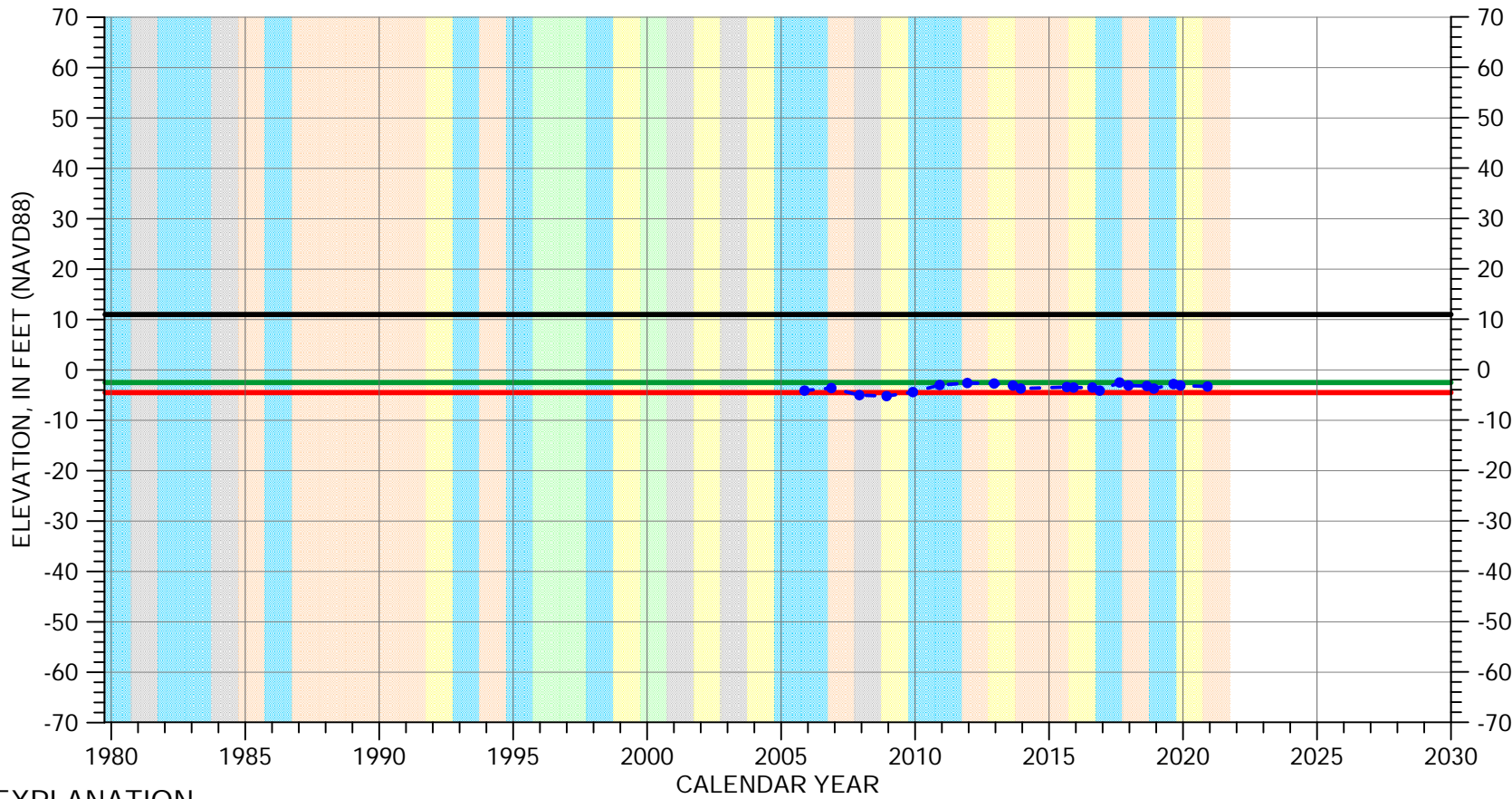
Multiple perforated intervals from -423 to -623 feet msl



Well bottom -623 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-29D04

180/400-Foot Aquifer Subbasin

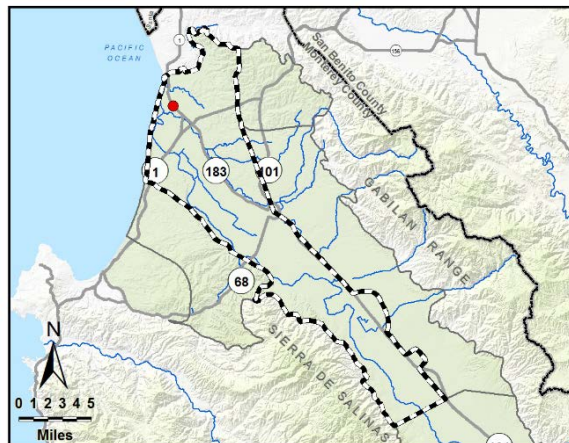


EXPLANATION

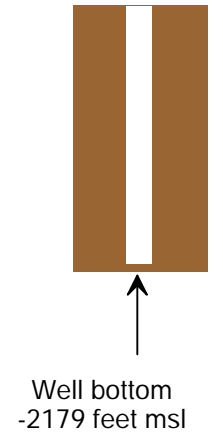
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



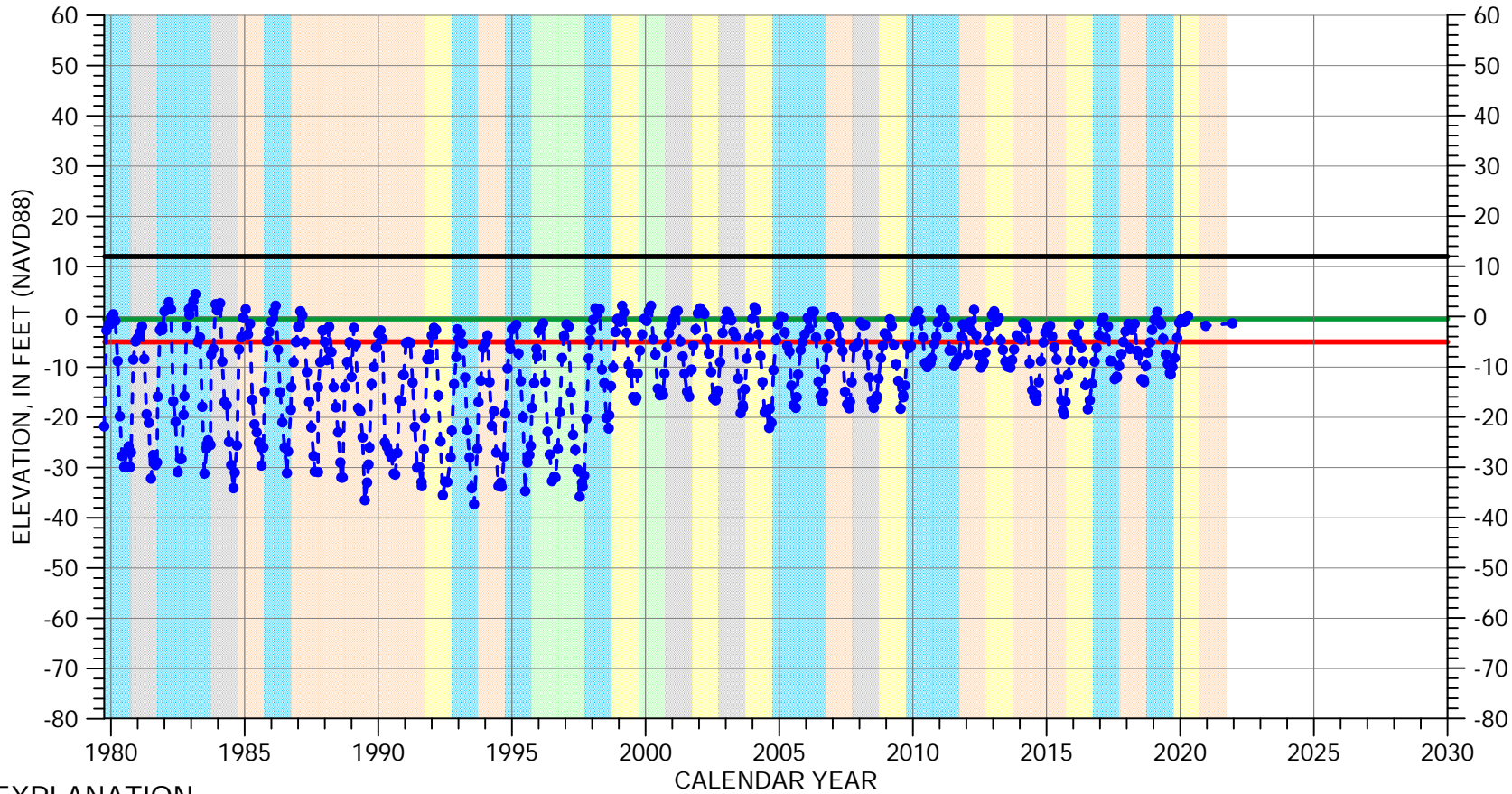
Perforated interval
unknown



\\uc-data\public\projects\9100_Salinas_GSPA\ProjectData\Analysis\water_levels\Hydrographs_MCWRA\NEWGRFs_Ch8\13S_02E-29D04.grf

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-31N02

180/400-Foot Aquifer Subbasin

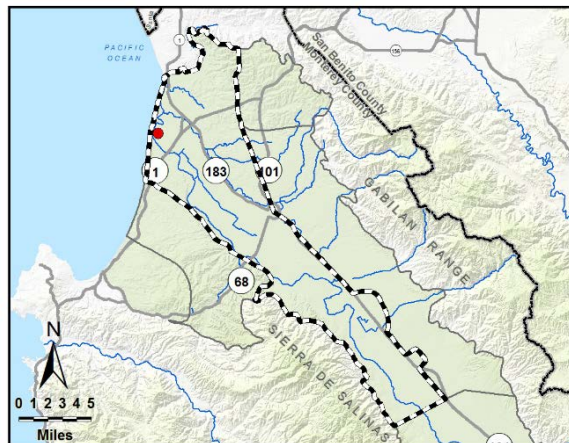


EXPLANATION

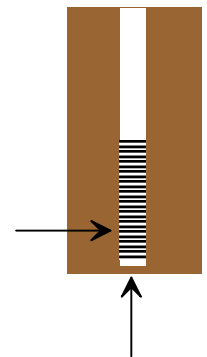
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



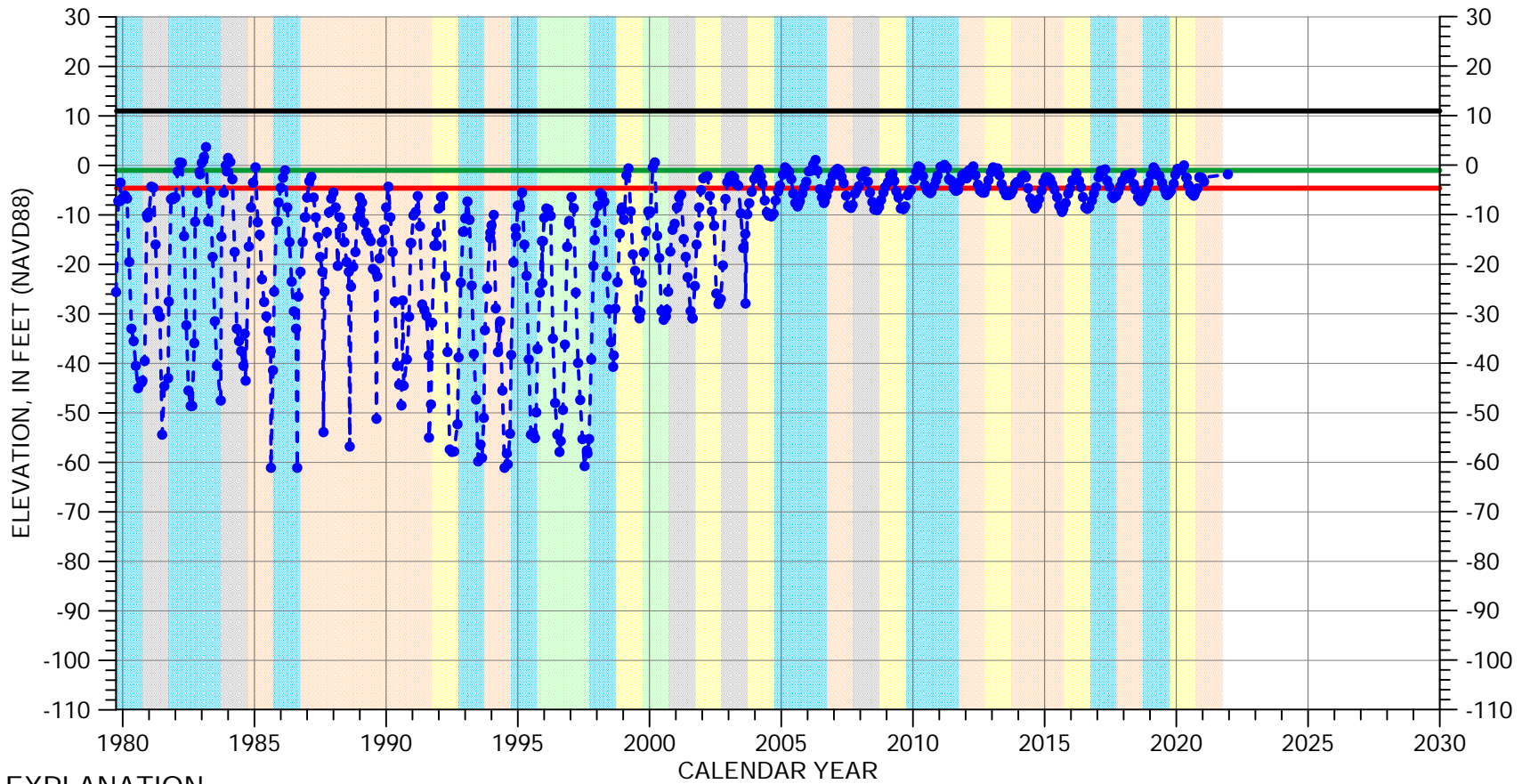
Perforated from
-314 to -518 feet msl



Well bottom
-566 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-32A02

180/400-Foot Aquifer Subbasin

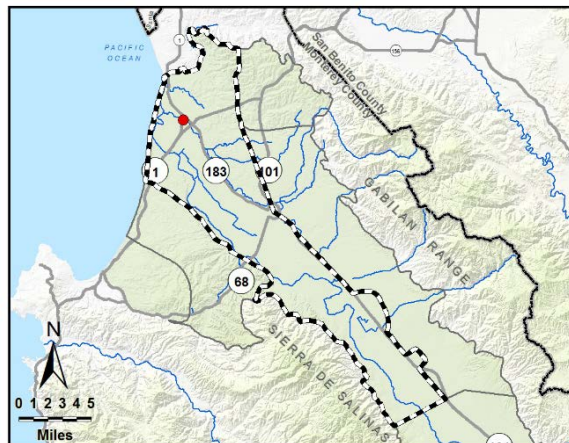


EXPLANATION

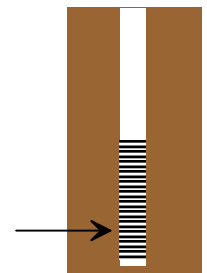
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|----------------|----------------|
| ■ DRY | ■ WET - NORMAL |
| ■ DRY - NORMAL | ■ WET |
| ■ NORMAL | |



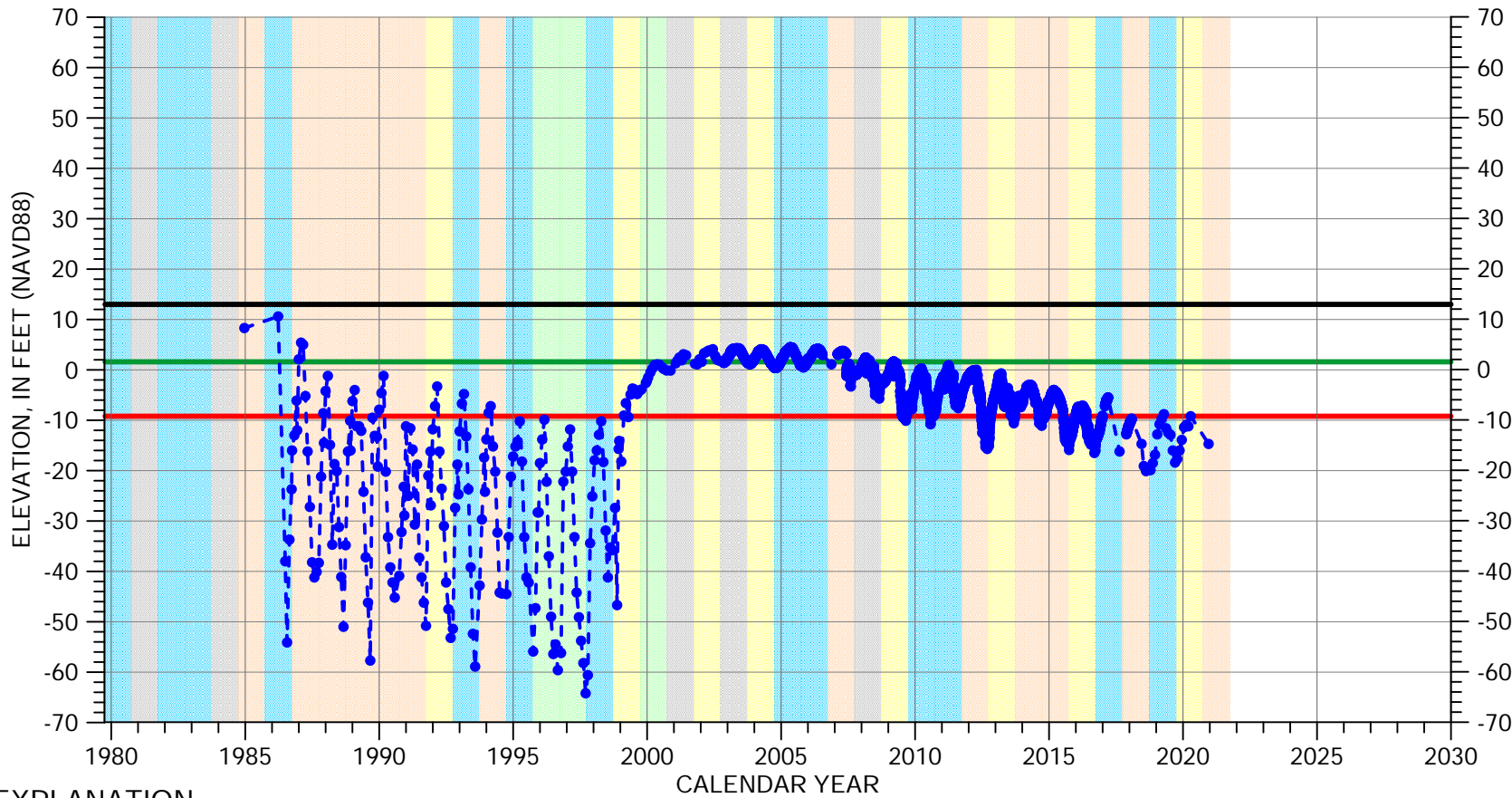
Perforated from
-289 to -589 feet msl



Well bottom
-589 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 13S/02E-32E05

180/400-Foot Aquifer Subbasin

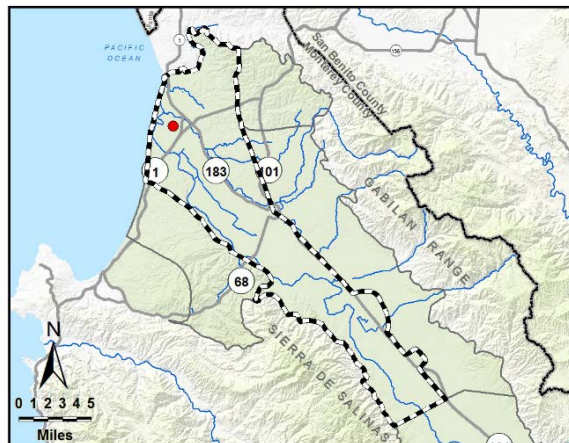


EXPLANATION

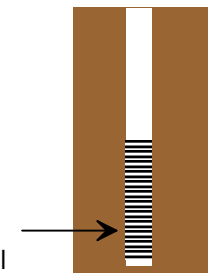
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



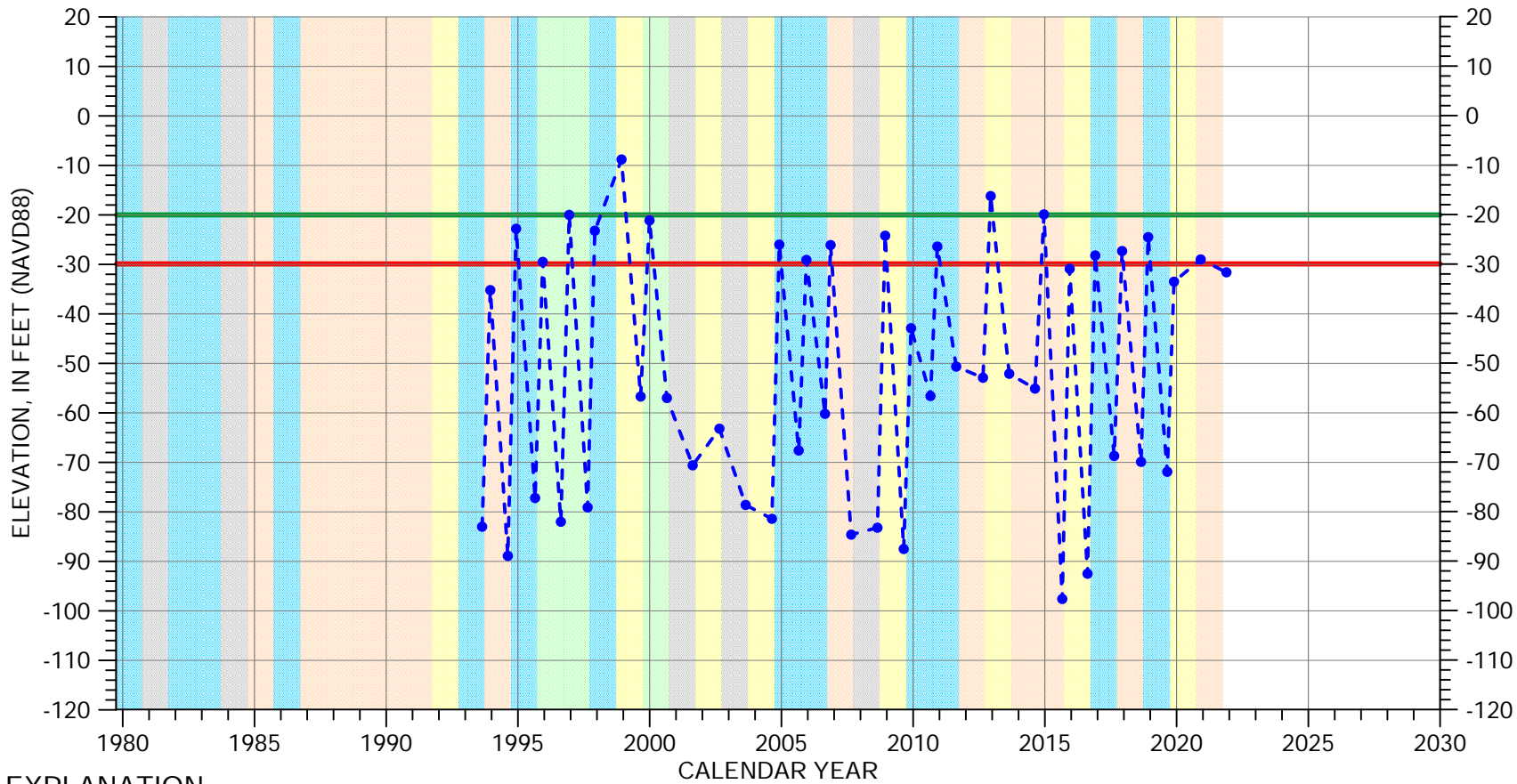
Perforated from
-756 to -1566 feet msl



Well bottom
-1631 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-02C03

180/400-Foot Aquifer Subbasin

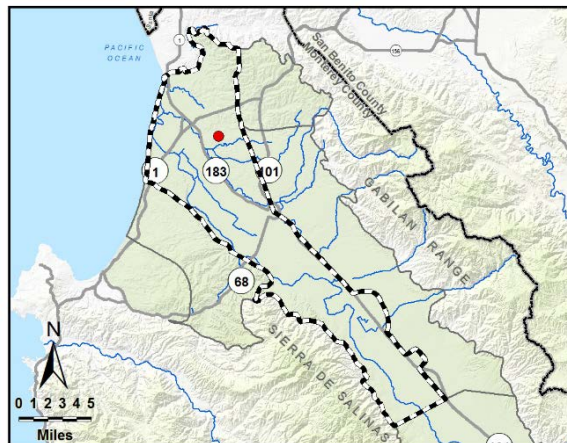


EXPLANATION

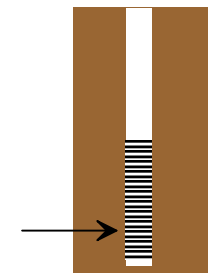
- Groundwater Elevation
- Suspect Measurement
- Land Surface (66 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



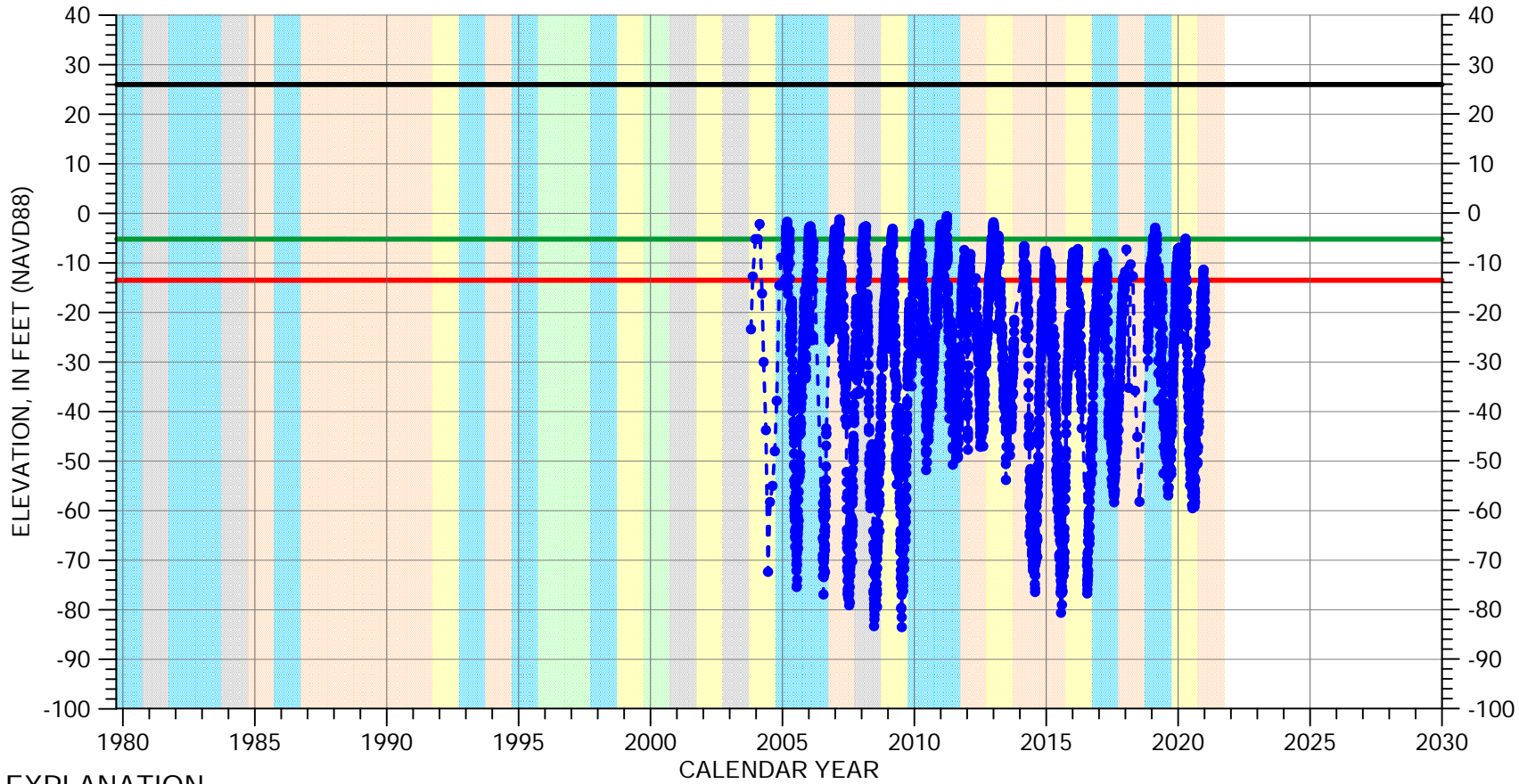
Multiple perforated intervals from -335 to -775 feet msl



Well bottom -775 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-03F03

180/400-Foot Aquifer Subbasin

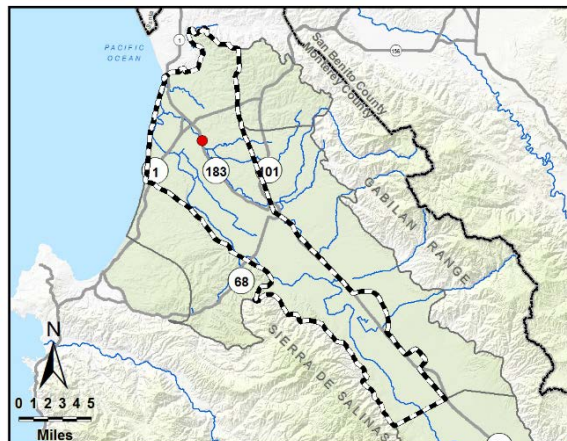


EXPLANATION

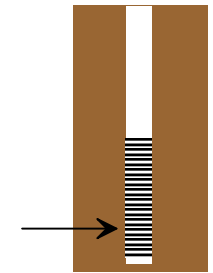
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------|--------------|
| Orange | DRY | Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Blue | WET |
| Grey | NORMAL | | |



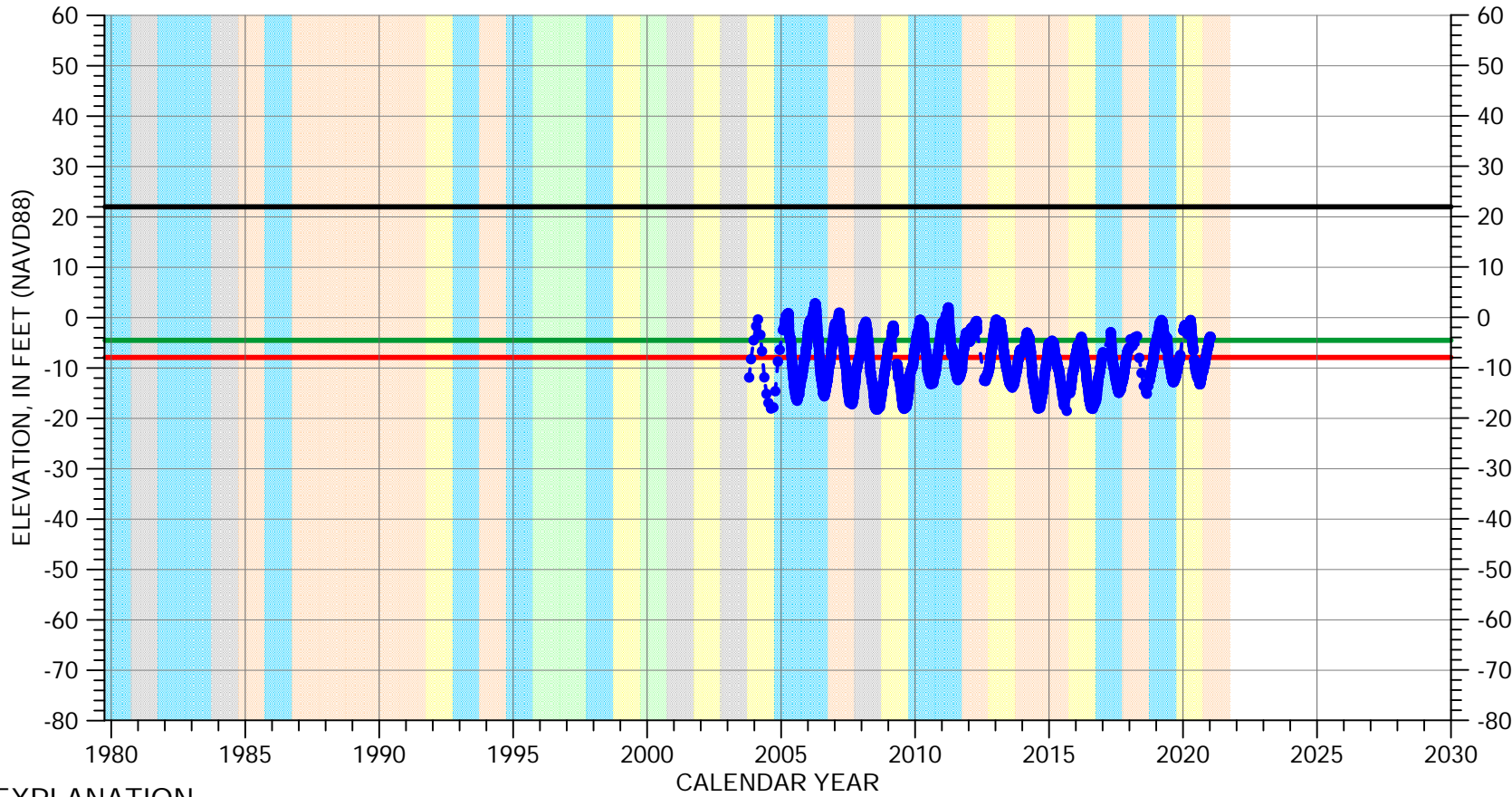
Perforated from
-395 to -425 feet msl



Well bottom
-430 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-03F04

180/400-Foot Aquifer Subbasin

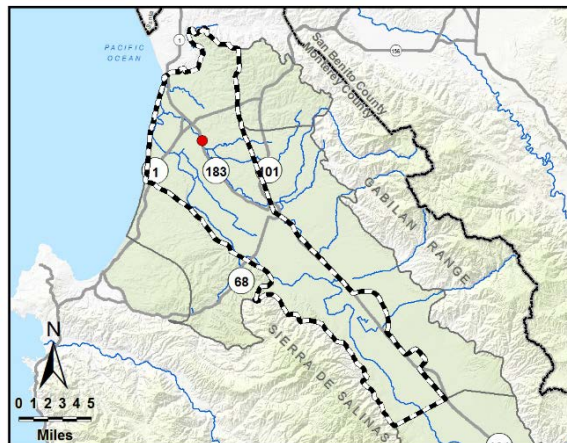


EXPLANATION

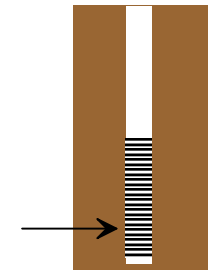
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



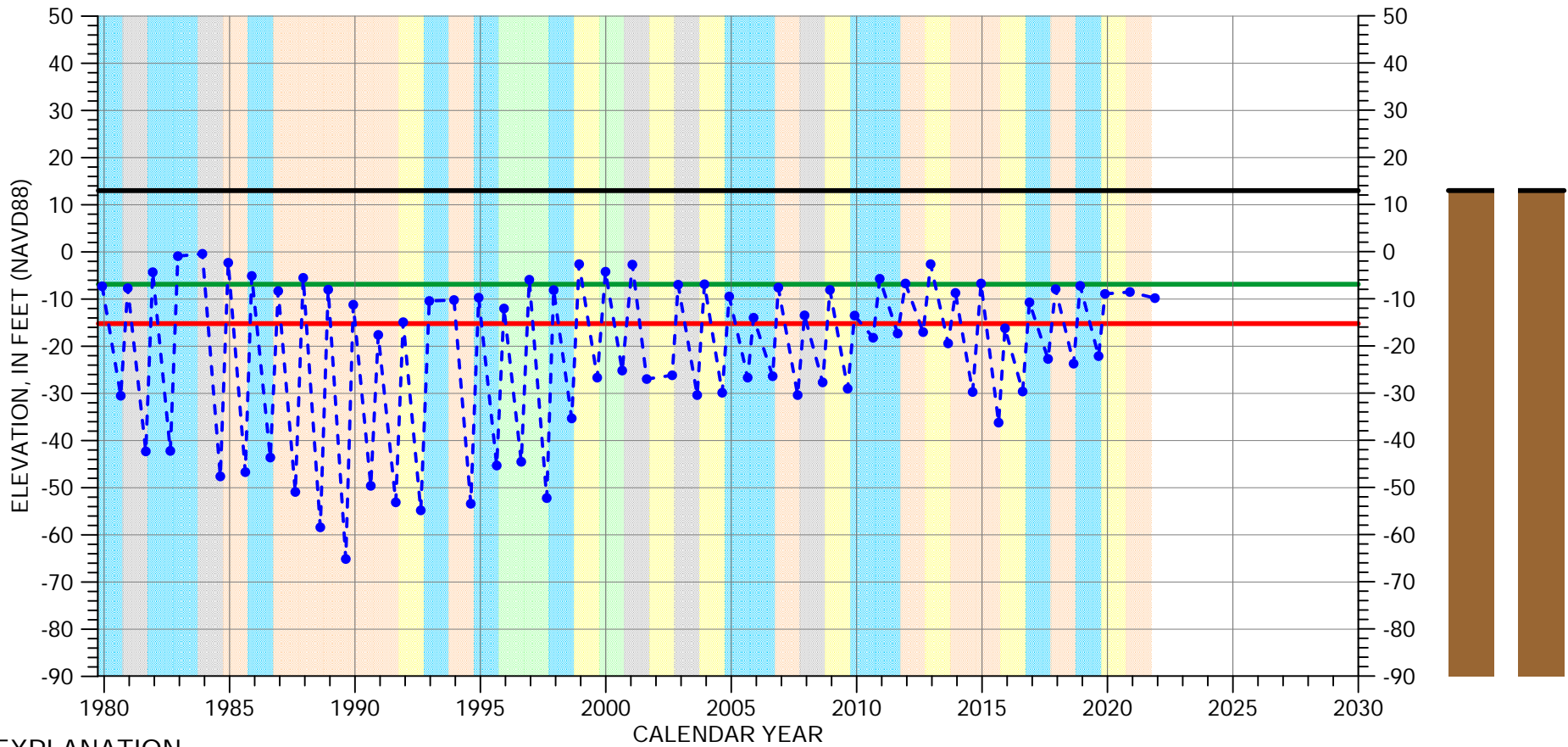
Perforated from
-133 to -183 feet msl



Well bottom
-184 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-05F04

180/400-Foot Aquifer Subbasin

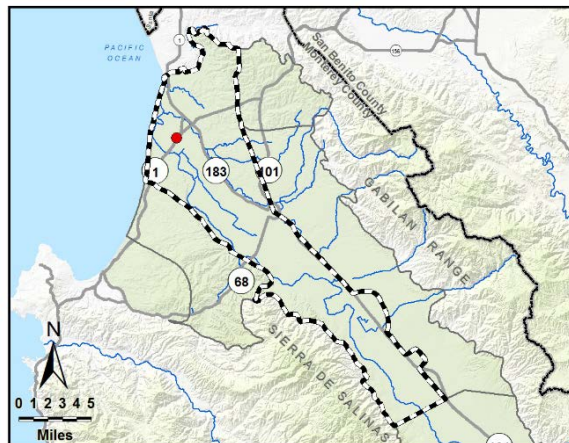


EXPLANATION

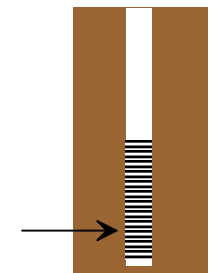
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



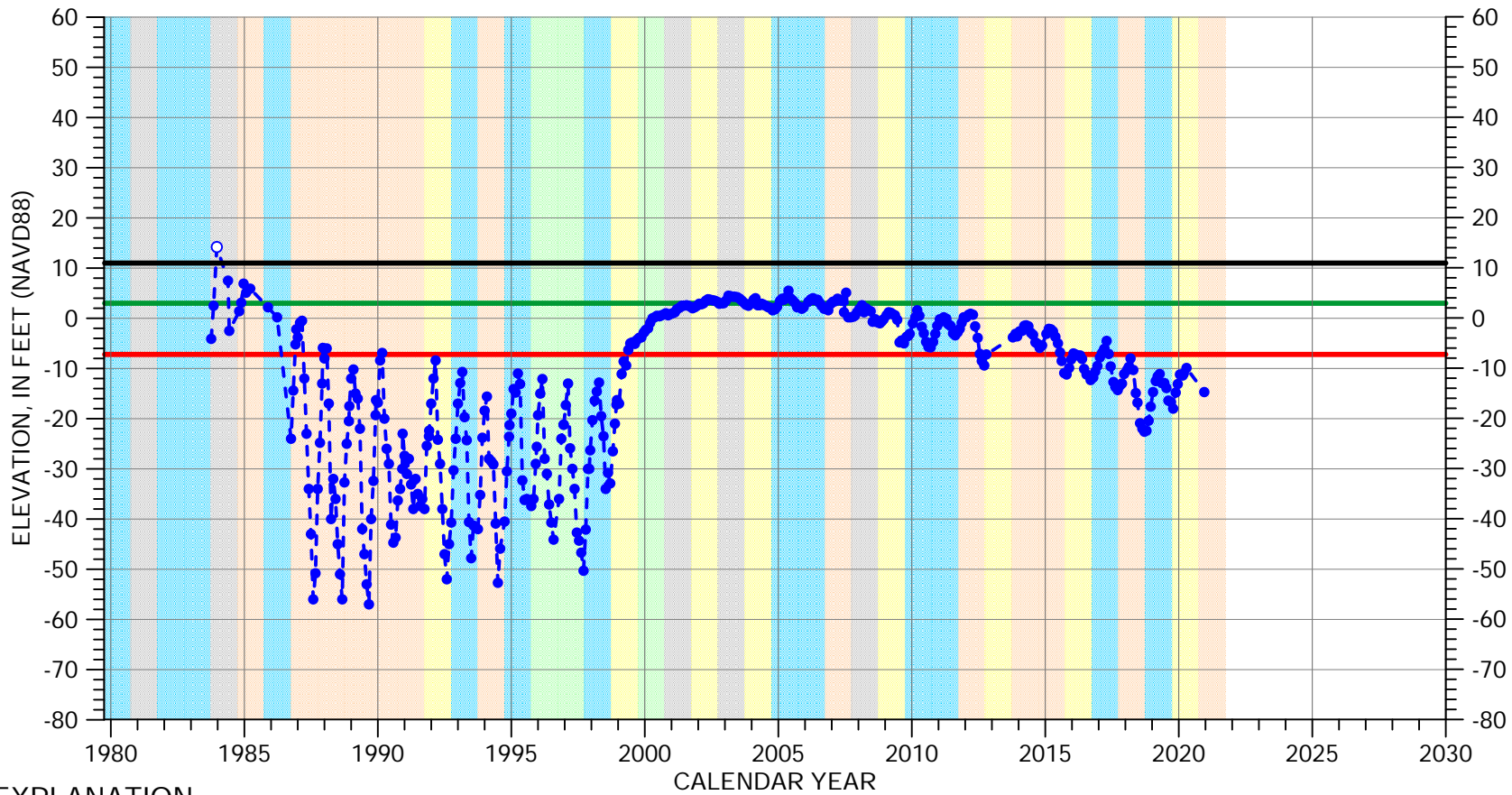
Multiple perforated intervals from -392 to -520 feet msl



Well bottom -568 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-06L01

180/400-Foot Aquifer Subbasin

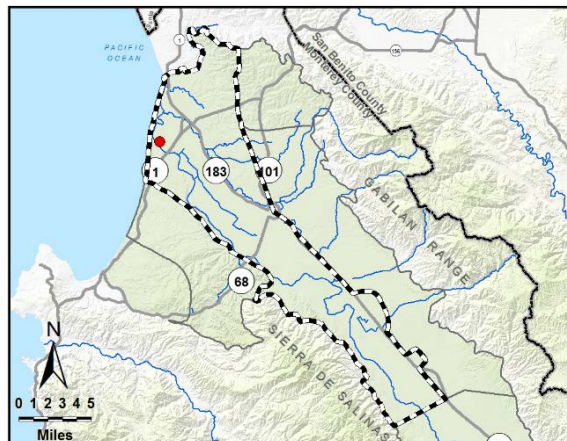


EXPLANATION

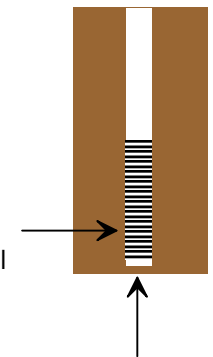
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------------|--------------|
| Orange | DRY | Light Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Cyan | WET |
| Grey | NORMAL | | |



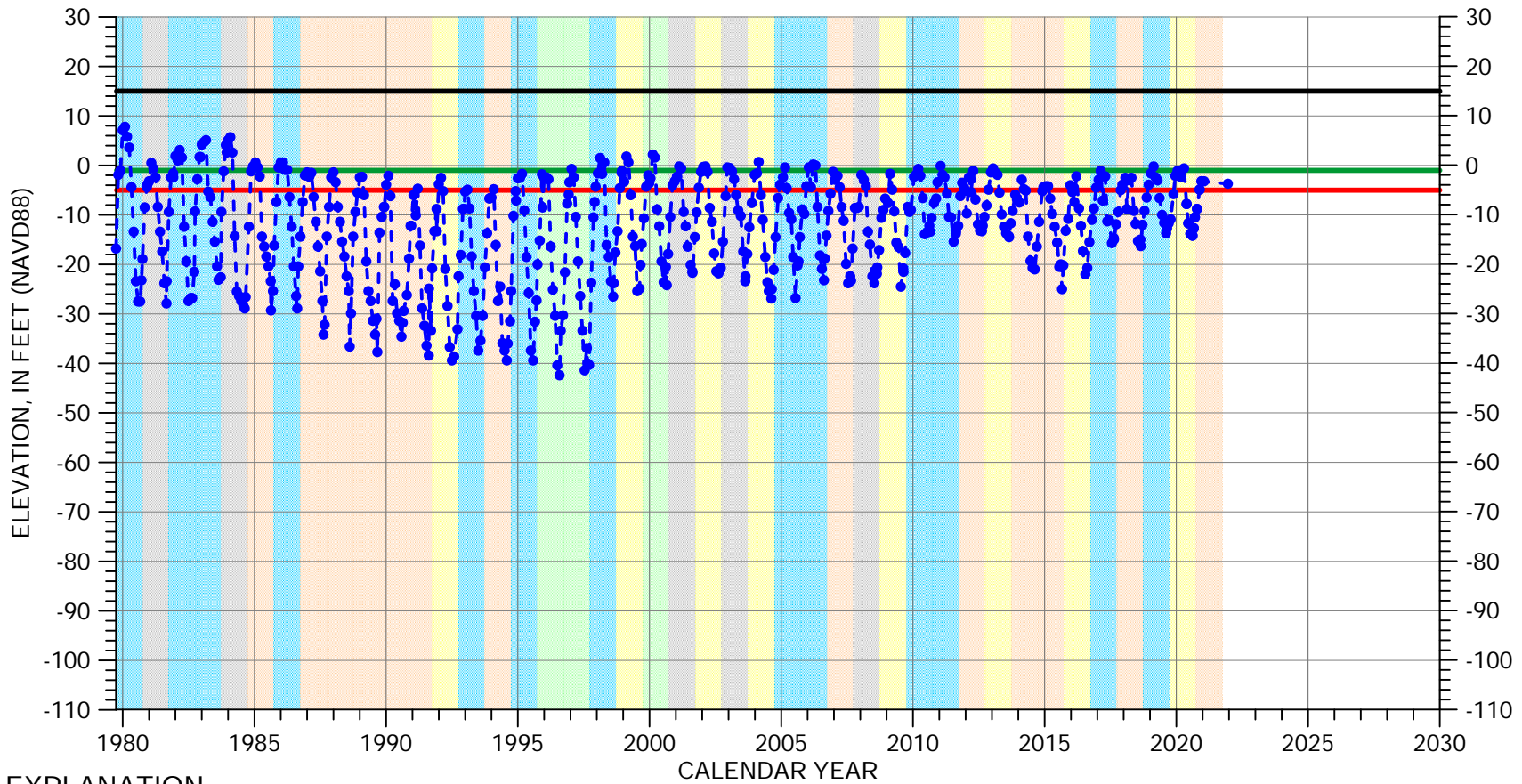
Perforated from
-852 to -1532 feet msl



Well bottom
-1552 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-08M02

180/400-Foot Aquifer Subbasin

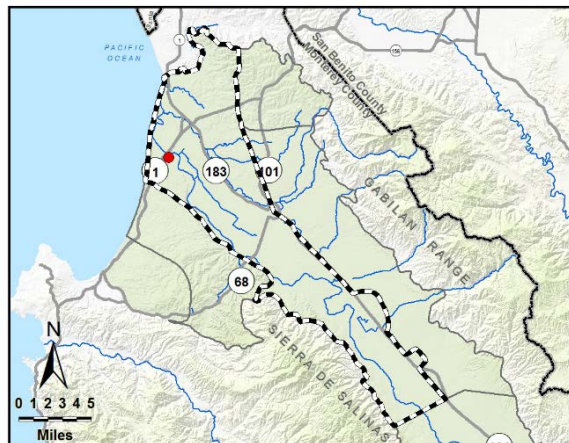


EXPLANATION

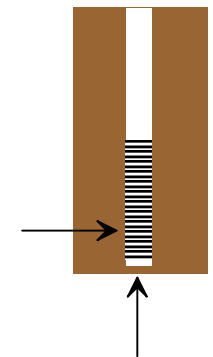
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|----------------|----------------|
| ■ DRY | ■ WET - NORMAL |
| ■ DRY - NORMAL | ■ WET |
| ■ NORMAL | |



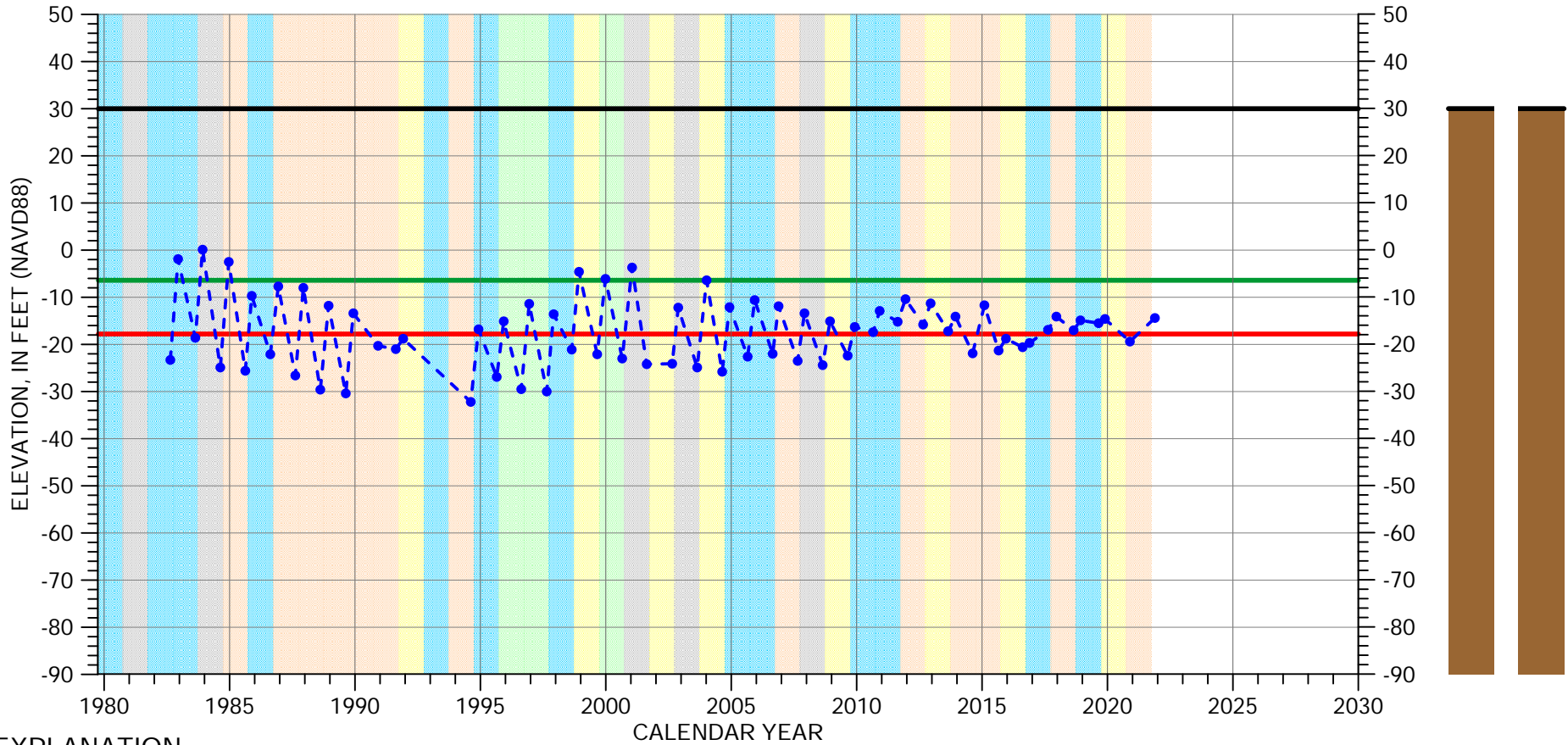
Perforated from
-299 to -441 feet msl



Well bottom
-485 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-10P01

180/400-Foot Aquifer Subbasin

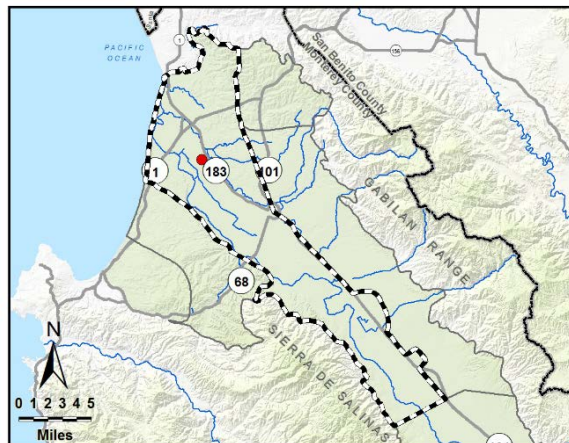


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



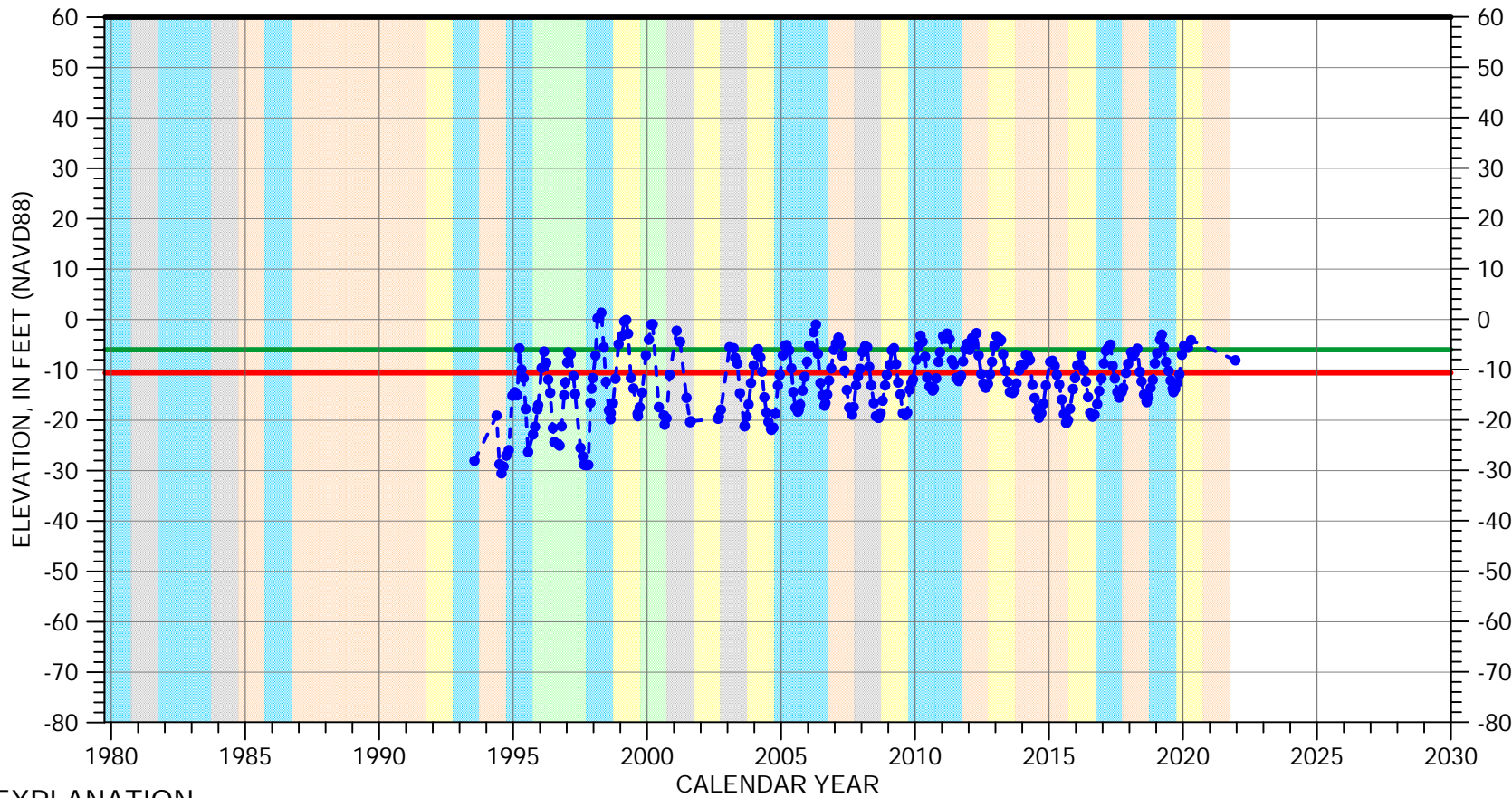
Perforated interval
unknown



Well bottom
-167 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-11A02

180/400-Foot Aquifer Subbasin

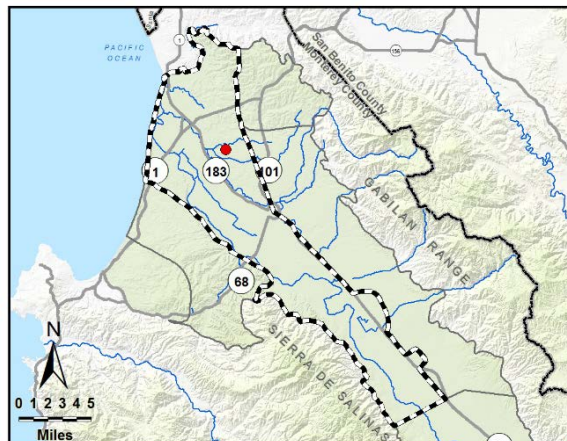


EXPLANATION

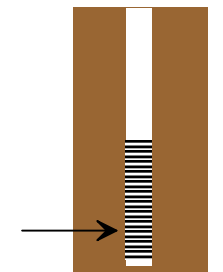
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



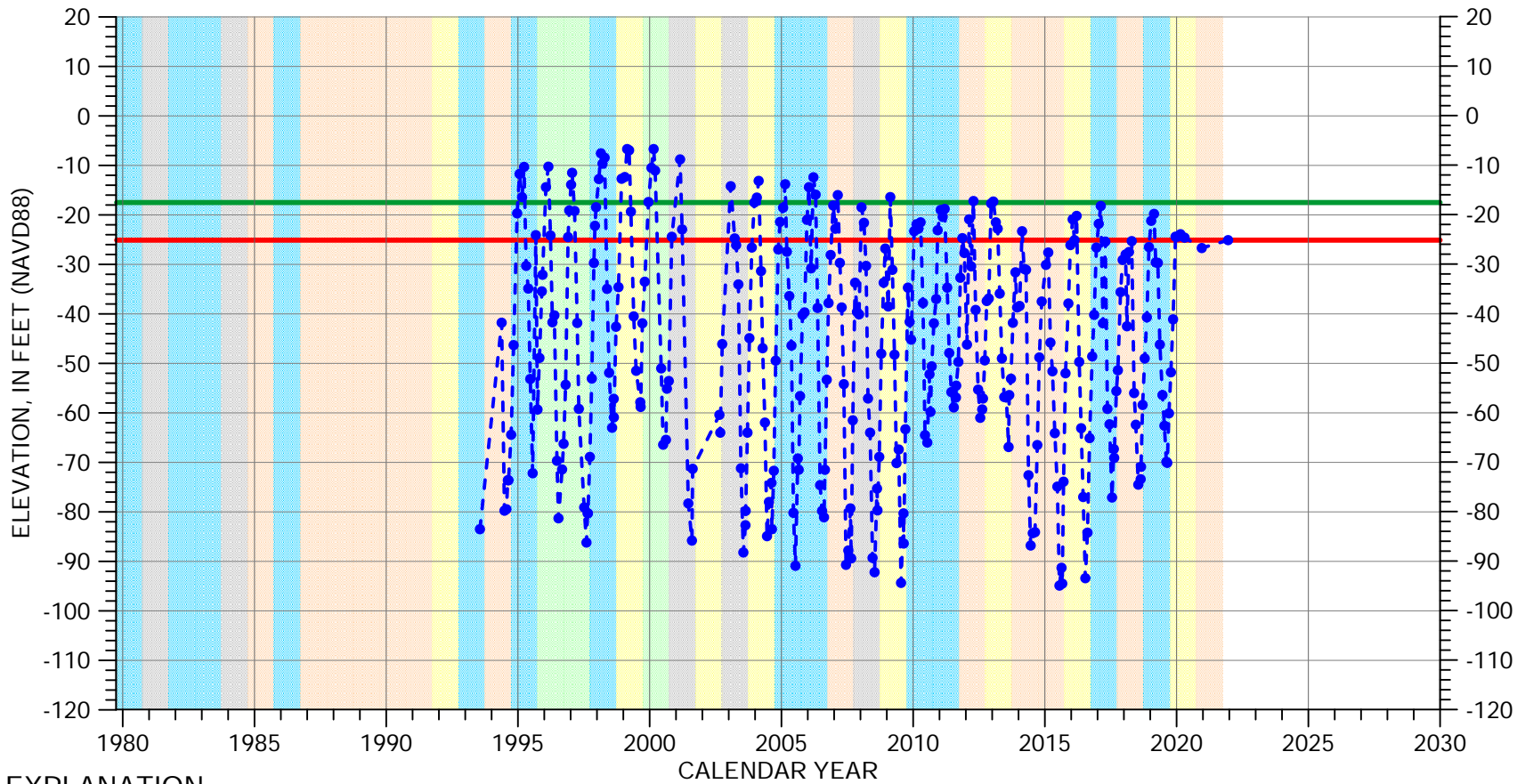
Multiple perforated intervals from -131 to -181 feet msl



Well bottom -191 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-11A04

180/400-Foot Aquifer Subbasin

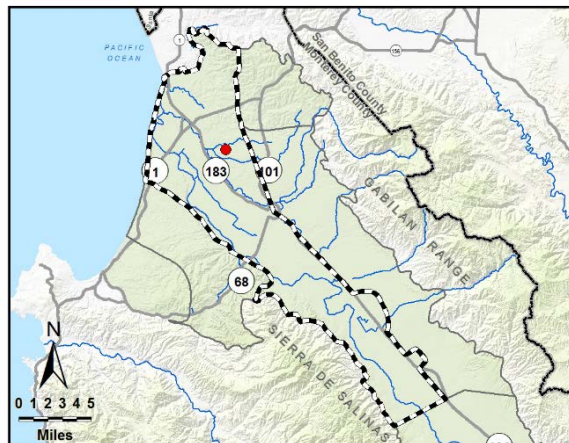


EXPLANATION

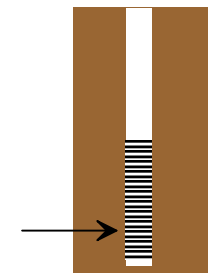
- Groundwater Elevation
- Suspect Measurement
- Land Surface (59 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------------|--------------|
| Orange | DRY | Light Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Cyan | WET |
| Grey | NORMAL | | |



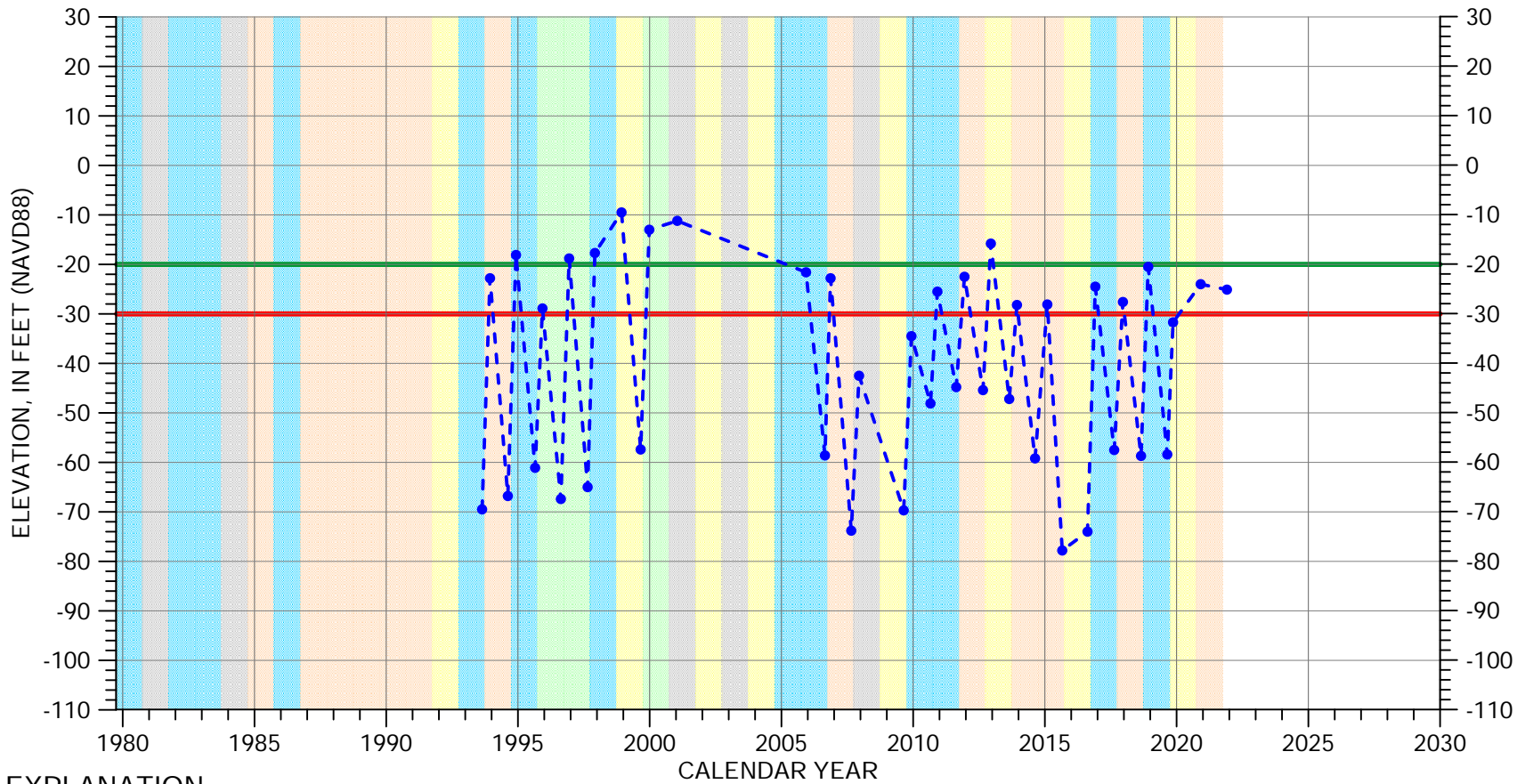
Multiple perforated intervals from -391 to -421 feet msl



Well bottom -431 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-11M03

180/400-Foot Aquifer Subbasin

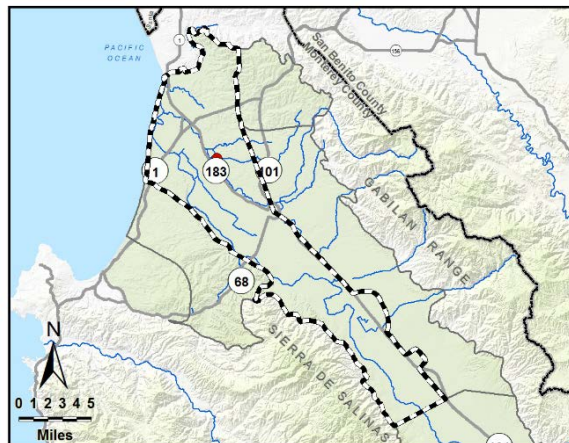


EXPLANATION

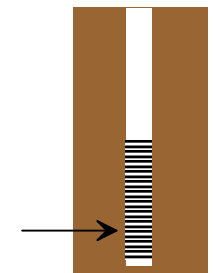
- Groundwater Elevation
- Suspect Measurement
- Land Surface (38 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



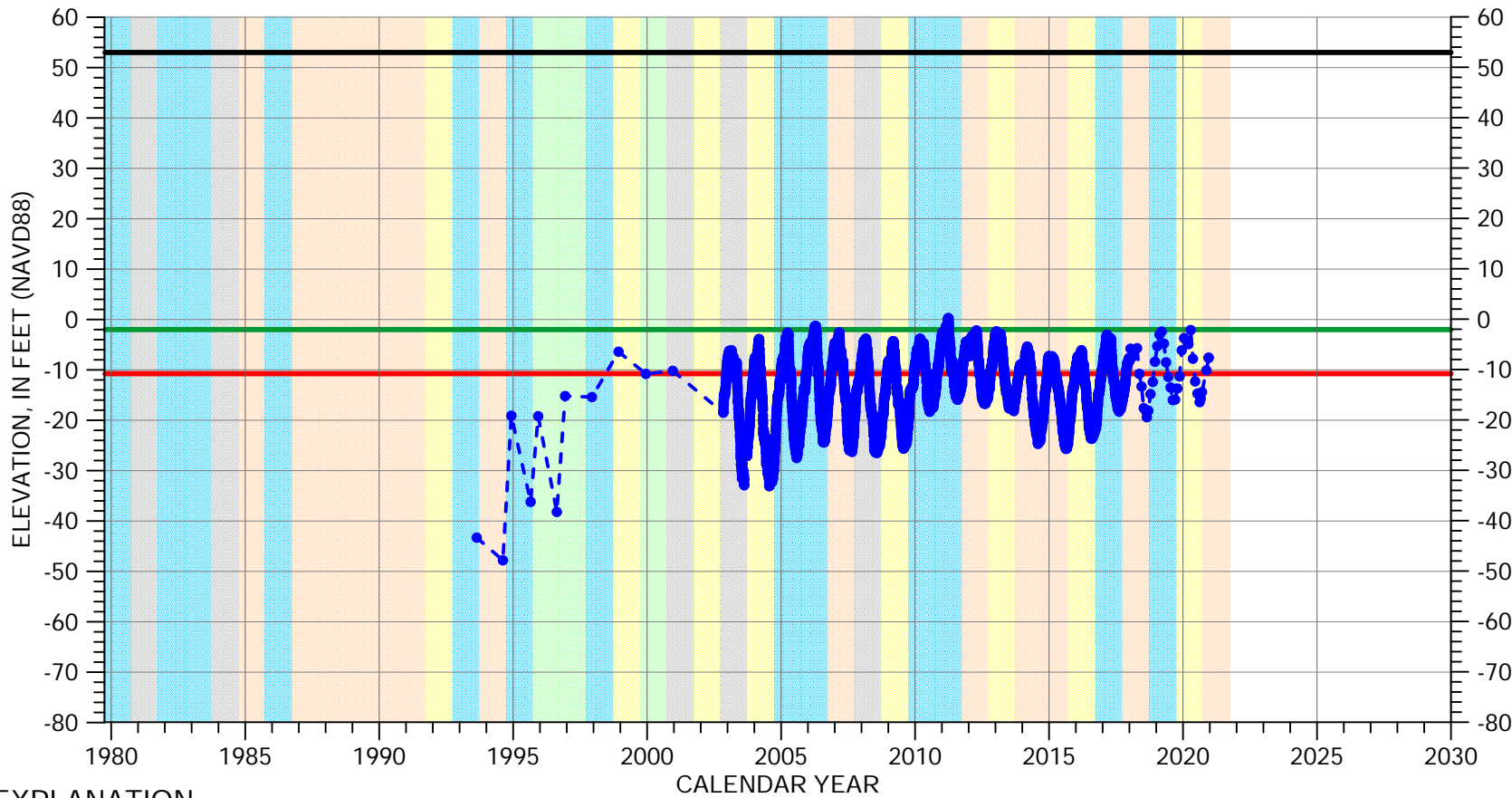
Multiple perforated intervals from -358 to -618 feet msl



Well bottom -618 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-12B02

180/400-Foot Aquifer Subbasin

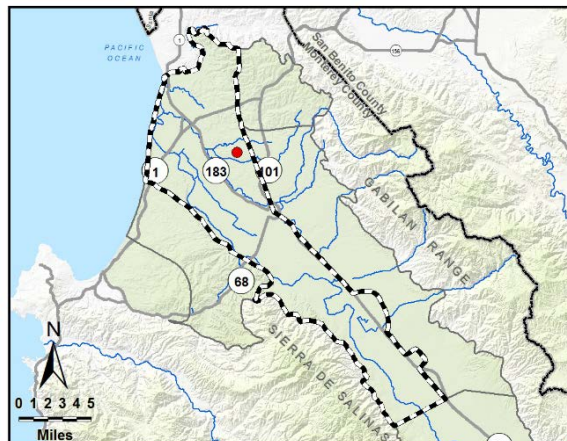


EXPLANATION

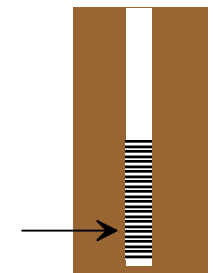
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



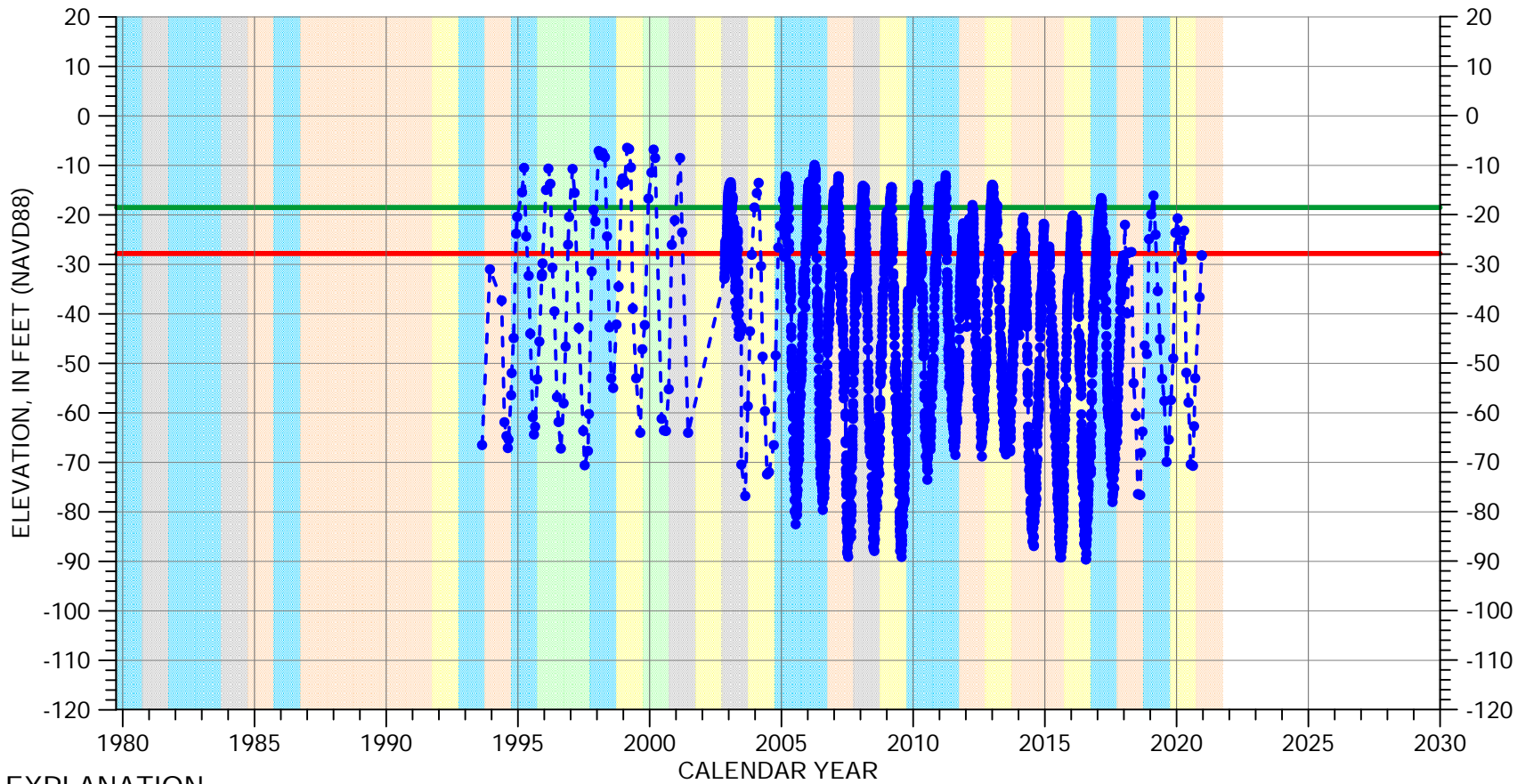
Perforated from
-157 to -207 feet msl



Well bottom
-212 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-12B03

180/400-Foot Aquifer Subbasin

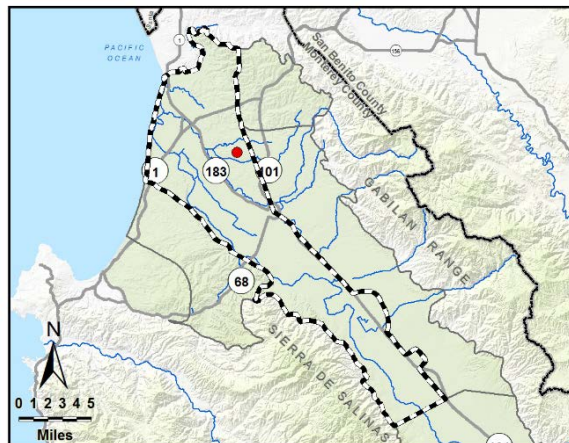


EXPLANATION

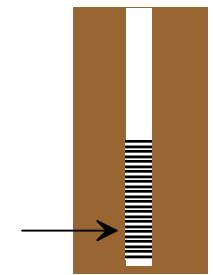
- Groundwater Elevation
- Suspect Measurement
- Land Surface (53 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------------|--------------|
| Orange | DRY | Light Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Cyan | WET |
| Grey | NORMAL | | |



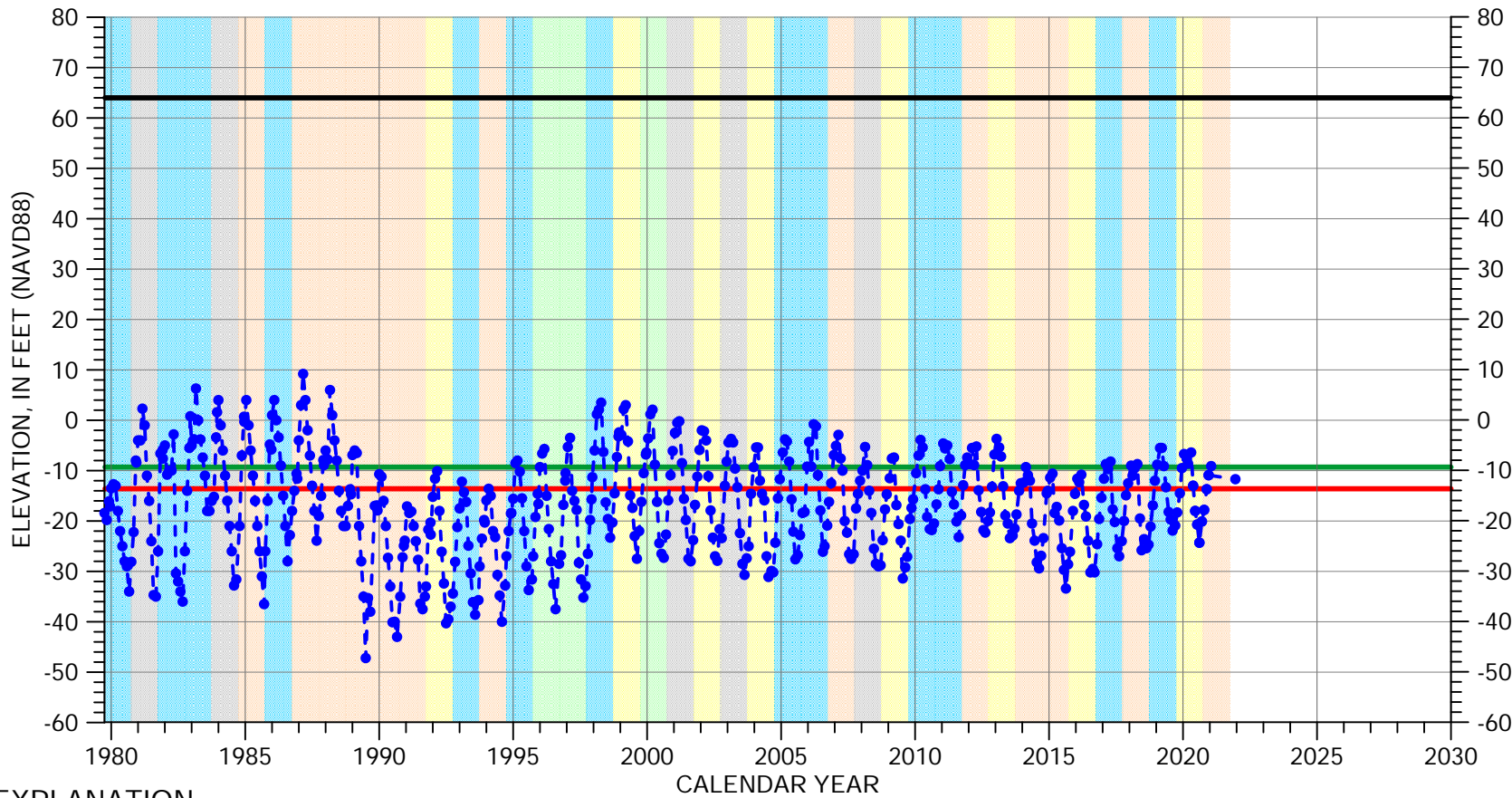
Perforated from
-297 to -327 feet msl



Well bottom
-337 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-12Q01

180/400-Foot Aquifer Subbasin

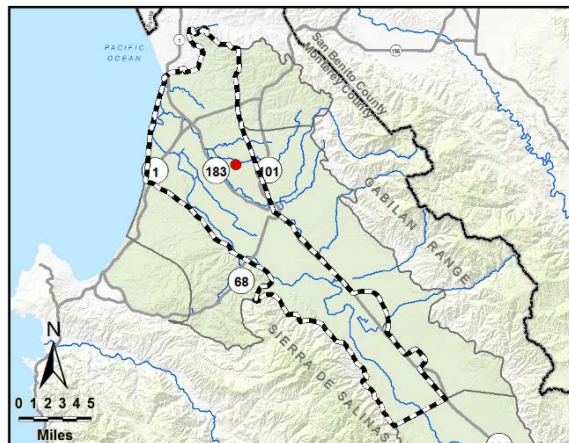


EXPLANATION

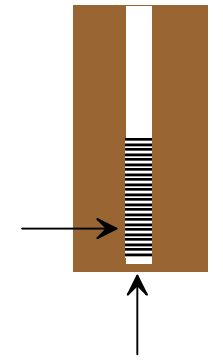
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|------------|--------------|-----------------|--------------|
| Orange box | DRY | Light green box | WET - NORMAL |
| Yellow box | DRY - NORMAL | Cyan box | WET |
| Grey box | NORMAL | | |



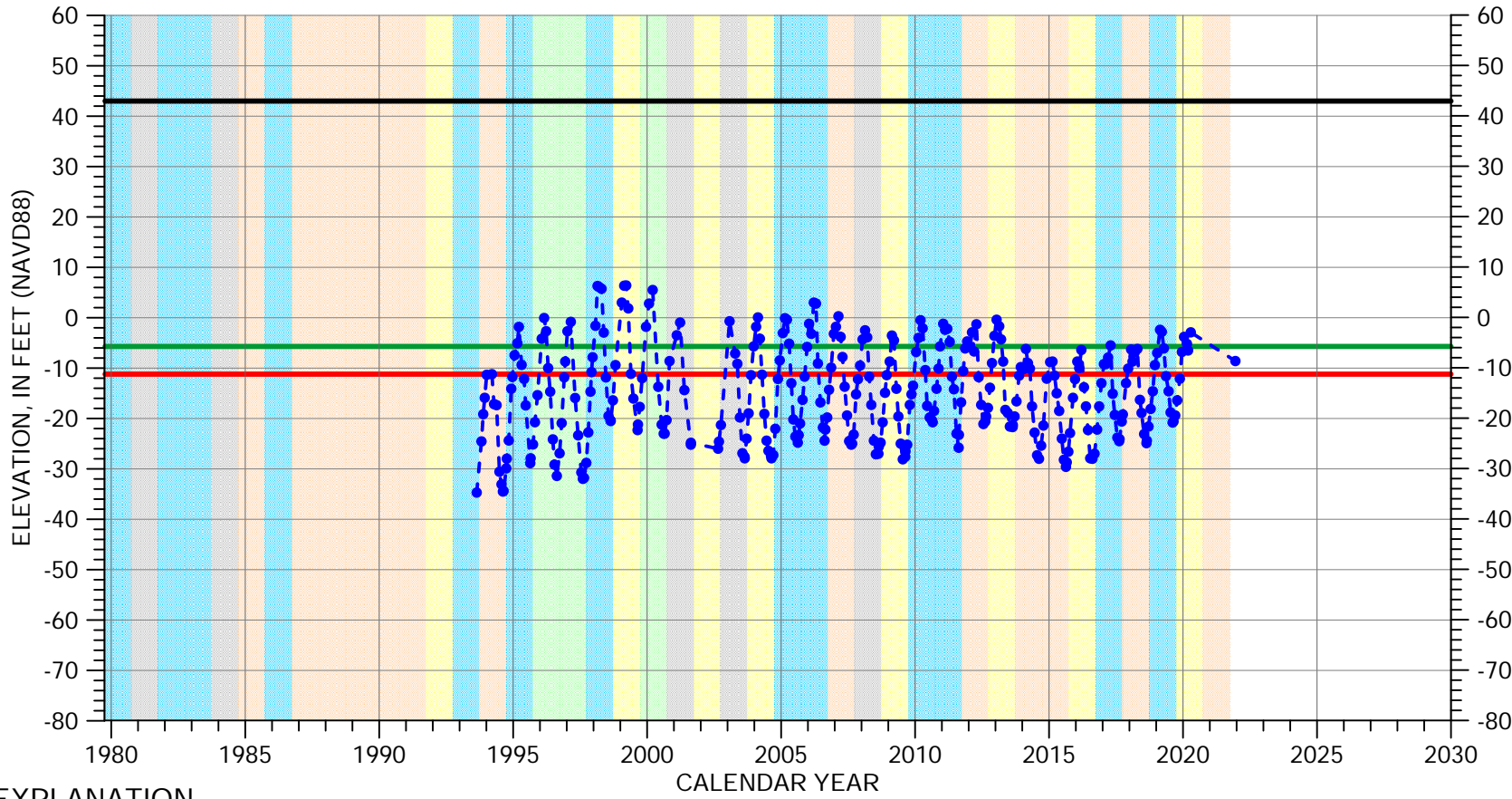
Perforated from
-209 to -228 feet msl



Well bottom
-555 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-13F03

180/400-Foot Aquifer Subbasin

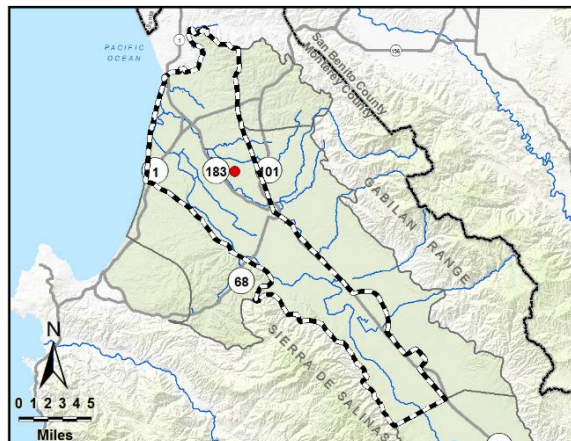


EXPLANATION

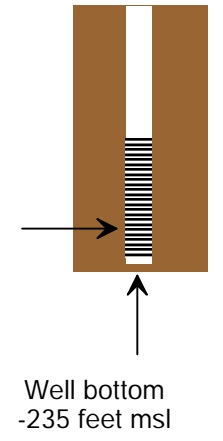
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--------------|--------------|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |

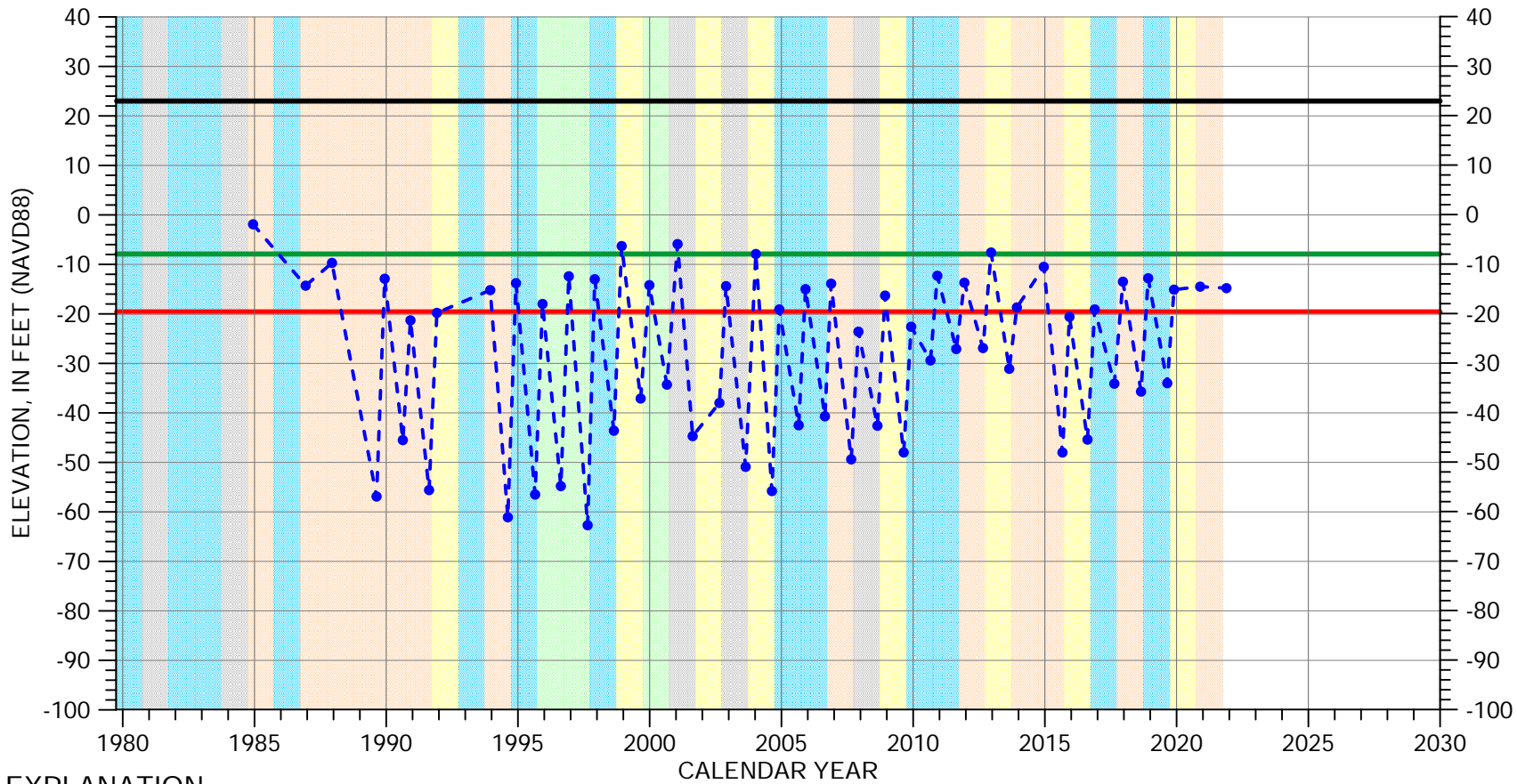


Multiple perforated intervals from -185 to -225 feet msl



HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-16A02

180/400-Foot Aquifer Subbasin

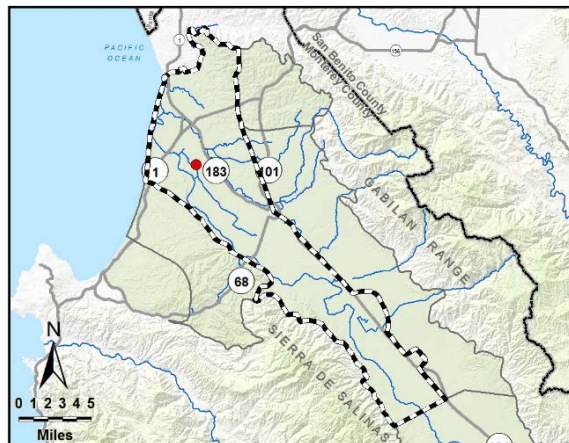


EXPLANATION

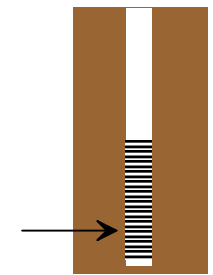
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



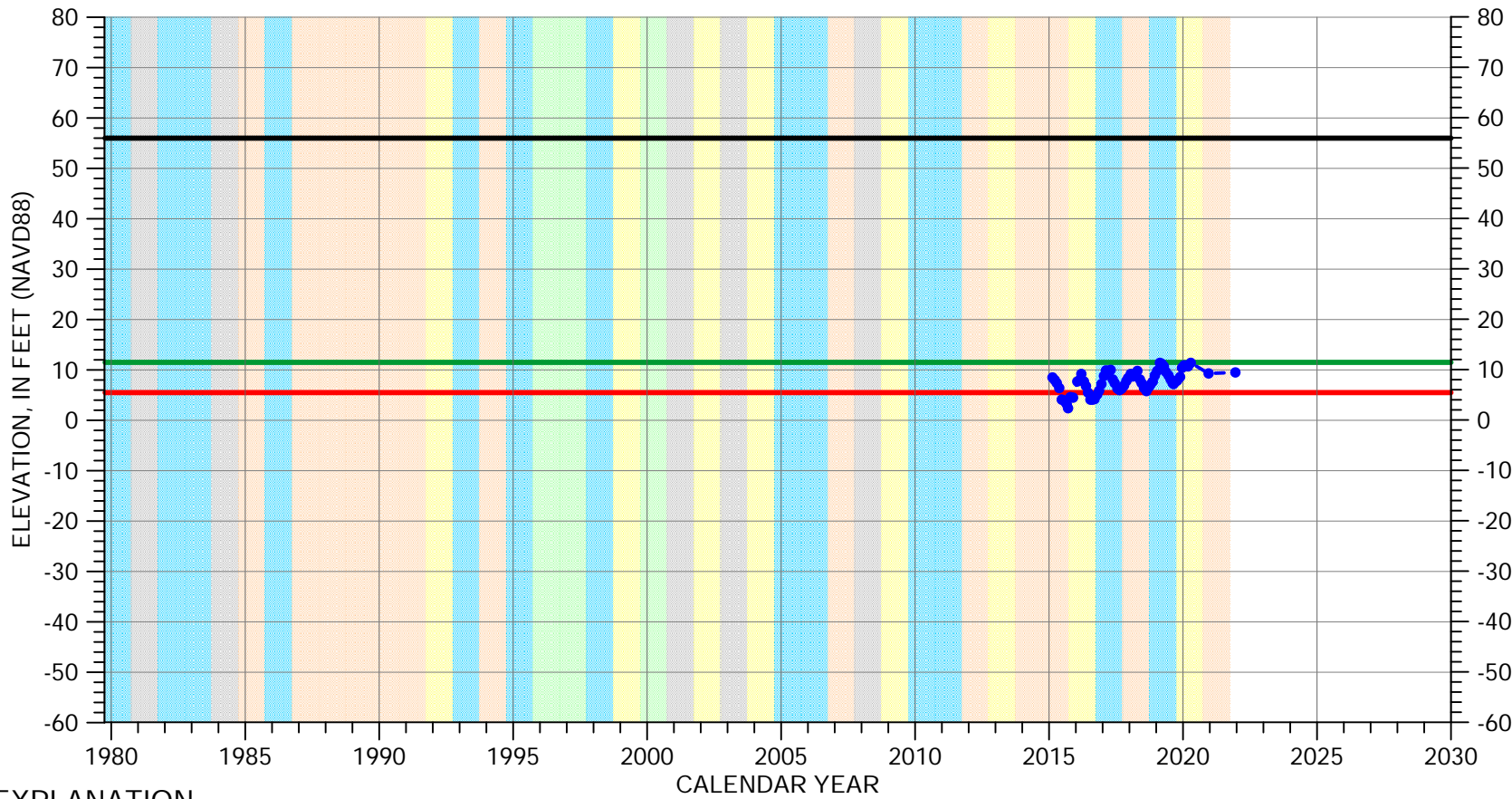
Multiple perforated intervals from -409 to -597 feet msl



Well bottom -648 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-17C02

180/400-Foot Aquifer Subbasin

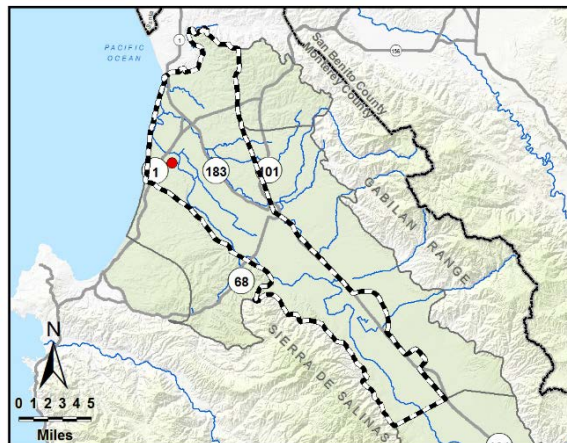


EXPLANATION

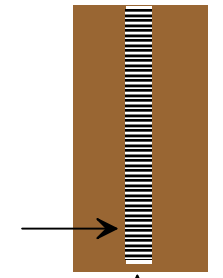
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



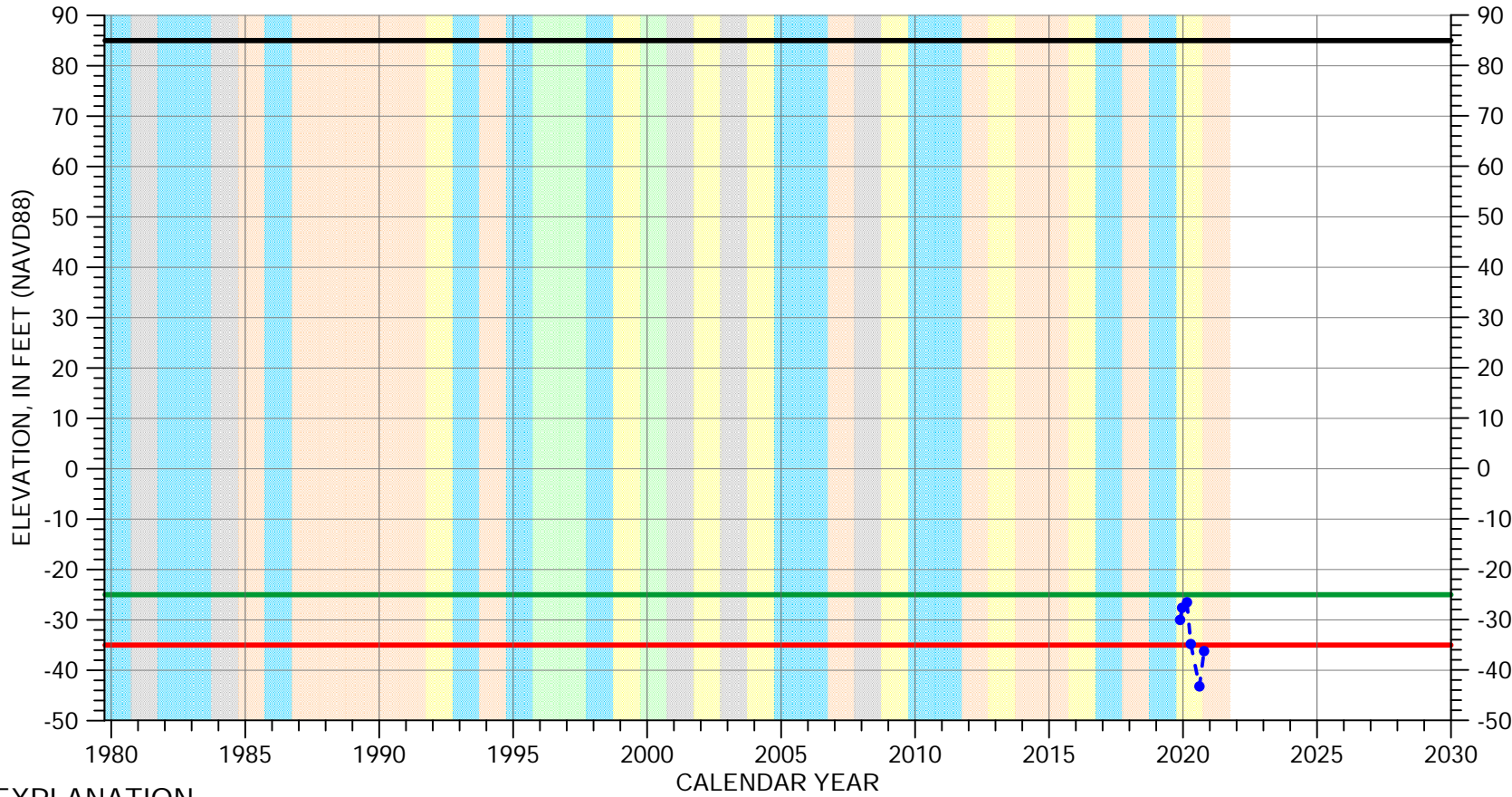
Perforated from
-24 to -84 feet msl



Well bottom
-84 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-18B01

180/400-Foot Aquifer Subbasin

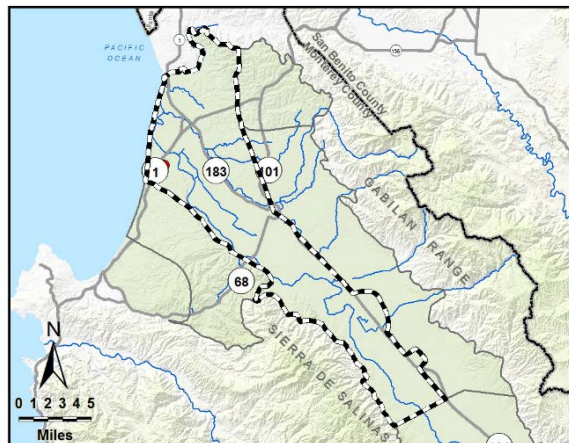


EXPLANATION

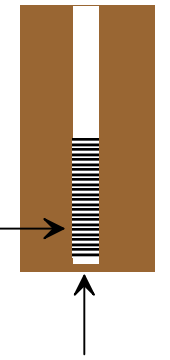
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--------------|--------------|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



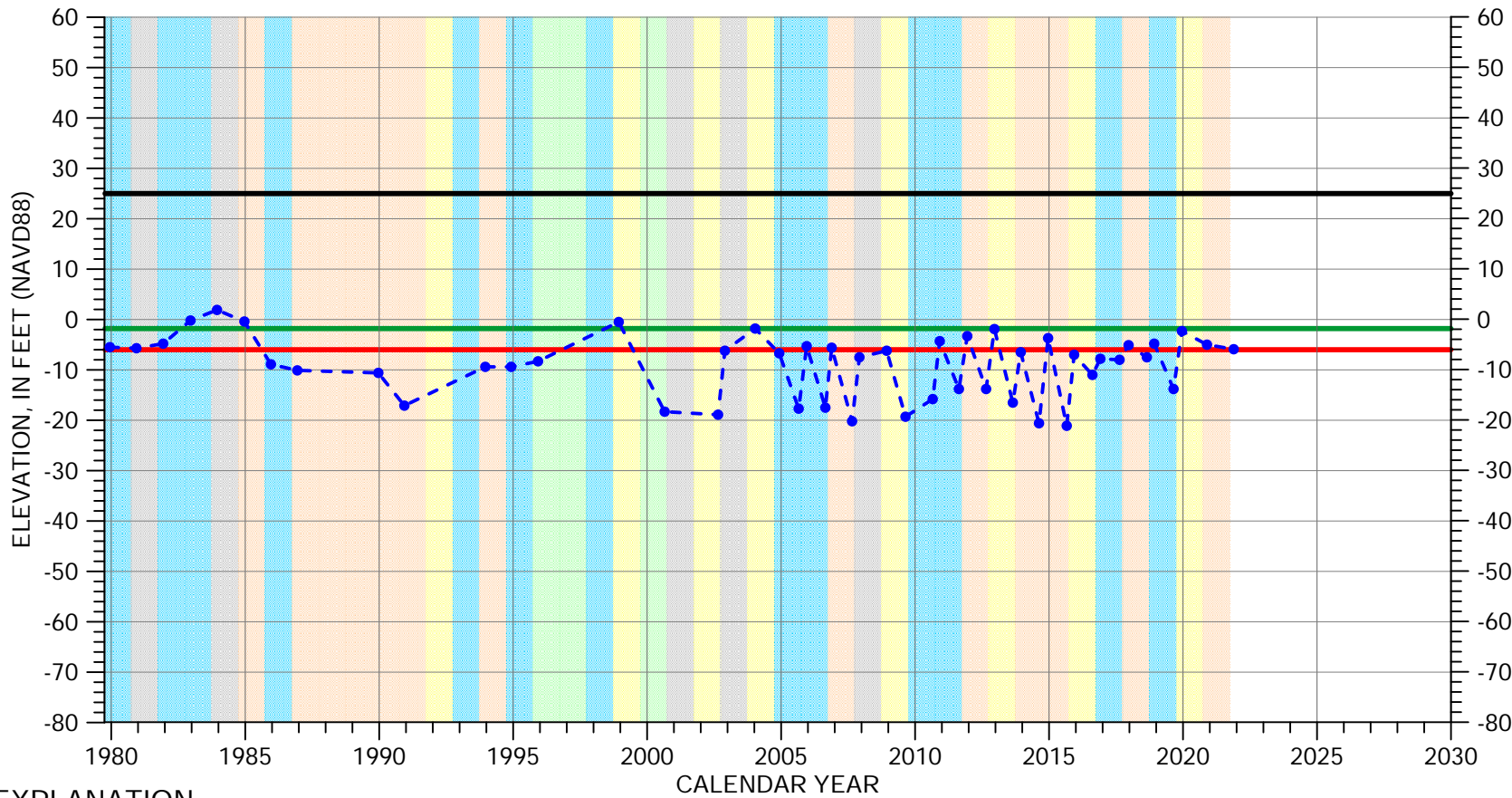
Perforated from
-1035 to -1595 feet msl



Well bottom
-1615 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-21L01

180/400-Foot Aquifer Subbasin

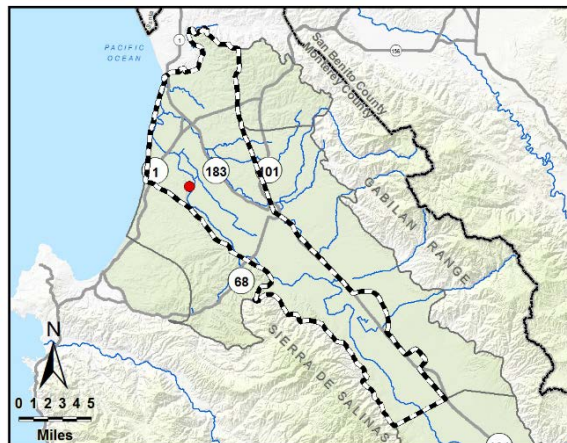


EXPLANATION

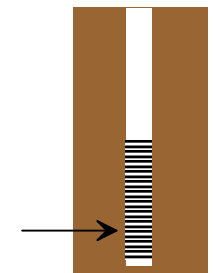
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



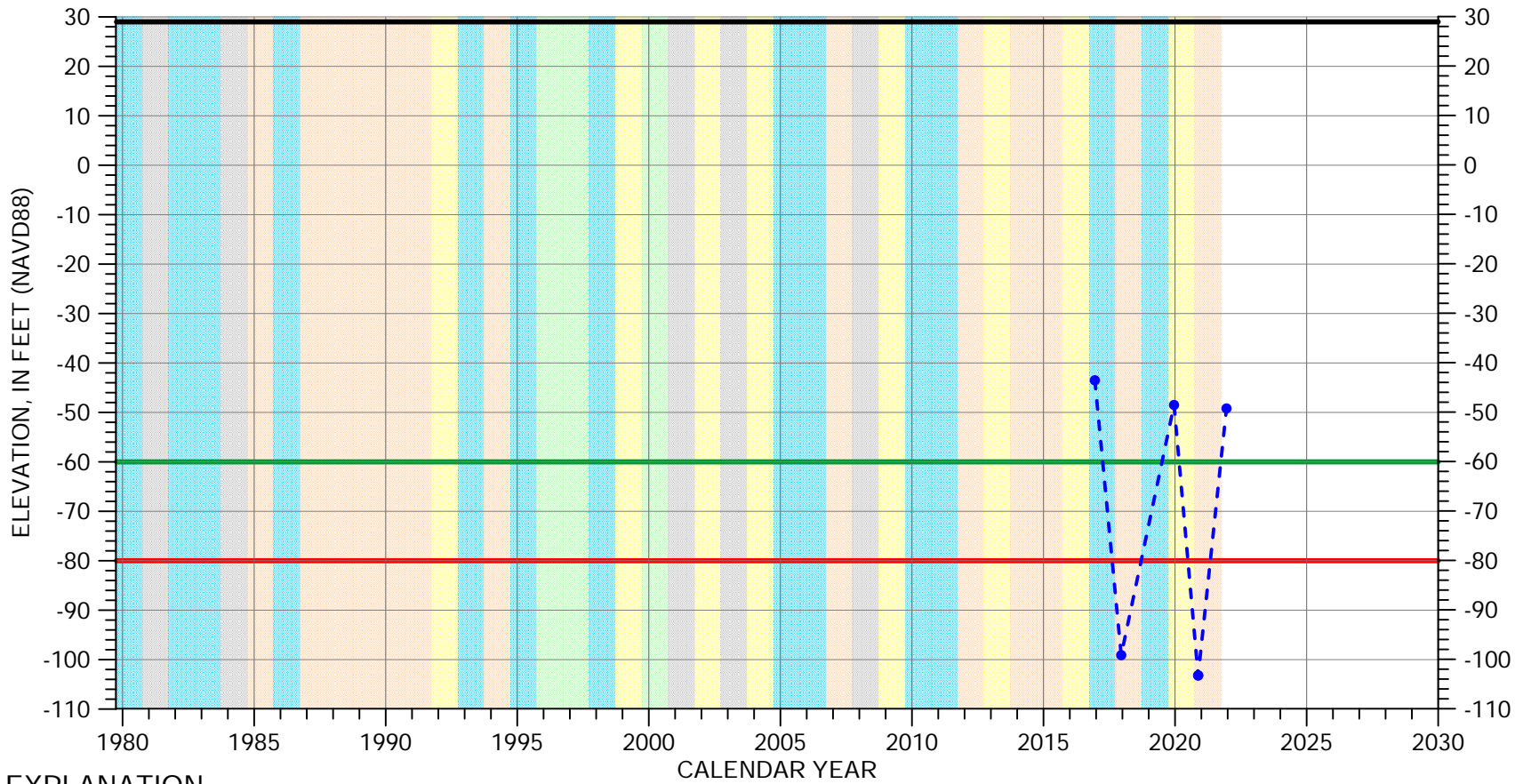
Multiple perforated intervals from -147 to -242 feet msl



Well bottom -222 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-22A03

180/400-Foot Aquifer Subbasin

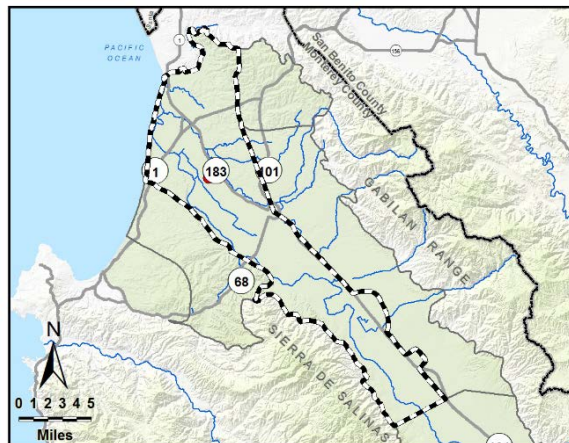


EXPLANATION

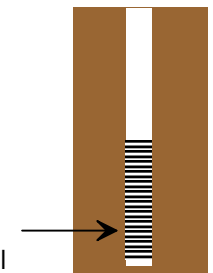
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--------------|--------------|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



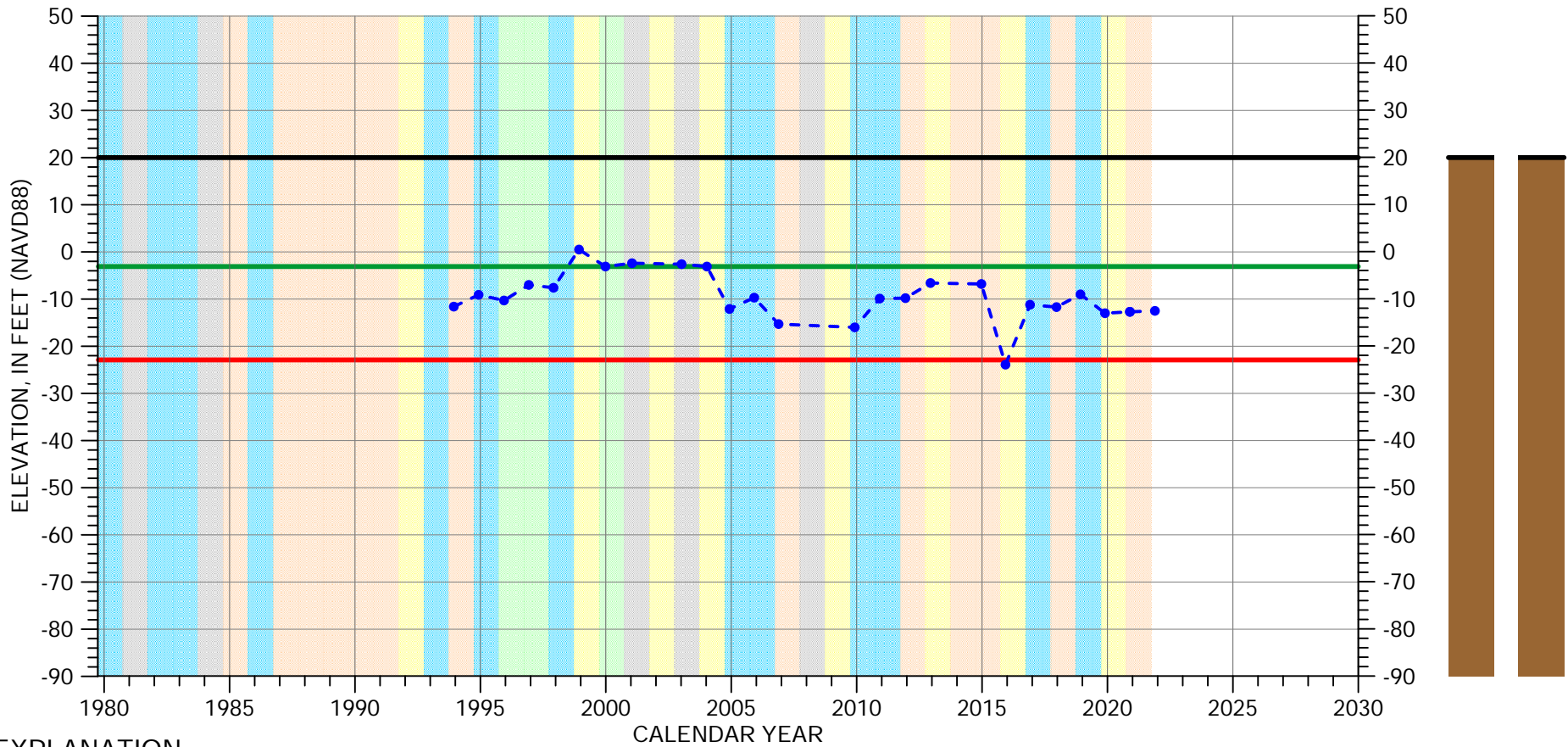
Perforated from
-951 to -1611 feet msl



Well bottom
-1611 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-22L01

180/400-Foot Aquifer Subbasin

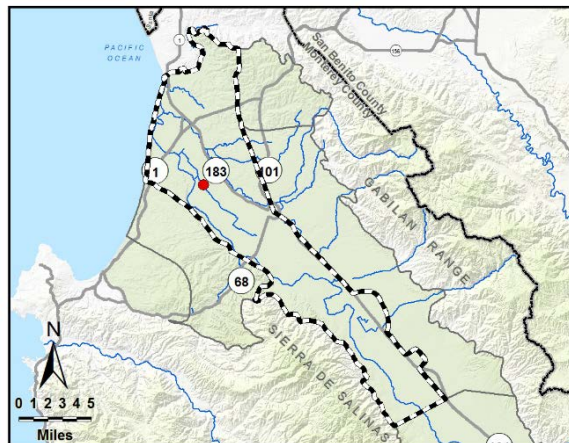


EXPLANATION

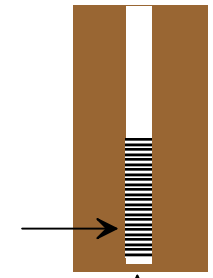
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



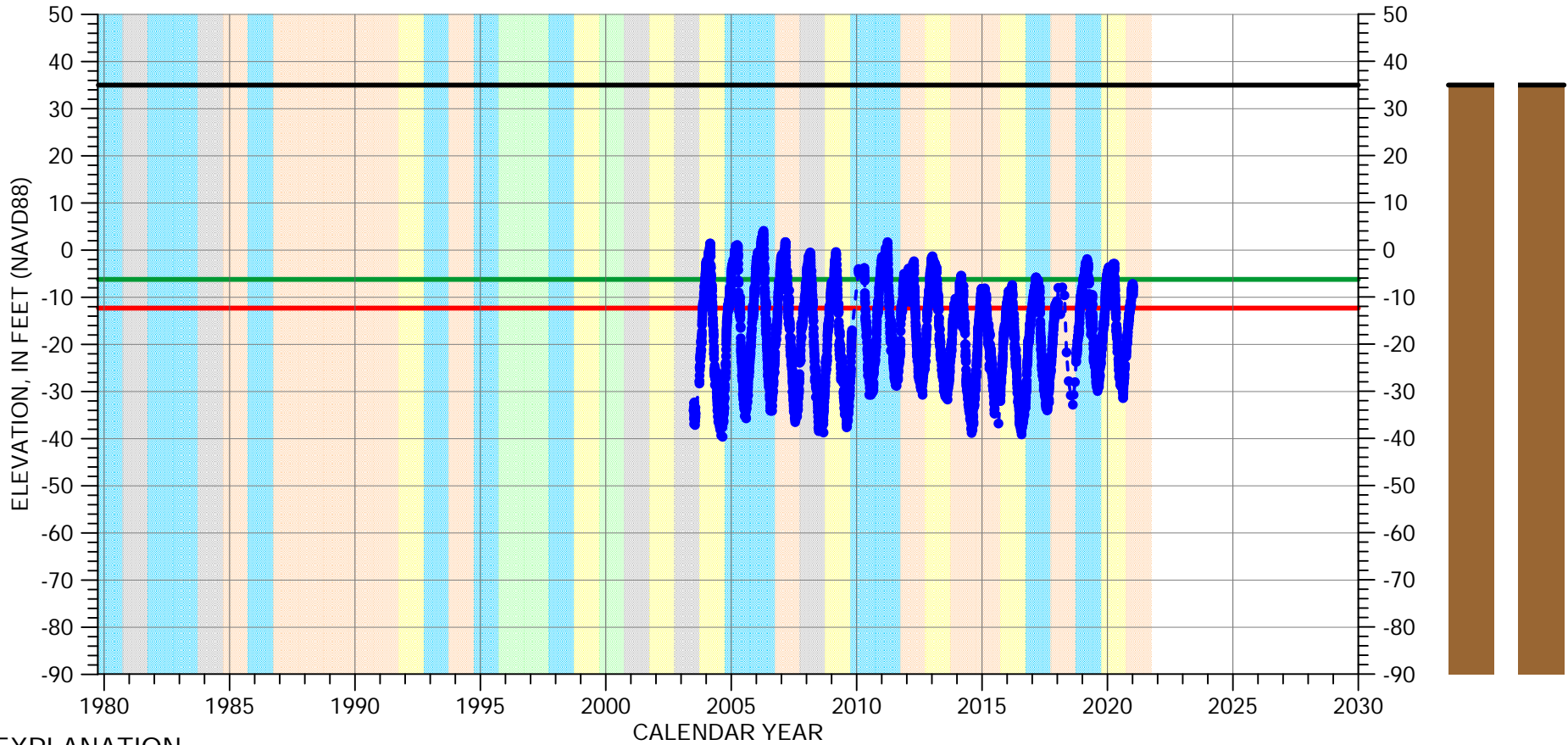
Multiple perforated intervals from -400 to -660 feet msl



Well bottom -660 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-26H01

180/400-Foot Aquifer Subbasin

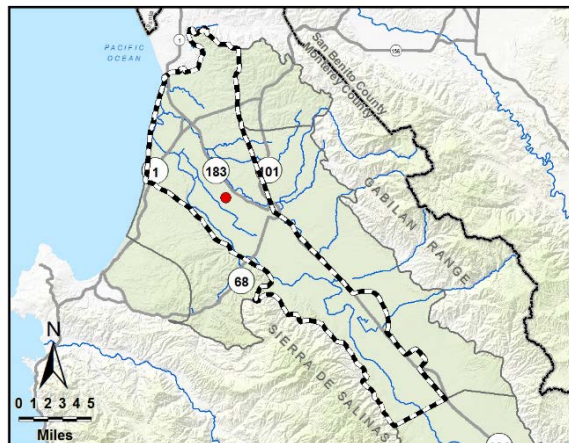


EXPLANATION

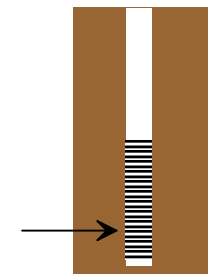
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--------------|--------------|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



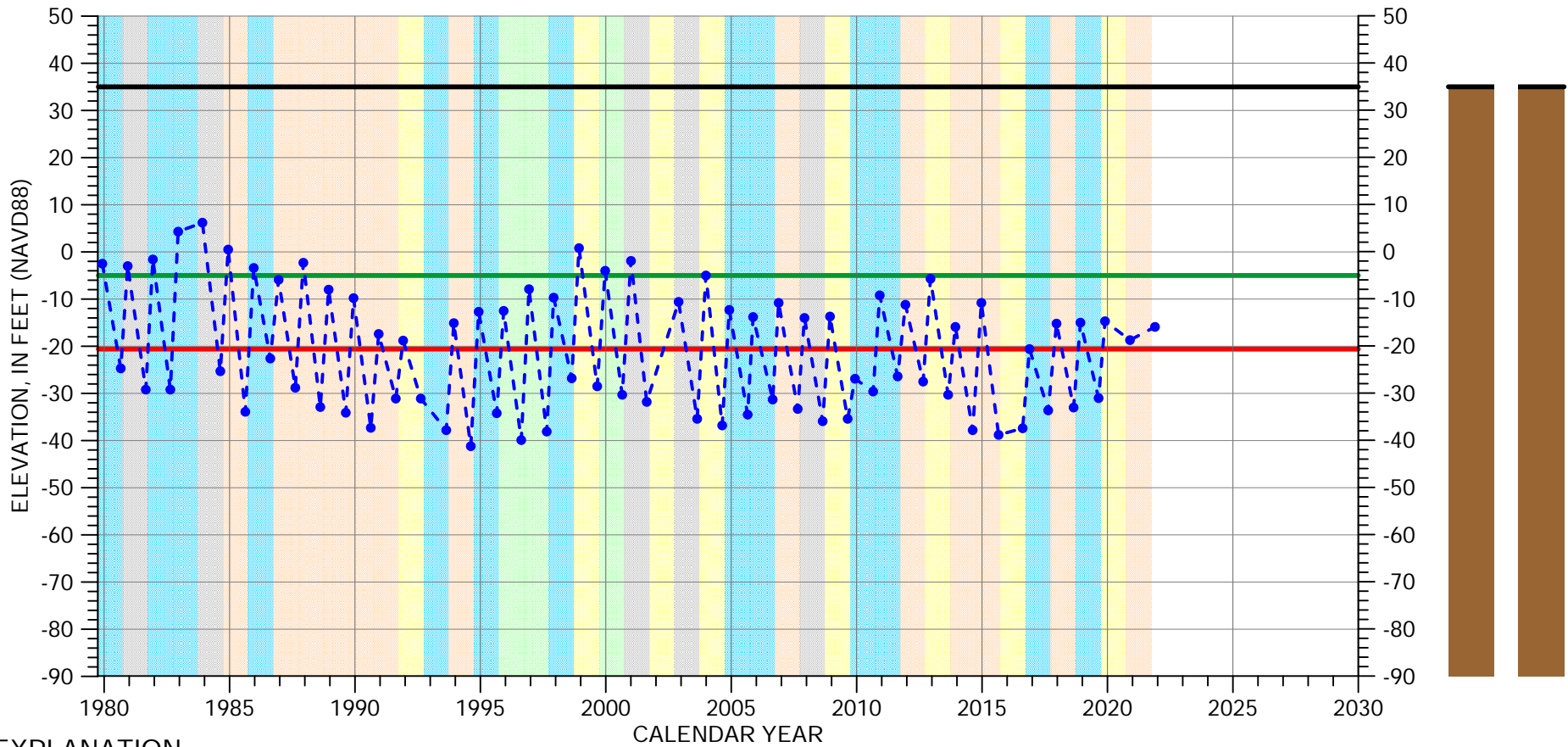
Perforated from
-252 to -302 feet msl



Well bottom
-304 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-26J03

180/400-Foot Aquifer Subbasin

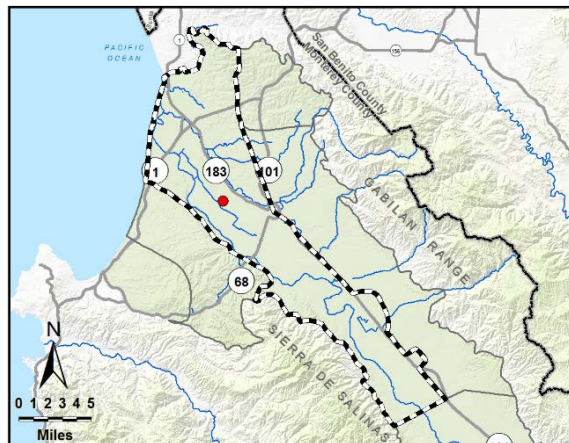


EXPLANATION

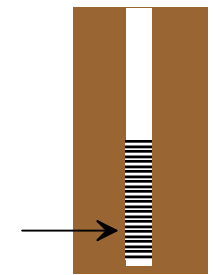
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



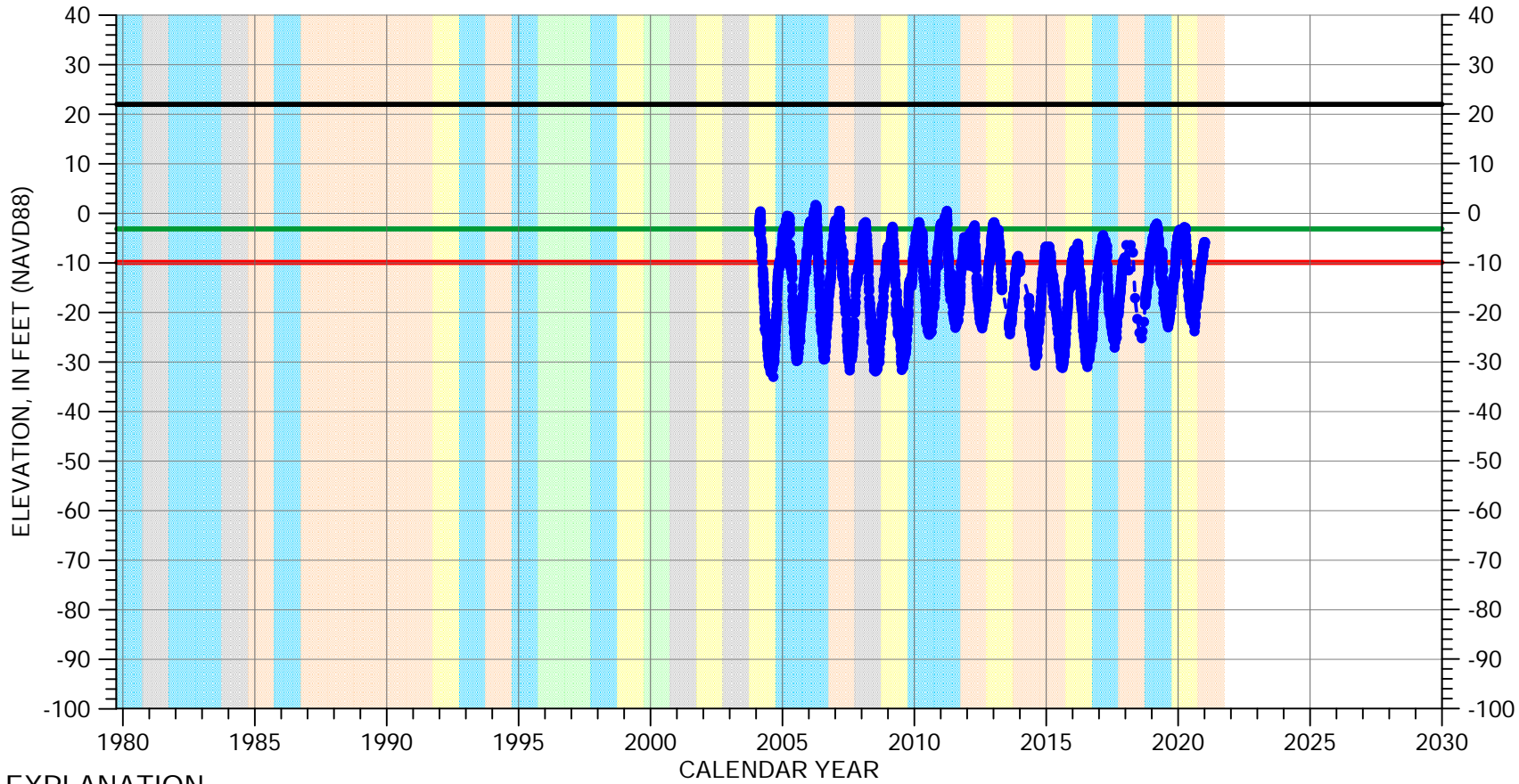
Multiple perforated intervals from -299 to -521 feet msl



Well bottom -530 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-27A01

180/400-Foot Aquifer Subbasin

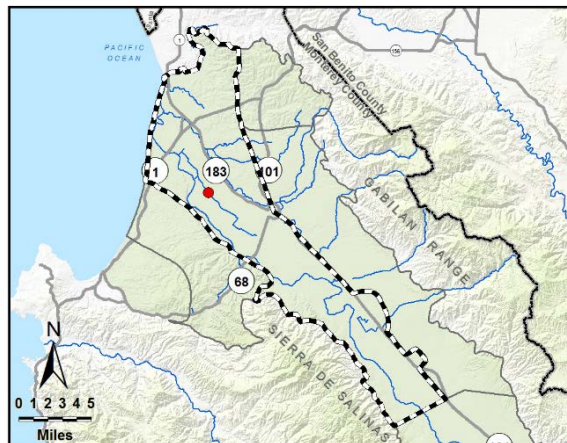


EXPLANATION

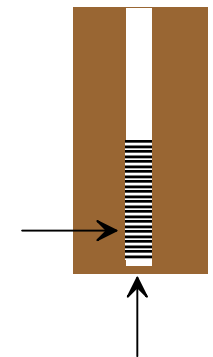
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



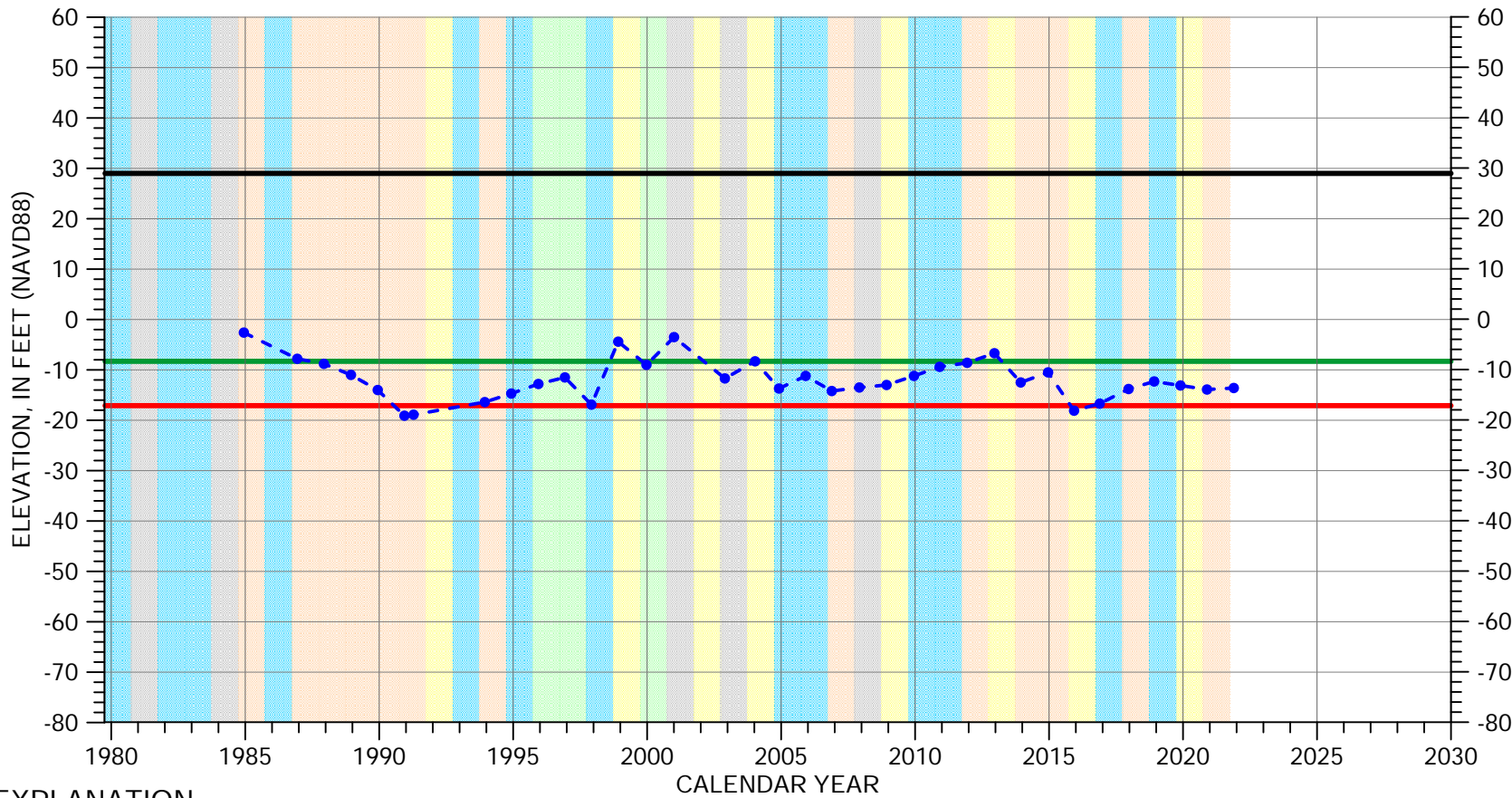
Perforated from
-218 to -268 feet msl



Well bottom
-271 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-27G03

180/400-Foot Aquifer Subbasin

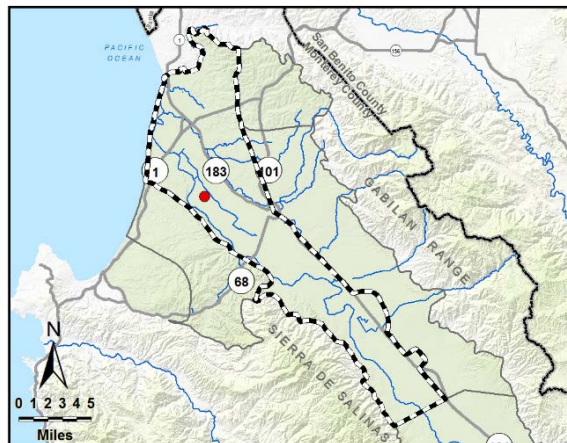


EXPLANATION

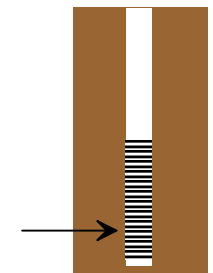
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



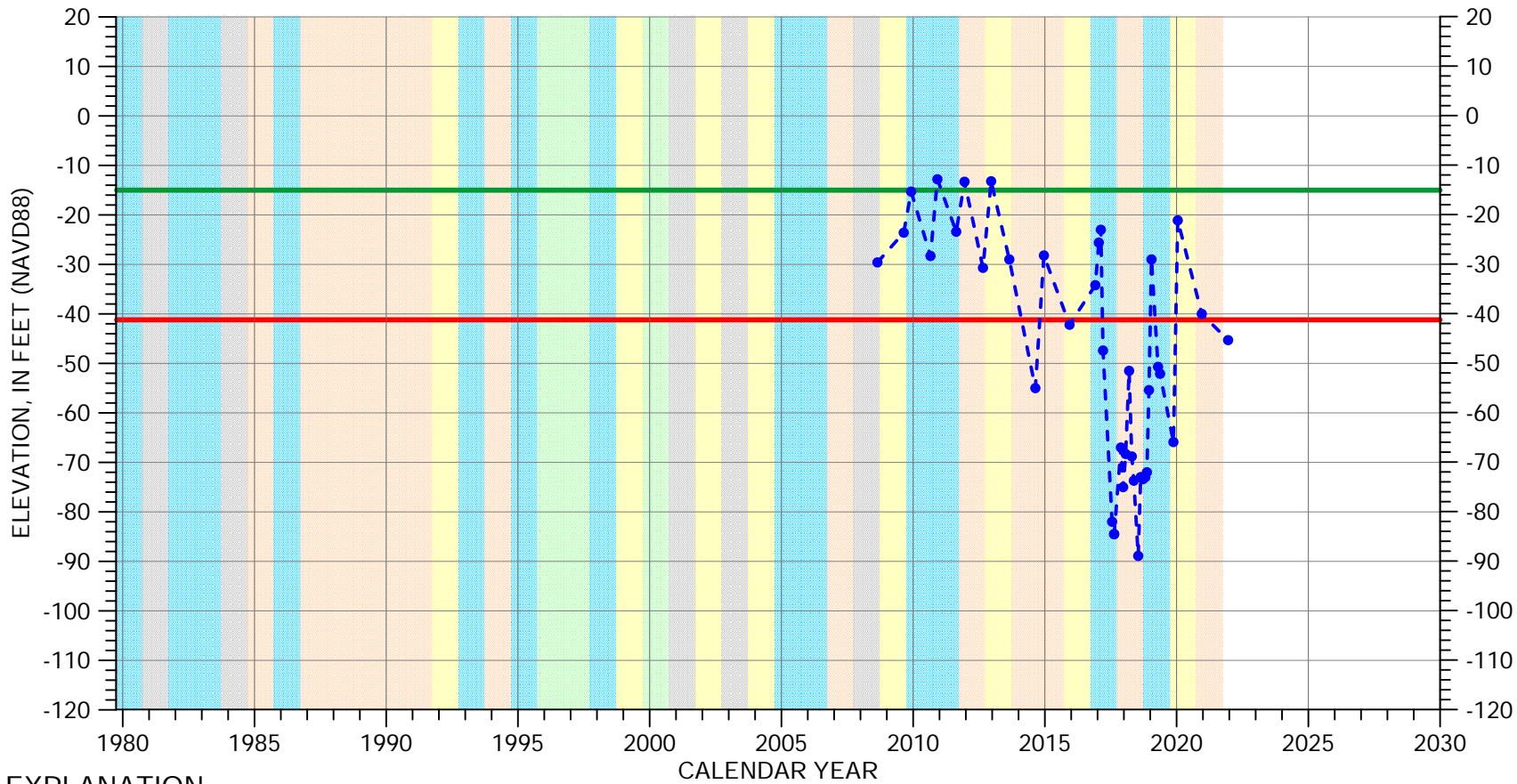
Multiple perforated intervals from -250 to -342 feet msl



Well bottom -469 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-28C02

180/400-Foot Aquifer Subbasin

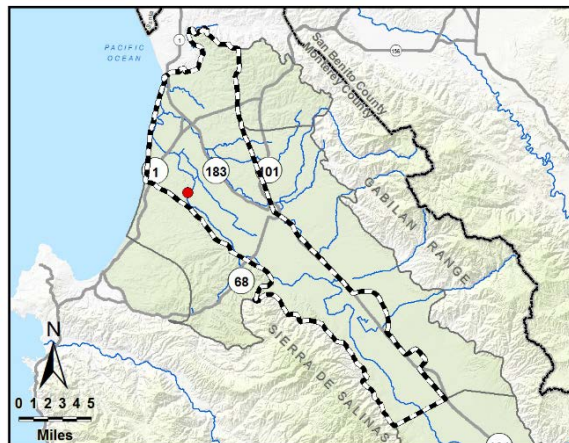


EXPLANATION

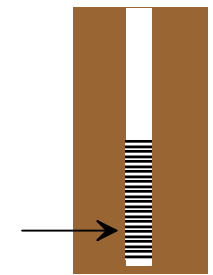
- Groundwater Elevation
- Suspect Measurement
- Land Surface (45 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



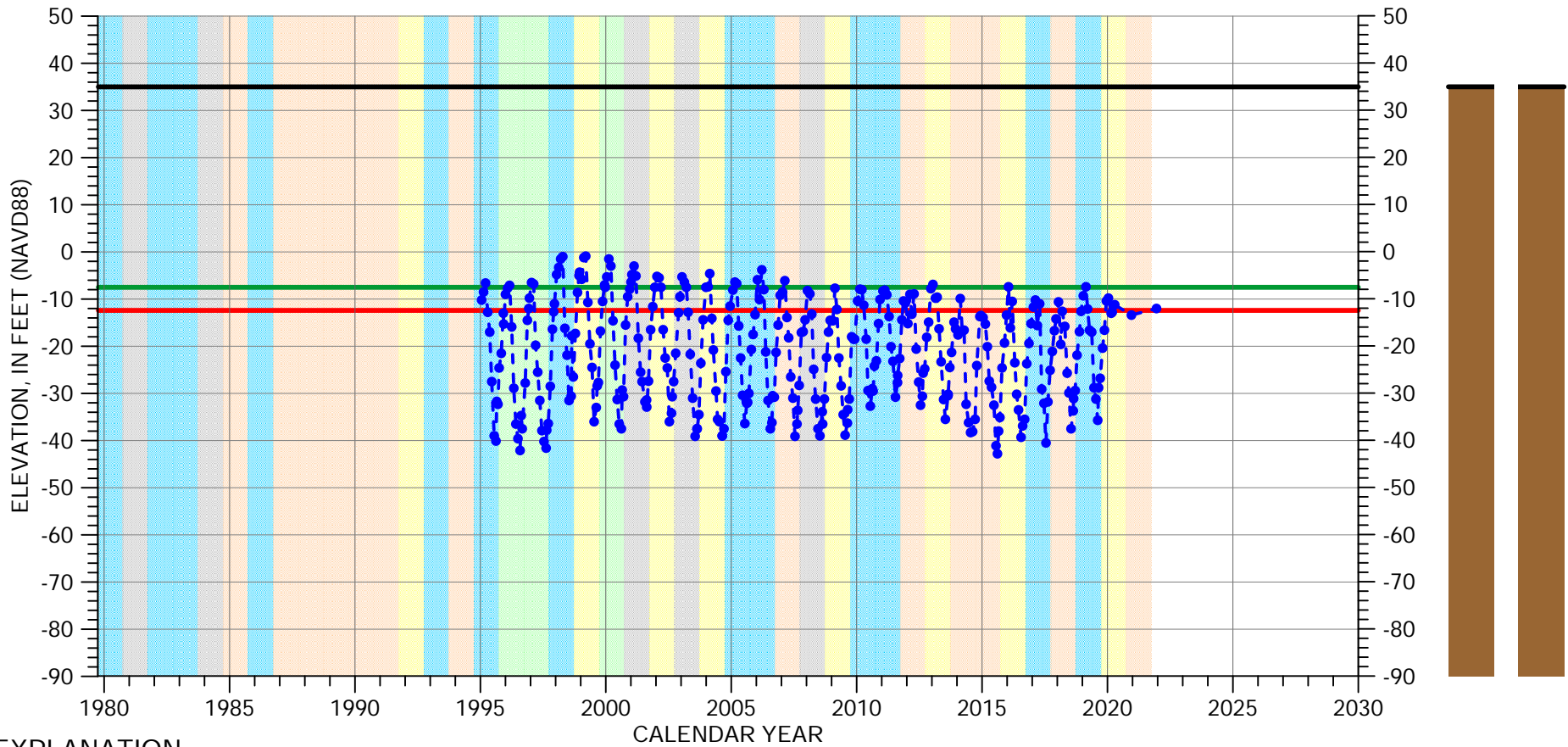
Multiple perforated intervals from -675 to -1095 feet msl



Well bottom -1115 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-34A03

180/400-Foot Aquifer Subbasin

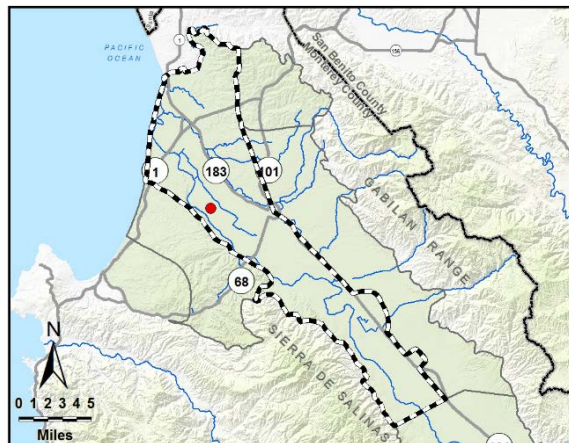


EXPLANATION

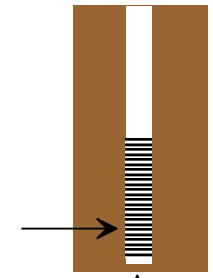
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



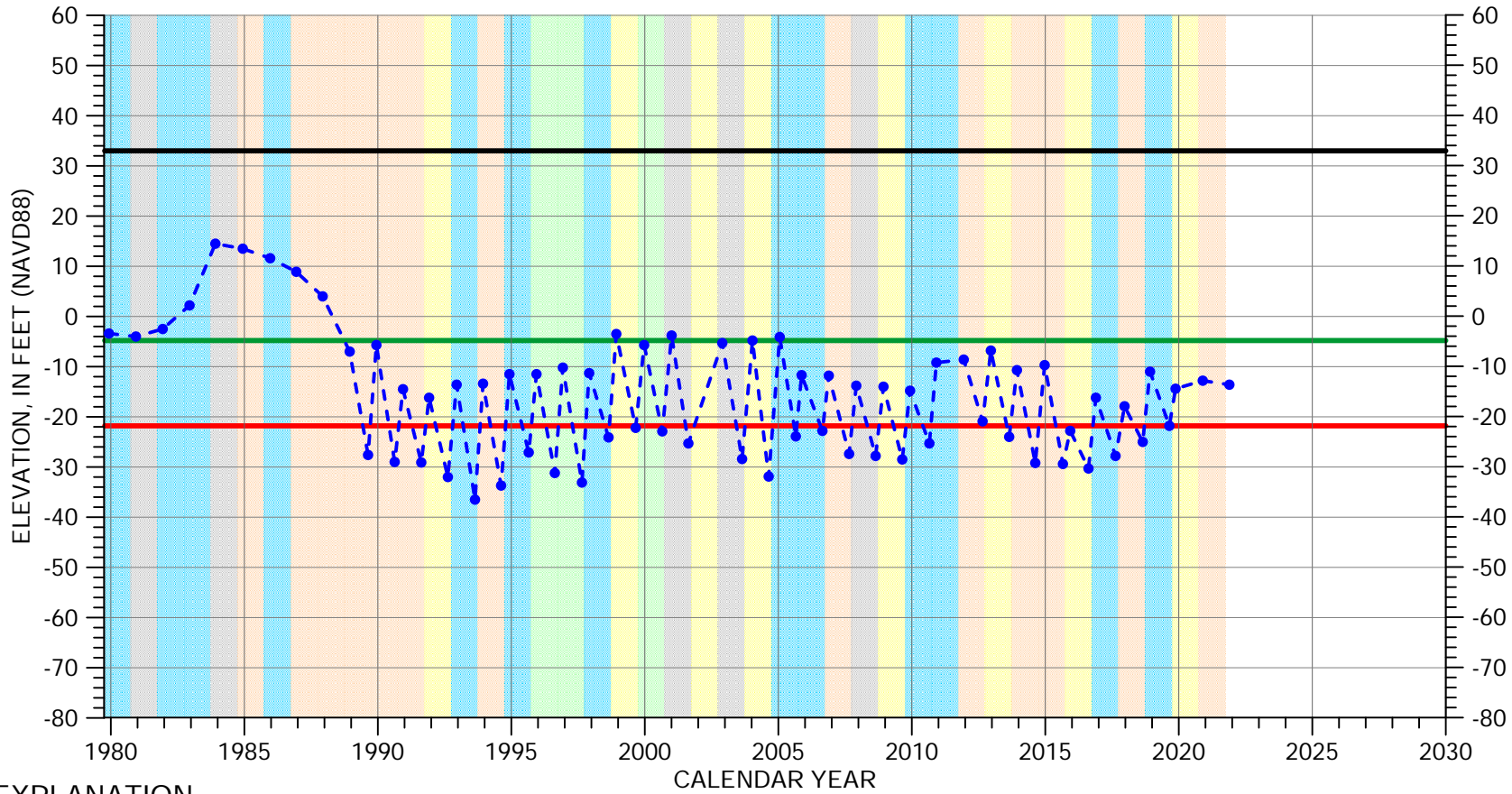
Multiple perforated intervals from -457 to -587 feet msl



Well bottom -637 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-34B03

180/400-Foot Aquifer Subbasin

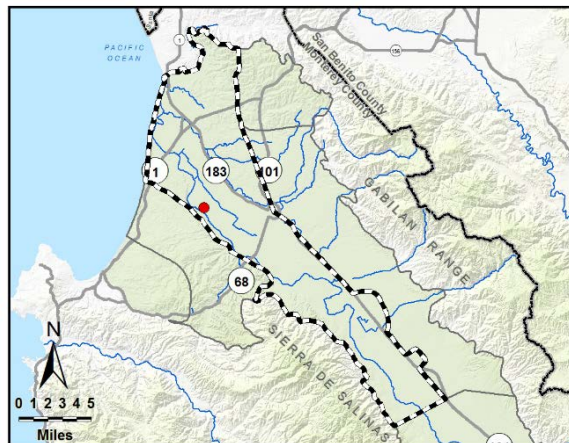


EXPLANATION

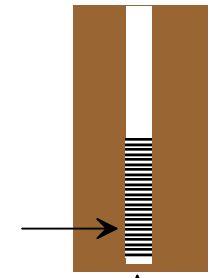
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



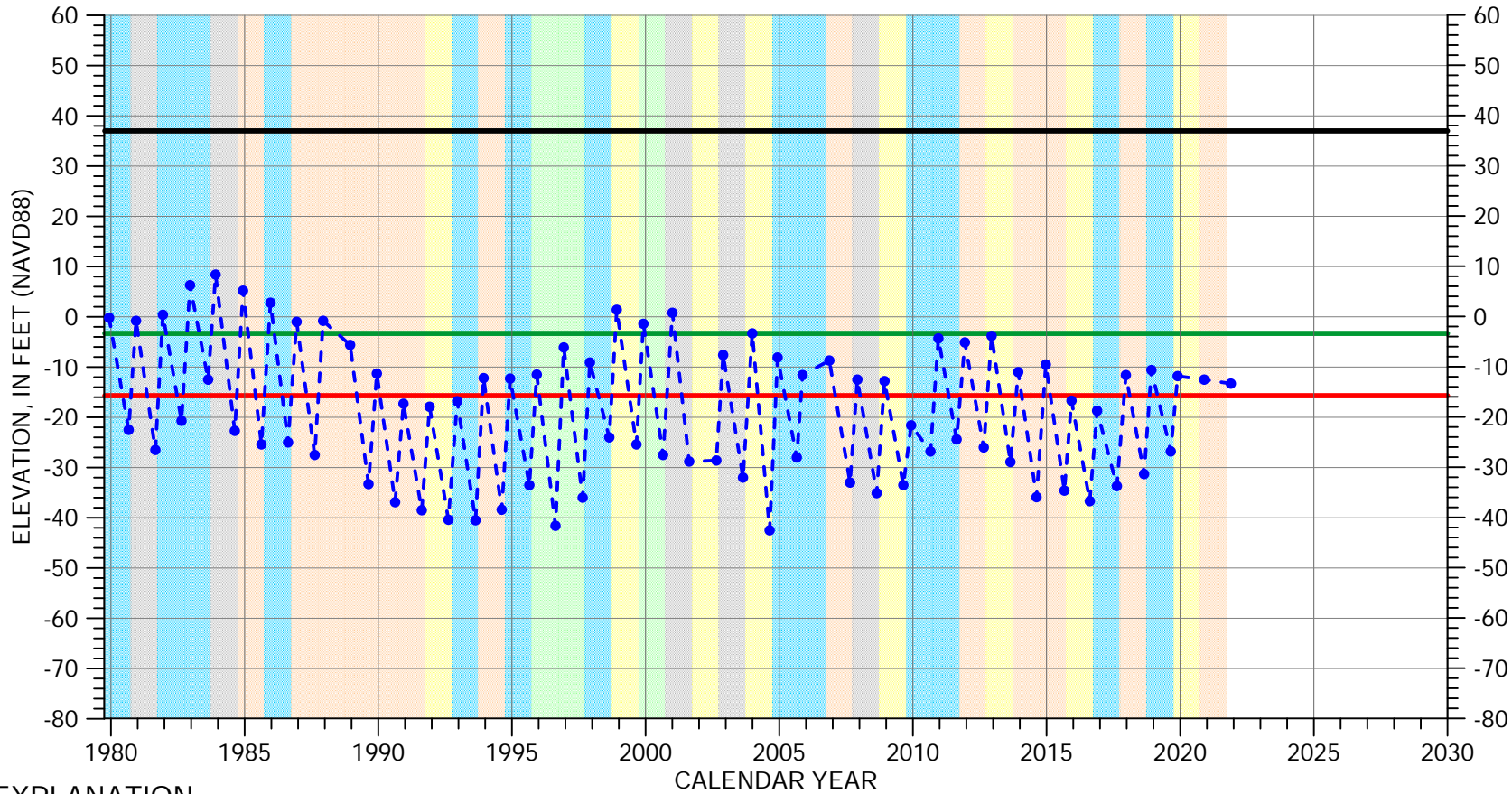
Multiple perforated intervals from -275 to -313 feet msl



Well bottom -315 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-36E01

180/400-Foot Aquifer Subbasin

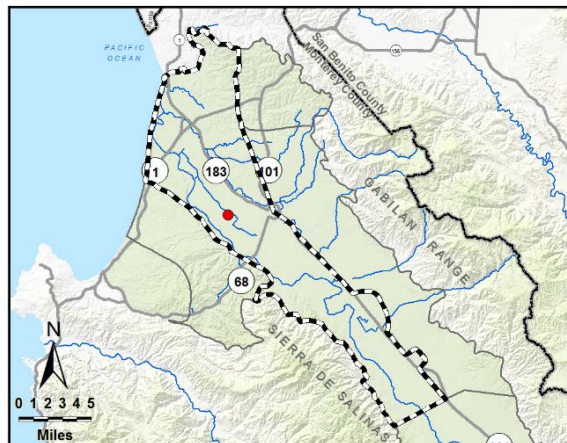


EXPLANATION

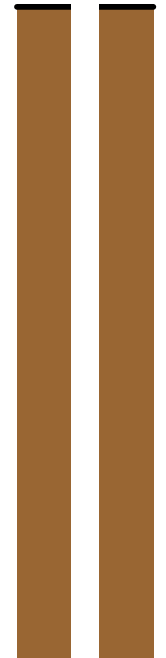
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|------------|--------------|-----------------|--------------|
| Orange box | DRY | Light Green box | WET - NORMAL |
| Yellow box | DRY - NORMAL | Cyan box | WET |
| Grey box | NORMAL | | |



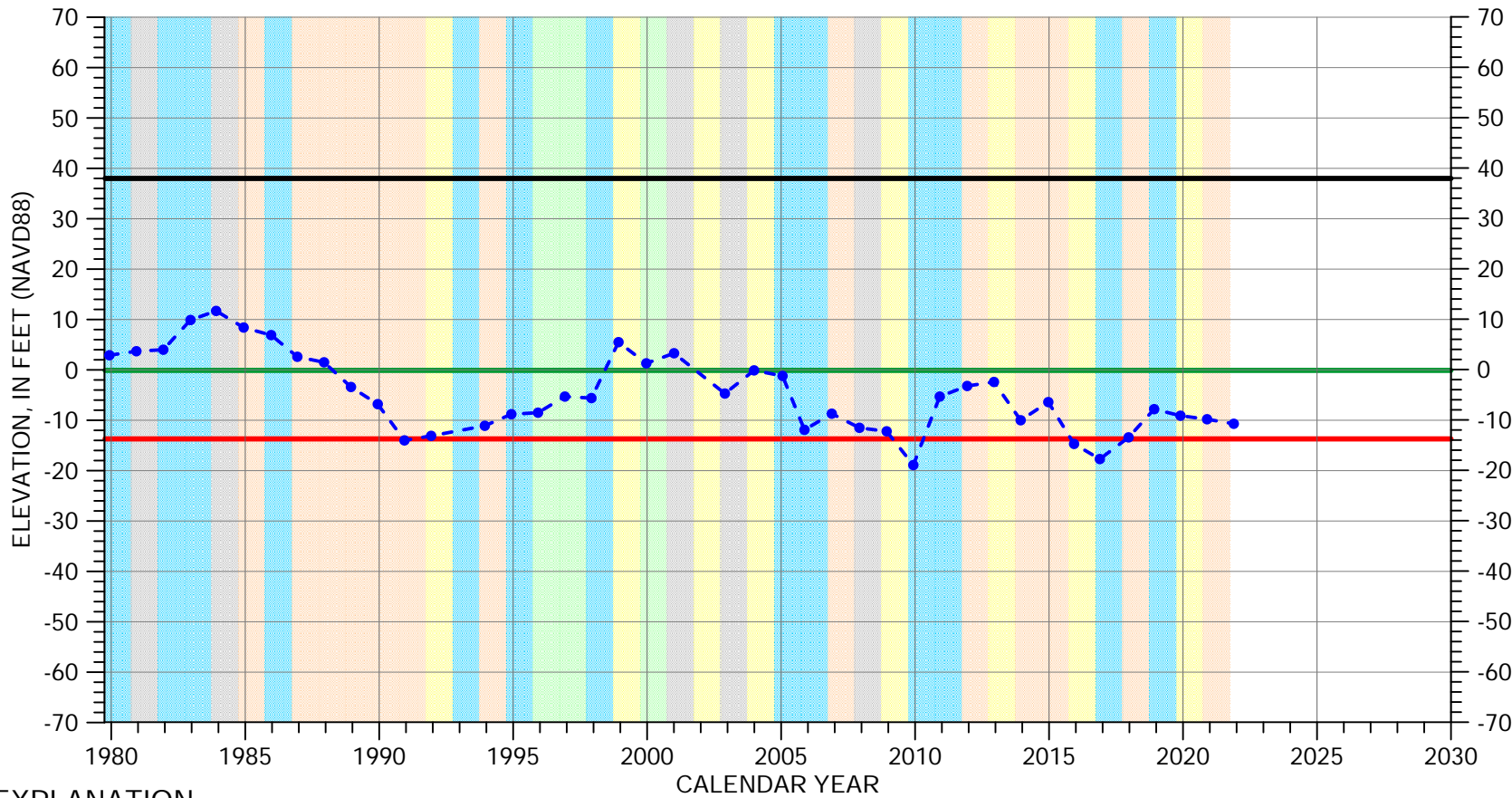
Perforated interval unknown



Well bottom
-165 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/02E-36G01

180/400-Foot Aquifer Subbasin

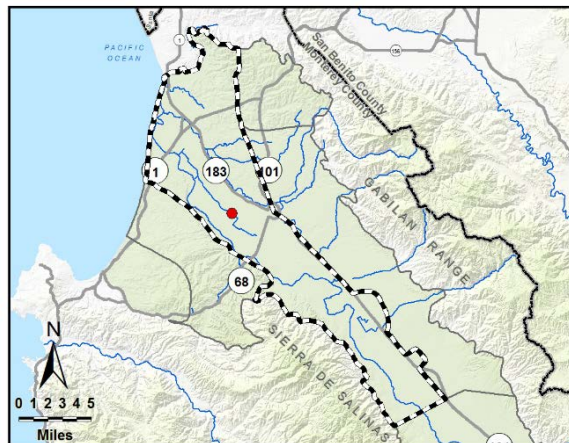


EXPLANATION

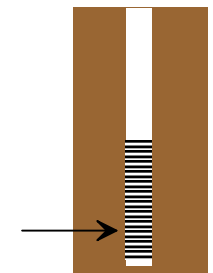
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



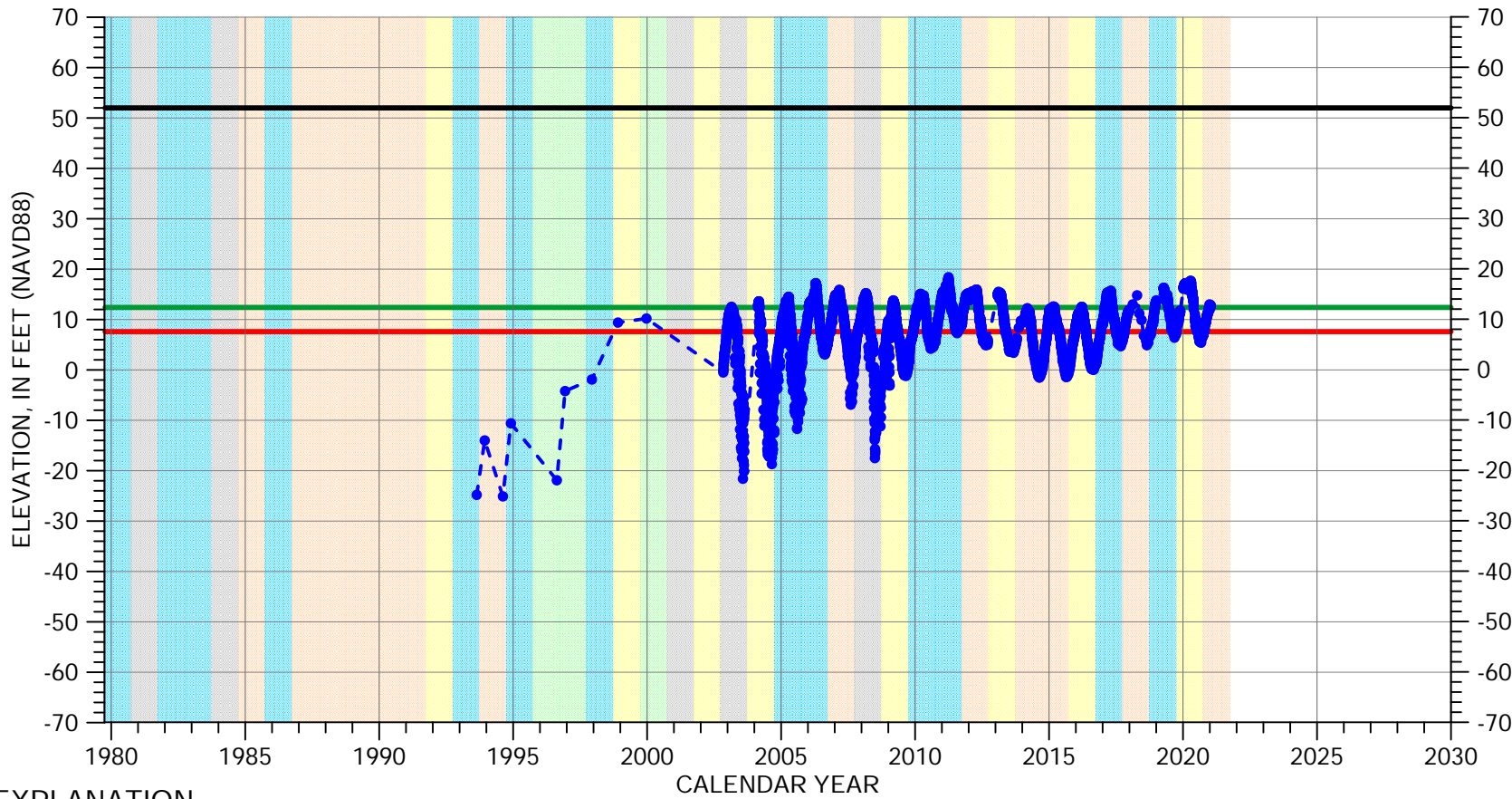
Multiple perforated intervals from -301 to -375 feet msl



Well bottom -381 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-18C01

180/400-Foot Aquifer Subbasin

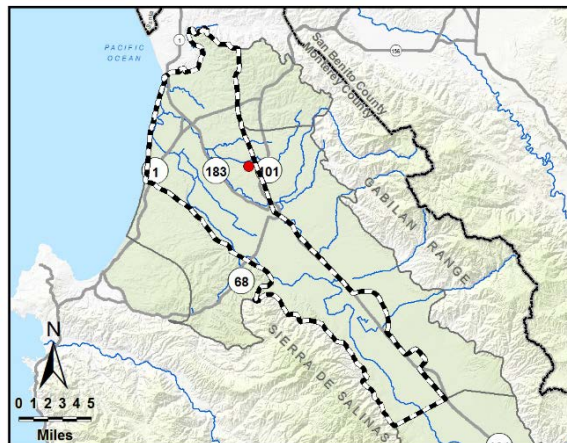


EXPLANATION

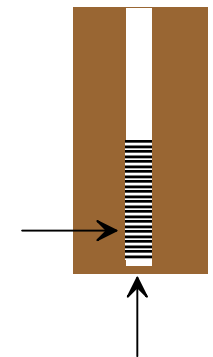
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



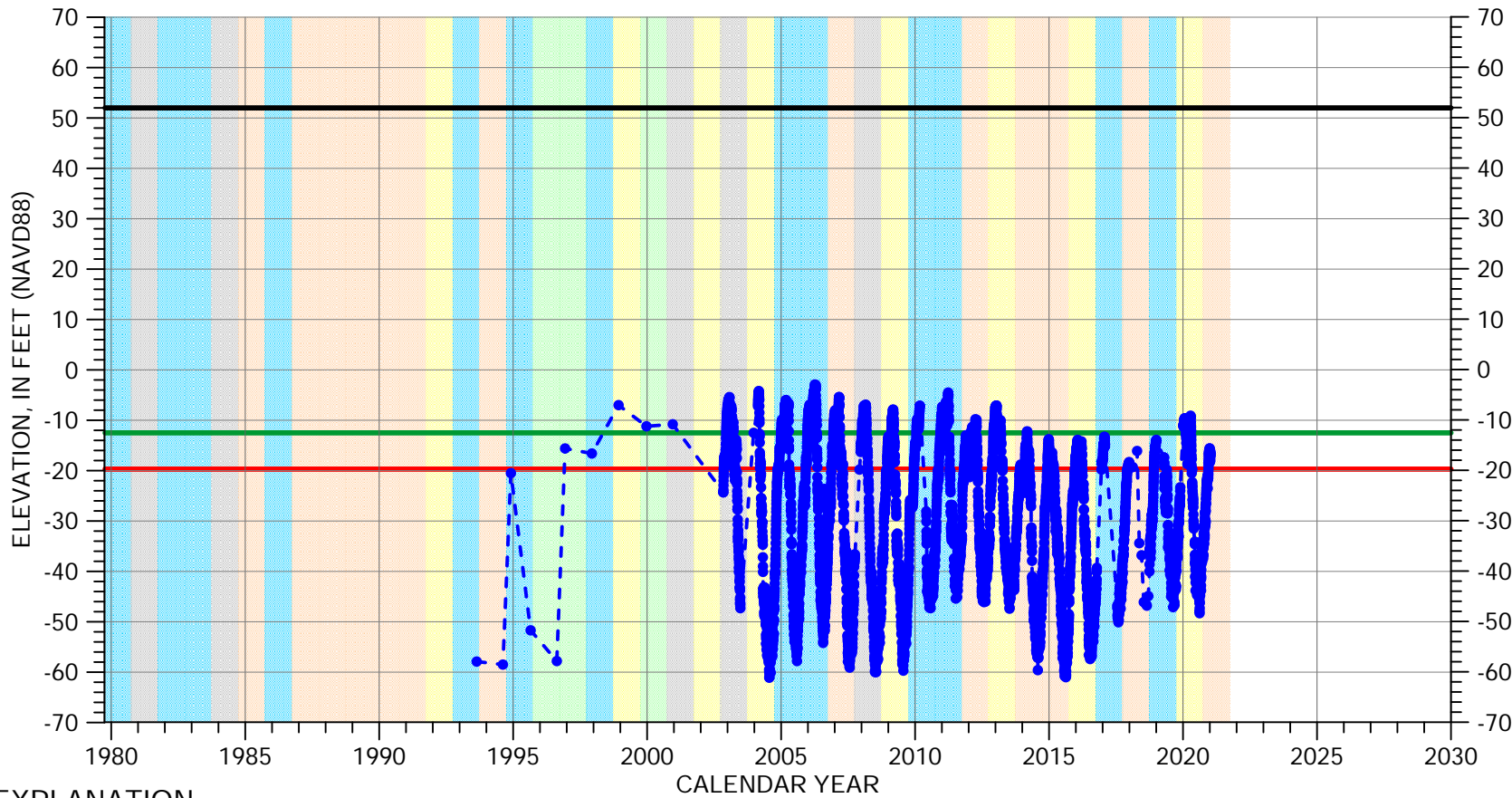
Perforated from
-113 to -163 feet msl



Well bottom
-173 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-18C02

180/400-Foot Aquifer Subbasin

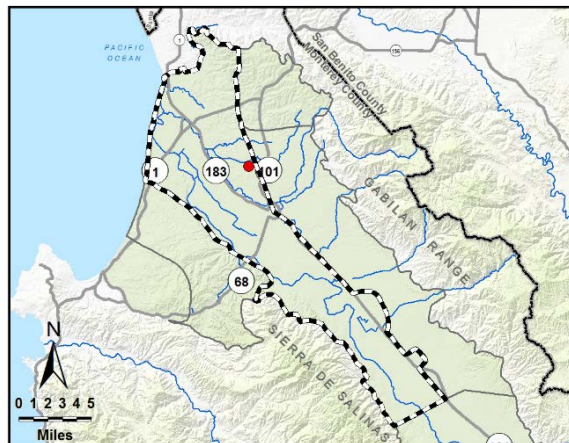


EXPLANATION

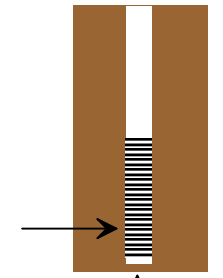
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|------------|--------------|-----------|--------------|
| Orange box | DRY | Green box | WET - NORMAL |
| Yellow box | DRY - NORMAL | Cyan box | WET |
| Grey box | NORMAL | | |



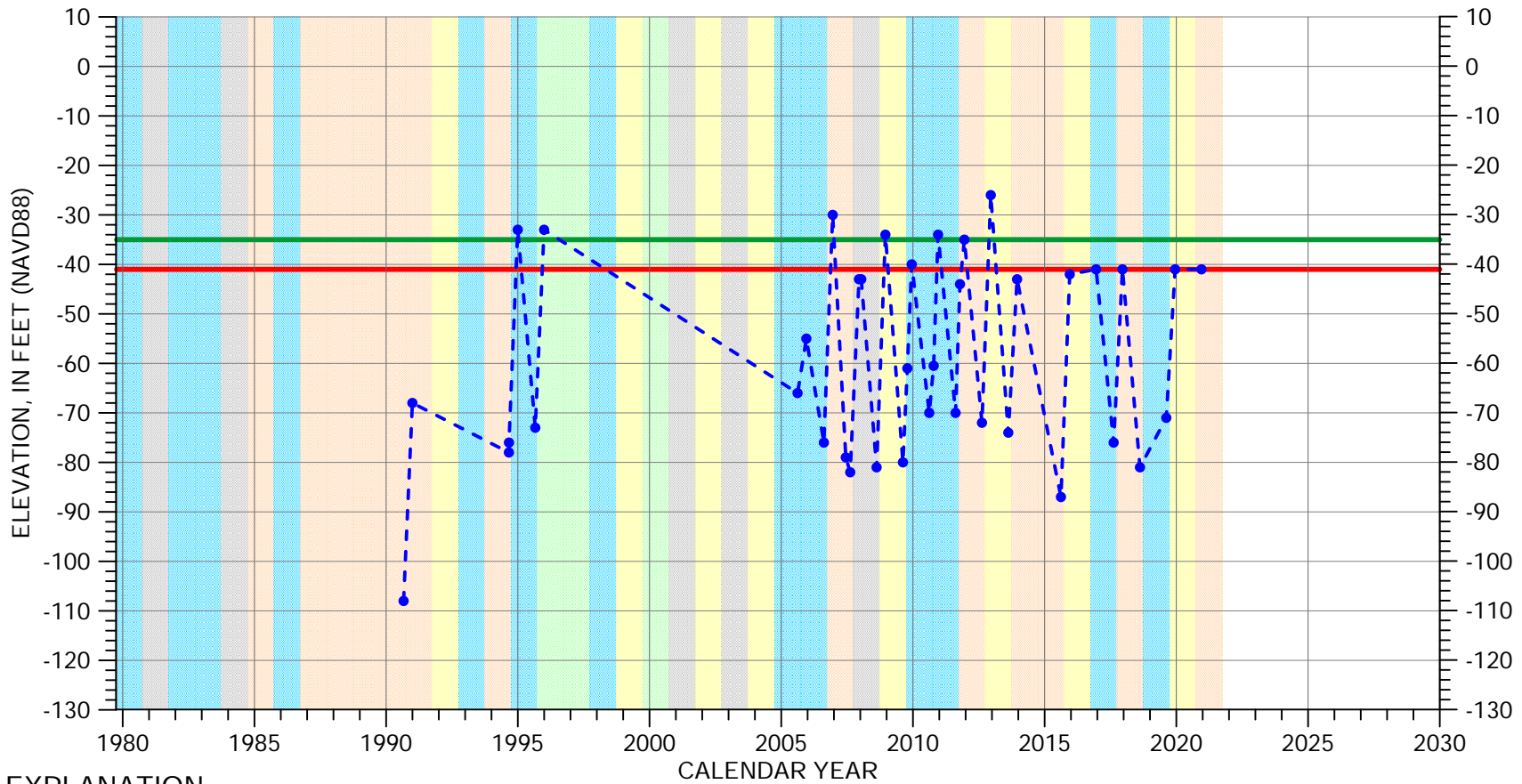
Perforated from
-218 to -333 feet msl



Well bottom
-343 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-20C01

180/400-Foot Aquifer Subbasin

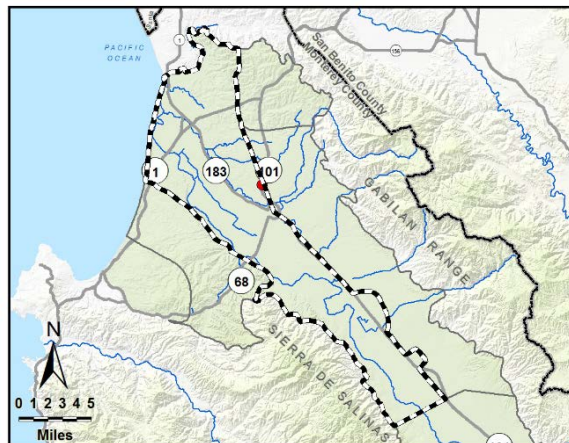


EXPLANATION

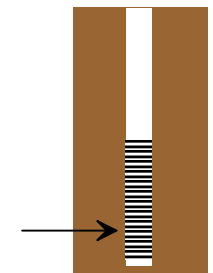
- Groundwater Elevation
- Suspect Measurement
- Land Surface (63 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



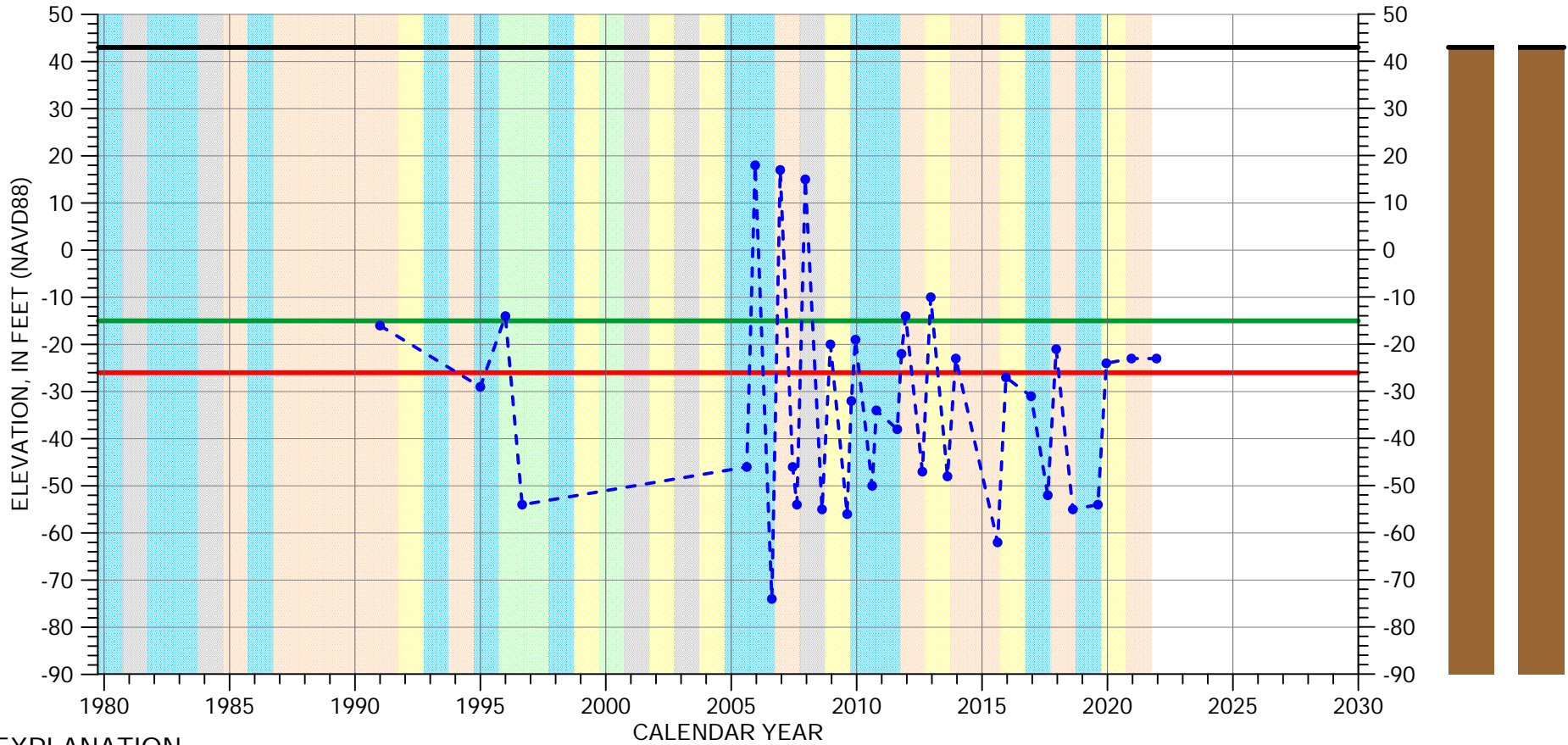
Multiple perforated intervals from -400 to -548 feet msl



Well bottom -639 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-29F03

180/400-Foot Aquifer Subbasin

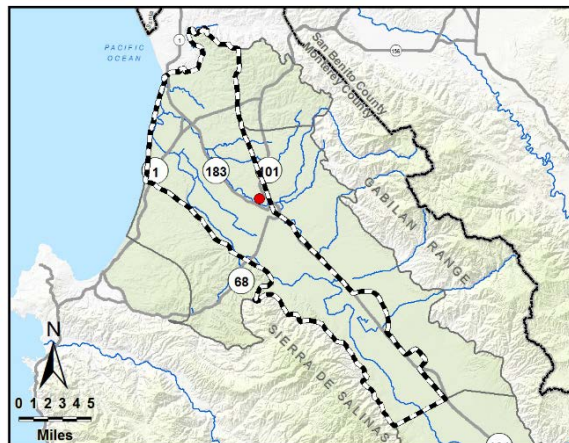


EXPLANATION

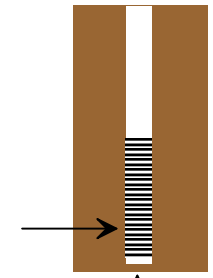
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------------|--------------|
| Orange | DRY | Light Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Light Blue | WET |
| Grey | NORMAL | | |



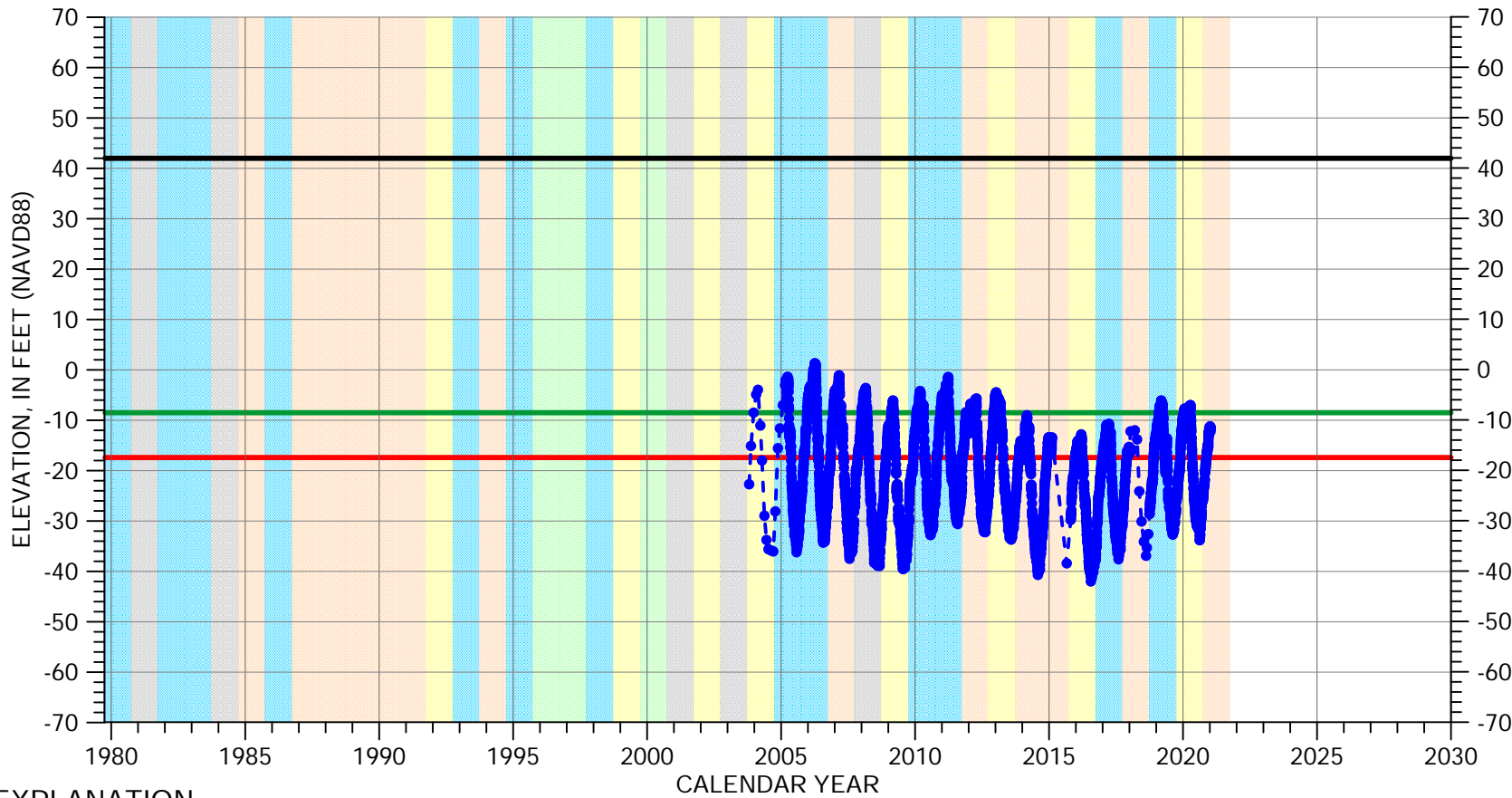
Multiple perforated intervals from -438 to -588 feet msl



Well bottom -598 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-30G08

180/400-Foot Aquifer Subbasin

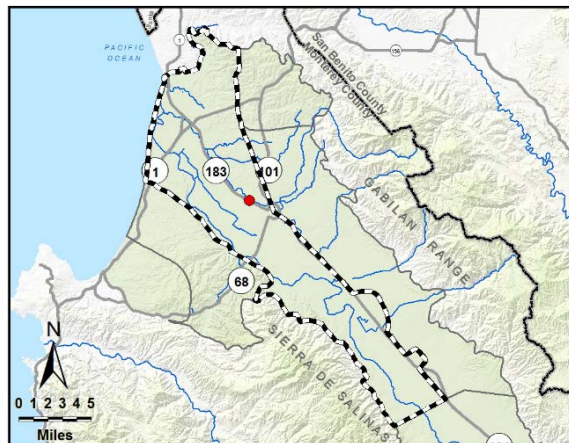


EXPLANATION

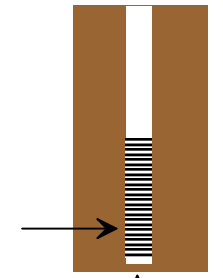
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



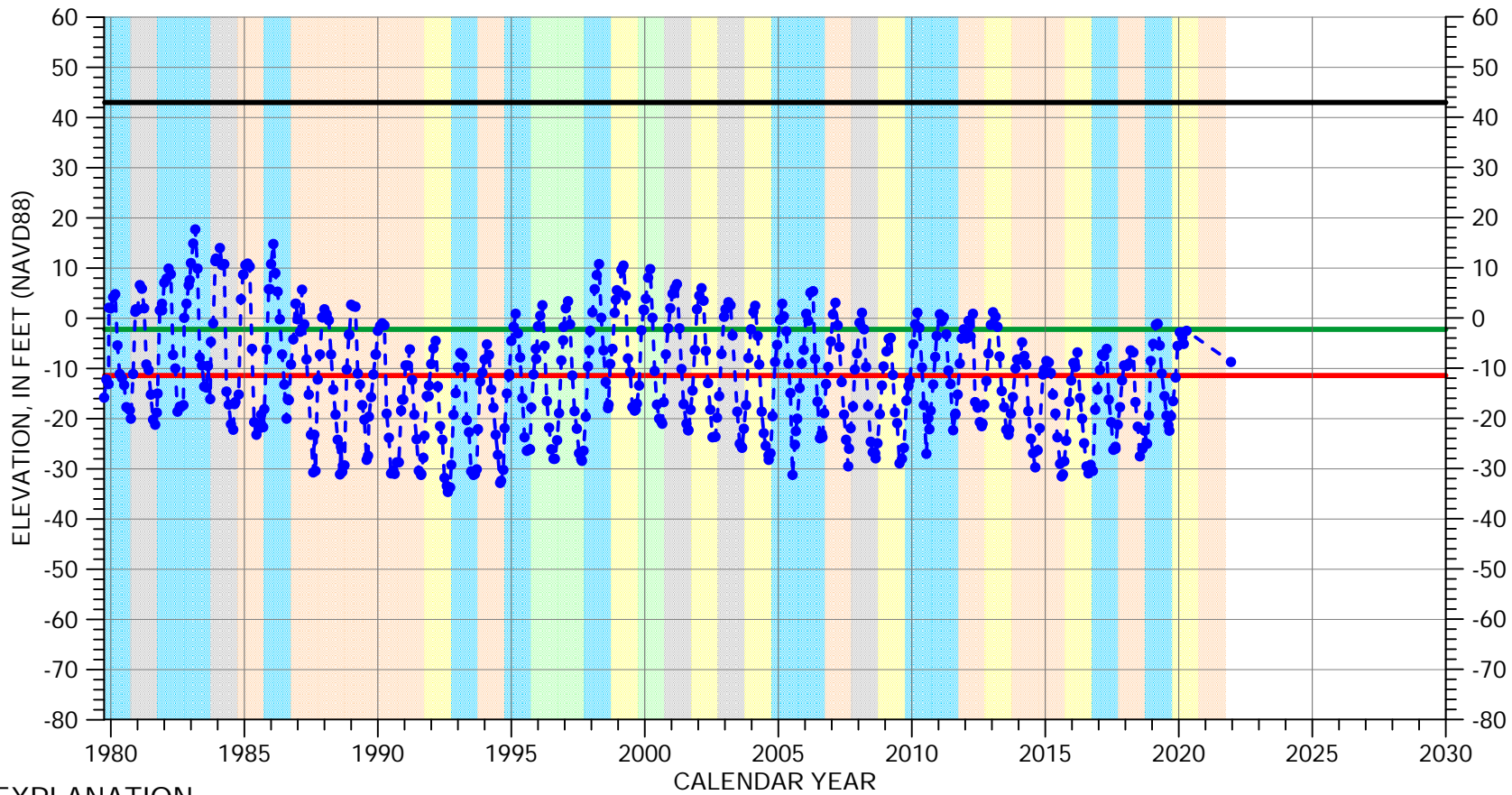
Perforated from
-198 to -248 feet msl



Well bottom
-251 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-31F01

180/400-Foot Aquifer Subbasin

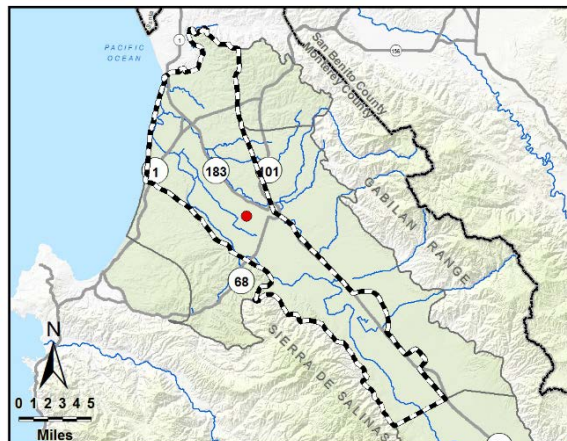


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------------|--------------|
| Orange | DRY | Light Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Cyan | WET |
| Grey | NORMAL | | |



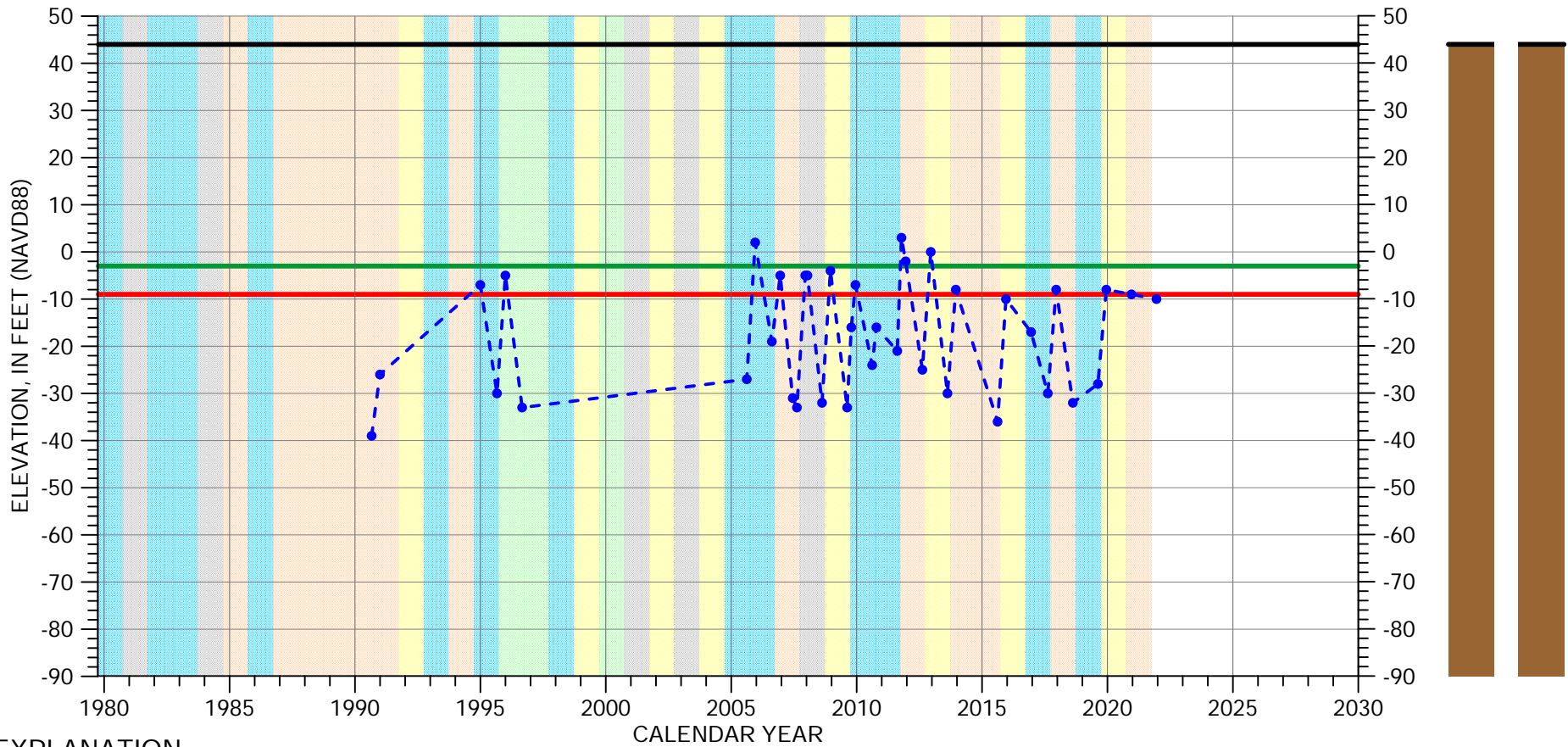
Perforated interval
unknown



Well bottom
-163 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 14S/03E-31L01

180/400-Foot Aquifer Subbasin

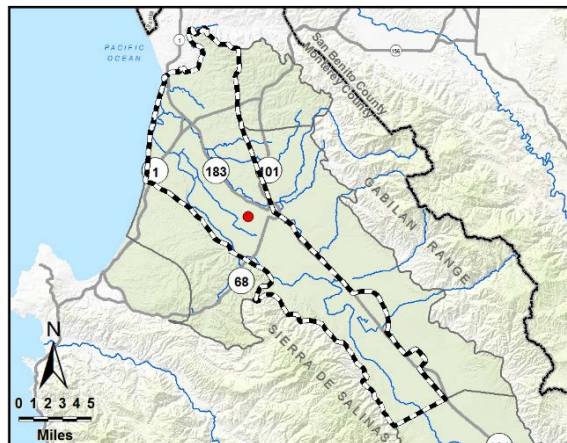


EXPLANATION

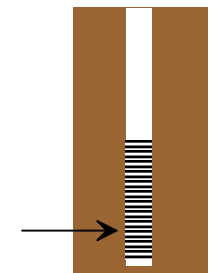
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



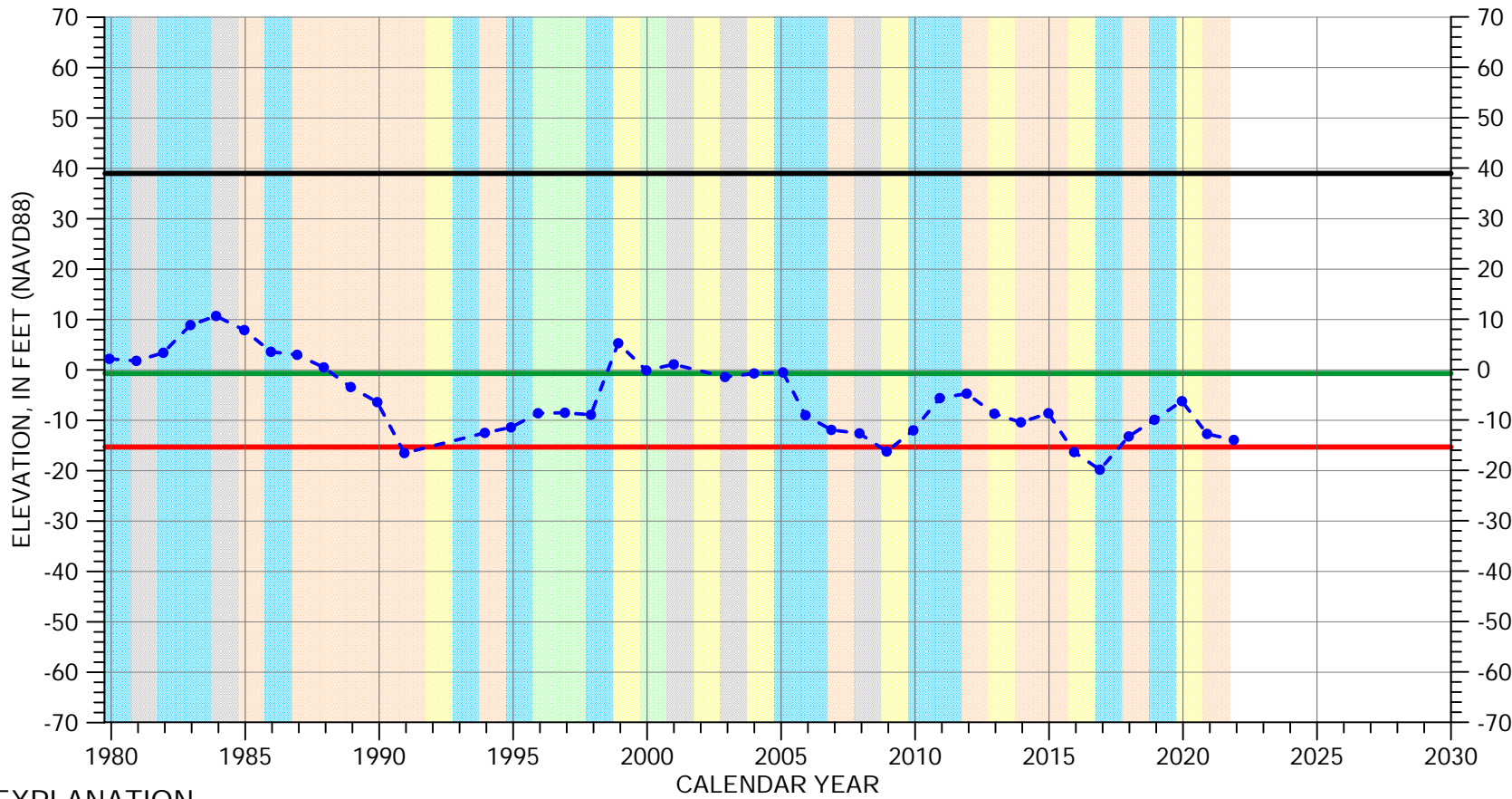
Multiple perforated intervals from -286 to -586 feet msl



Well bottom -596 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/02E-01A03

180/400-Foot Aquifer Subbasin

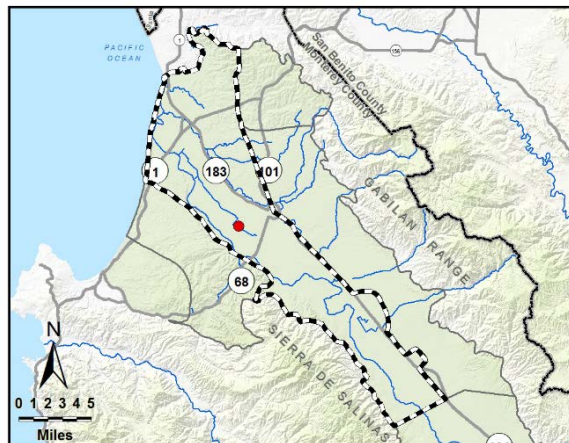


EXPLANATION

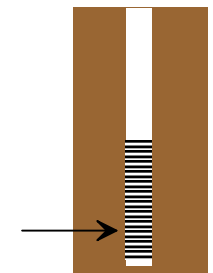
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



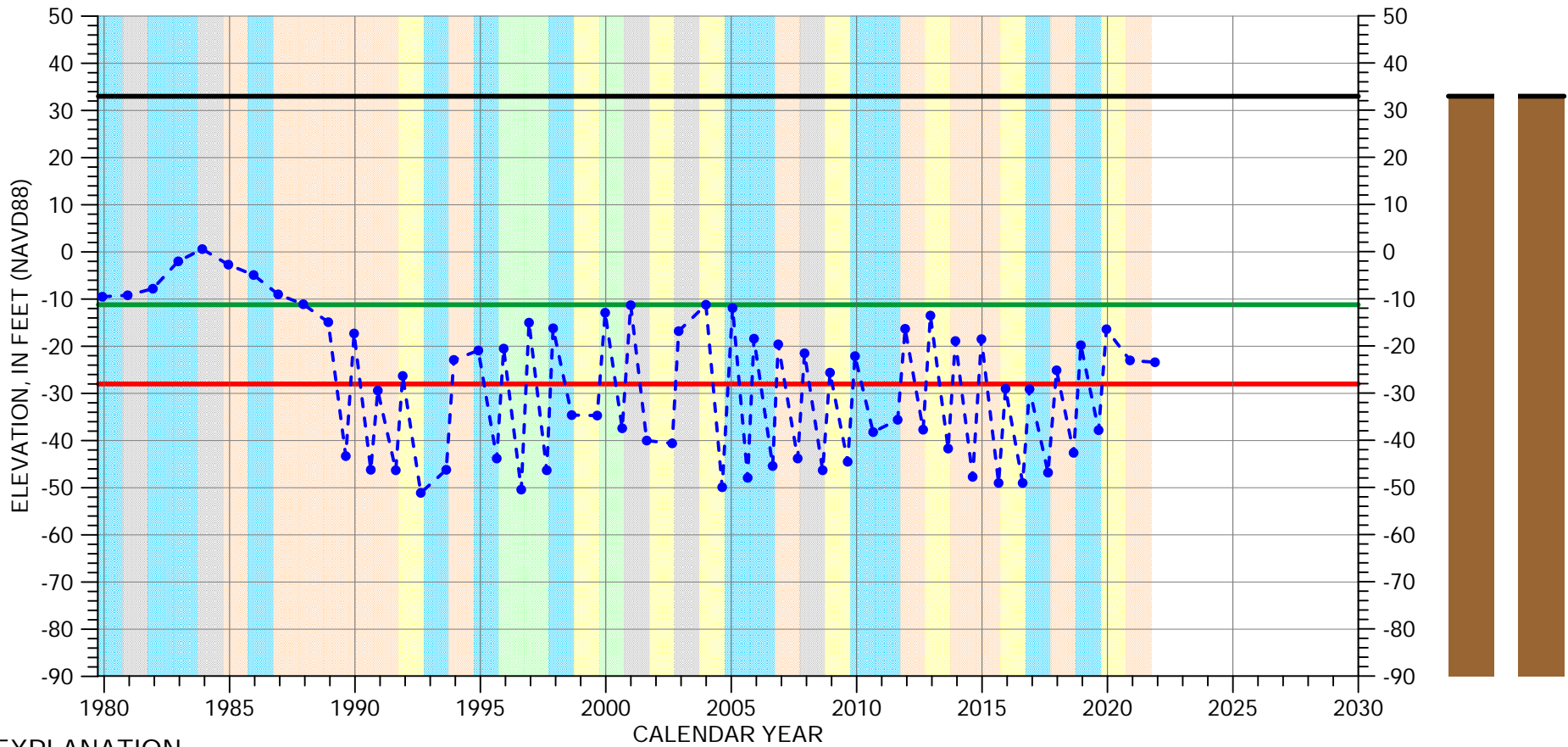
Multiple perforated intervals from -300 to -439 feet msl



Well bottom -444 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/02E-02G01

180/400-Foot Aquifer Subbasin

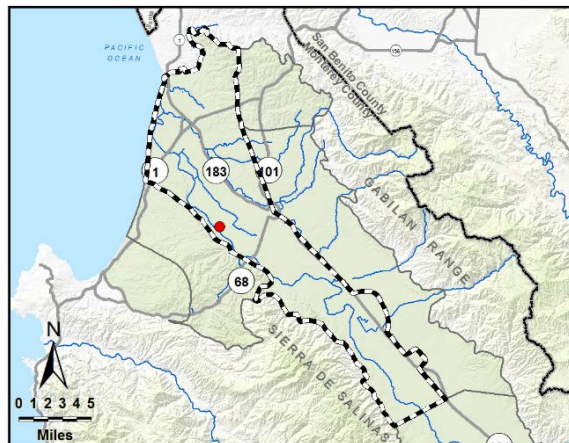


EXPLANATION

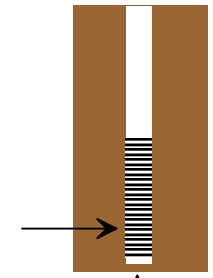
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------------|--------------|
| Orange | DRY | Light Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Light Blue | WET |
| Grey | NORMAL | | |



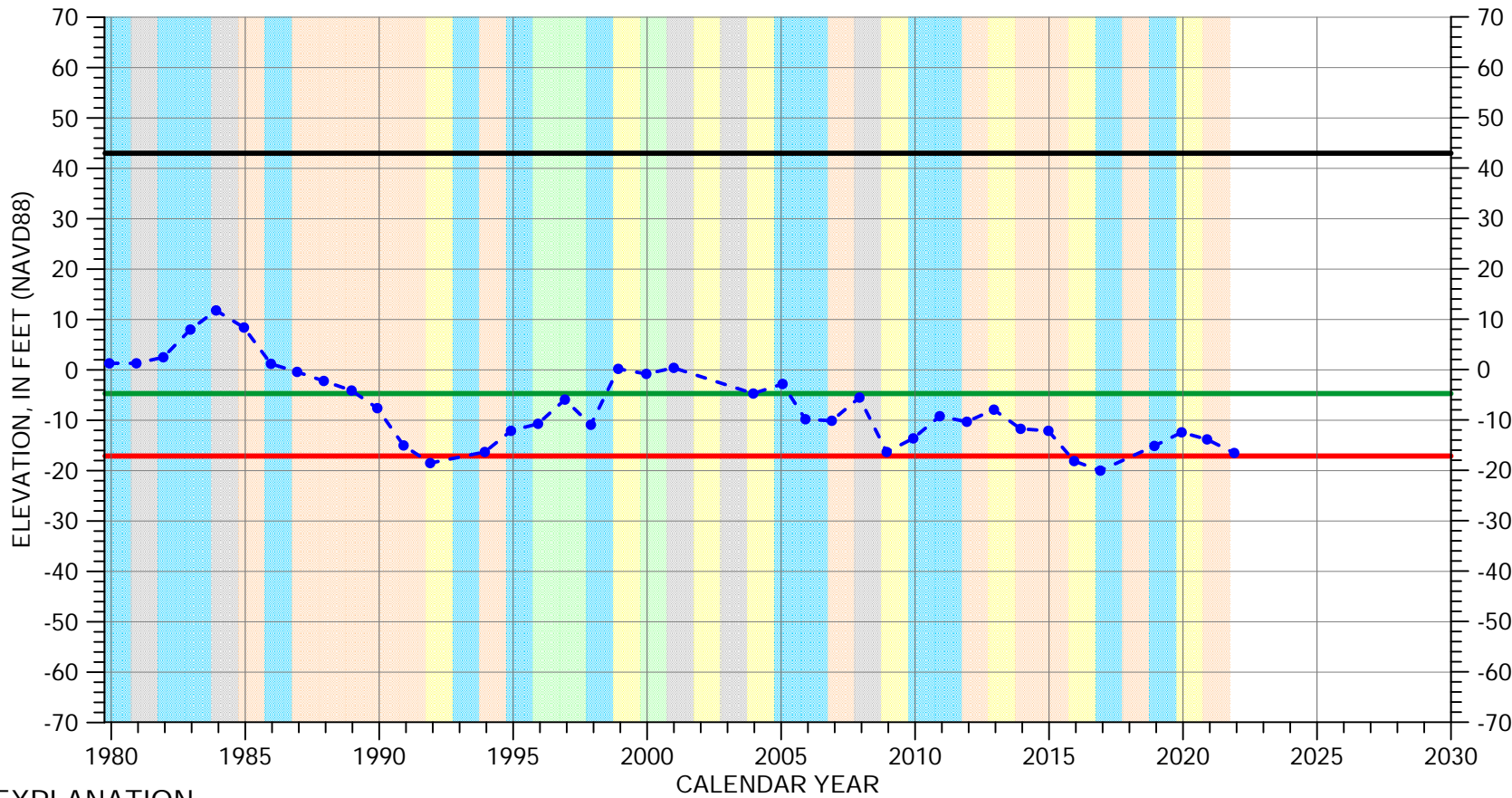
Multiple perforated intervals from -270 to -370 feet msl



Well bottom -374 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/02E-12A01

180/400-Foot Aquifer Subbasin

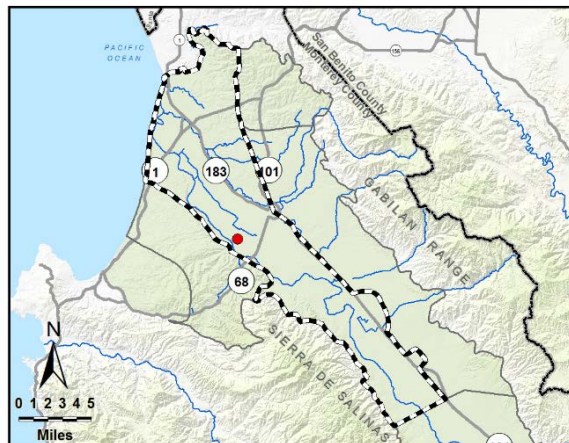


EXPLANATION

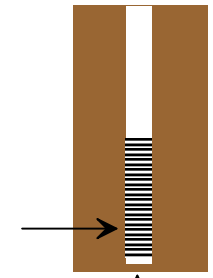
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



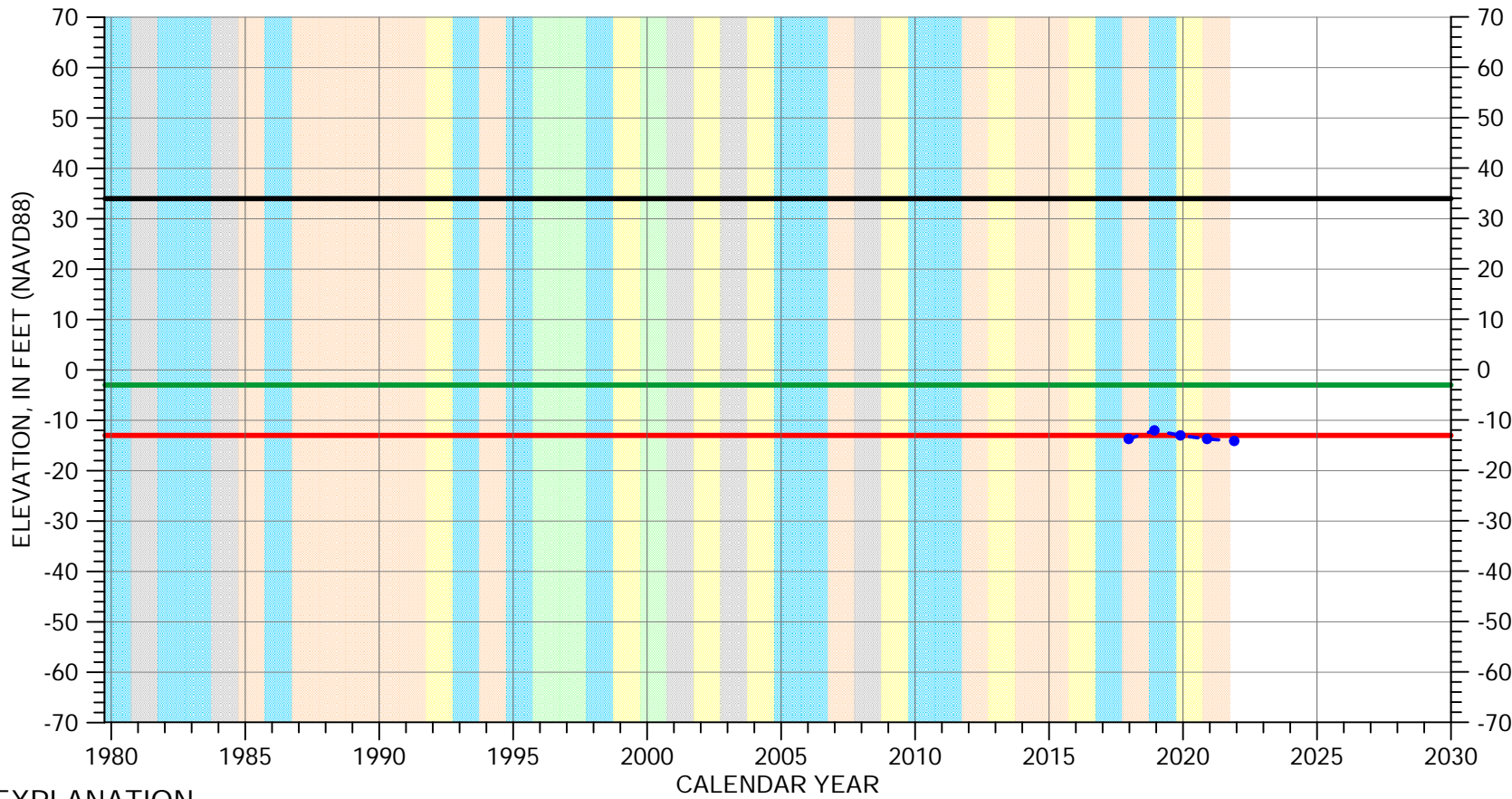
Multiple perforated intervals from -383 to -464 feet msl



Well bottom -506 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/02E-12C01

180/400-Foot Aquifer Subbasin

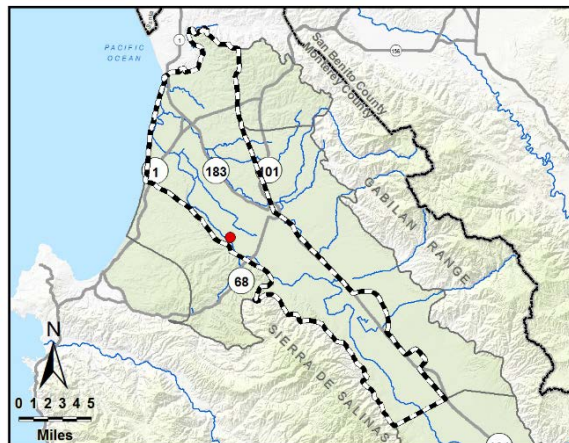


EXPLANATION

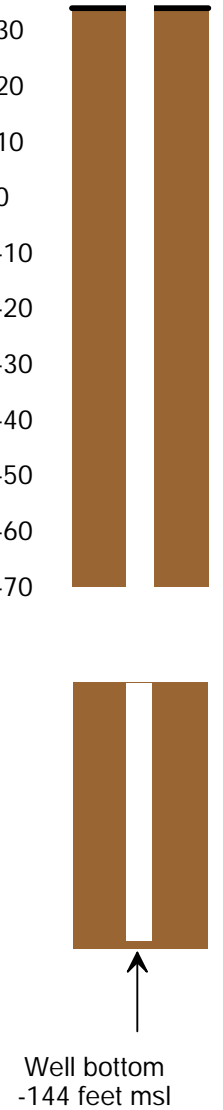
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |

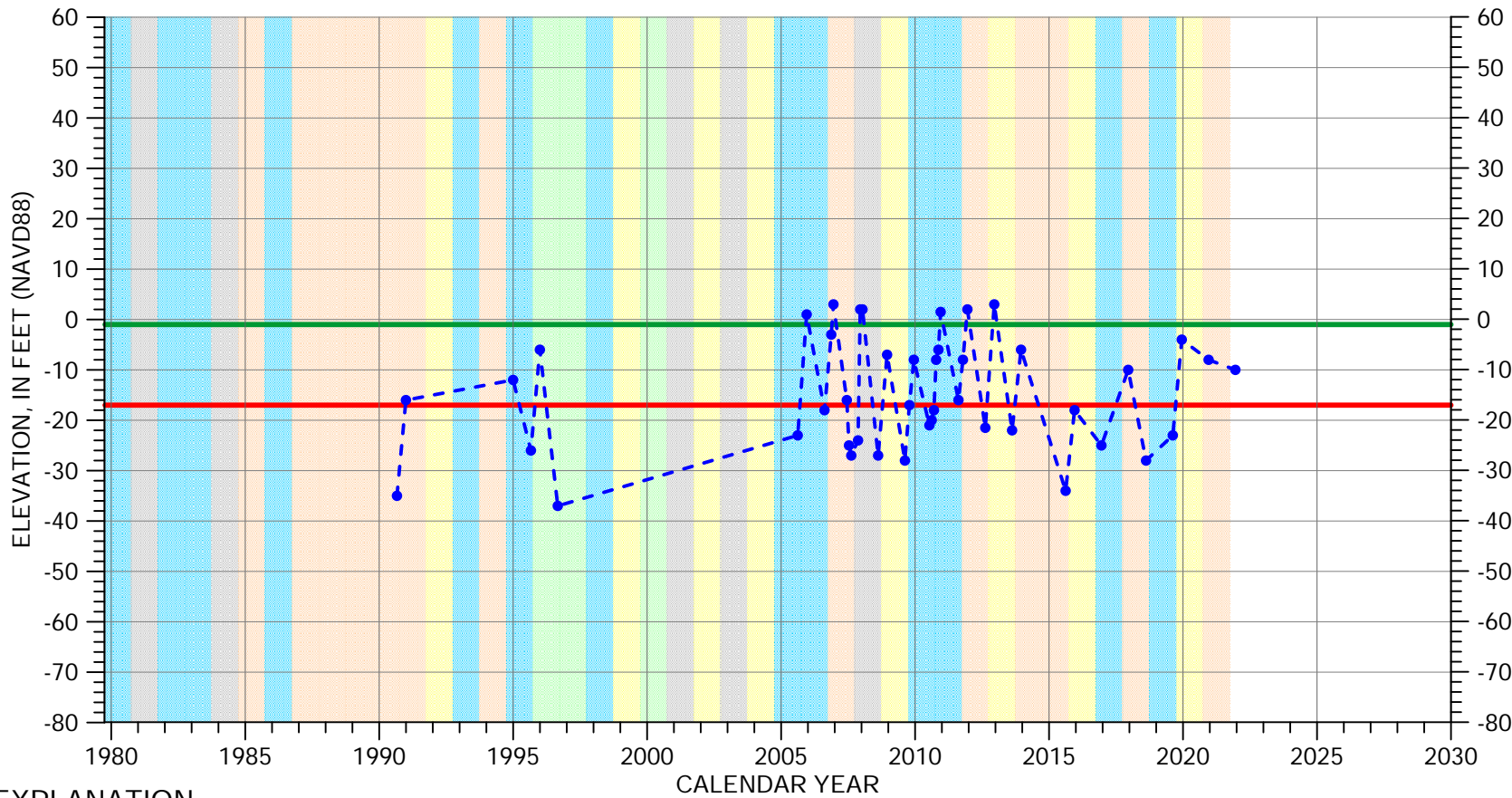


Perforated interval
unknown



HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-03R02

180/400-Foot Aquifer Subbasin

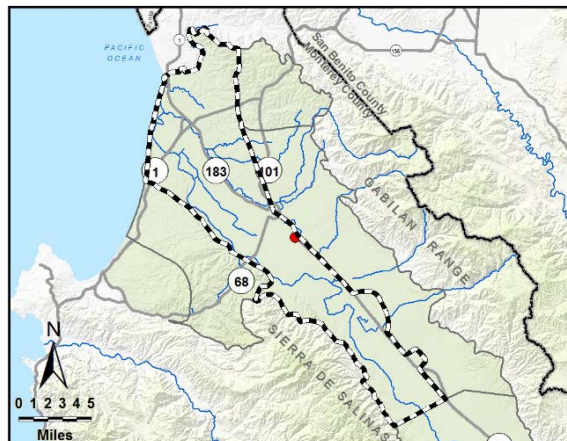


EXPLANATION

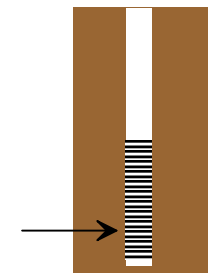
- Groundwater Elevation
- Suspect Measurement
- Land Surface (63 FT MSL)
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



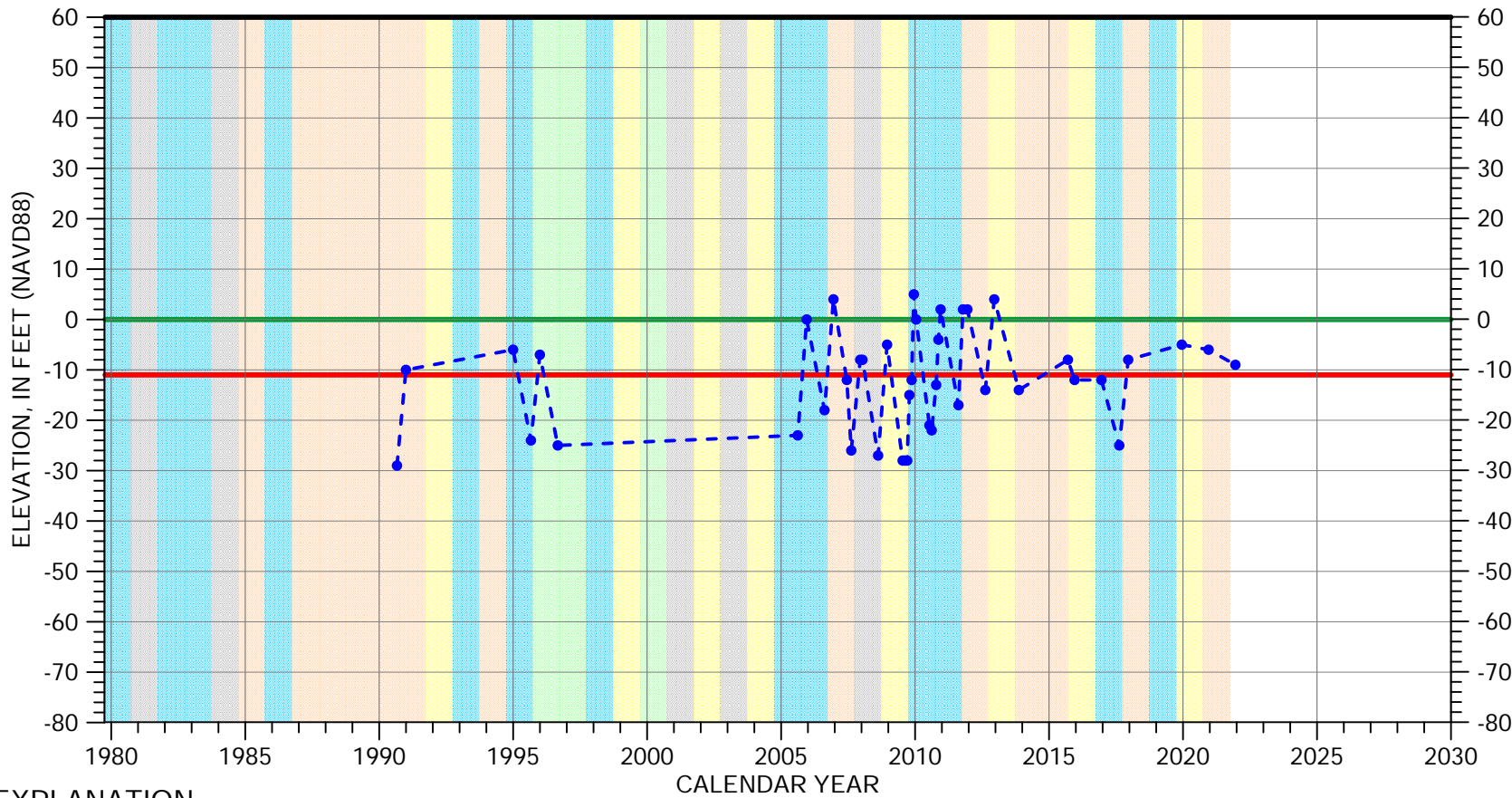
Multiple perforated intervals from -313 to -381 feet msl



Well bottom -573 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-04Q01

180/400-Foot Aquifer Subbasin

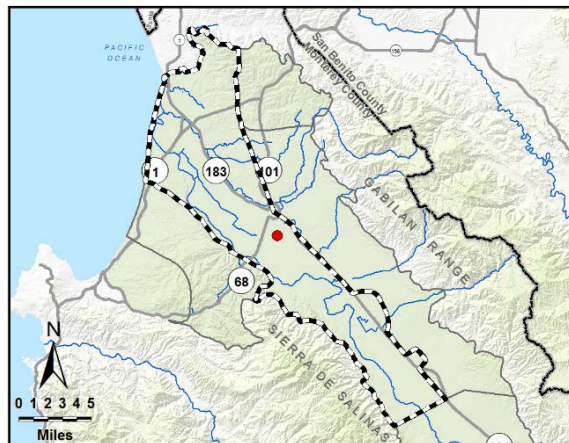


EXPLANATION

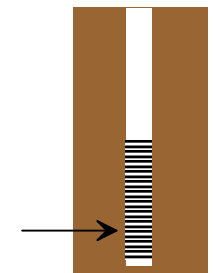
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



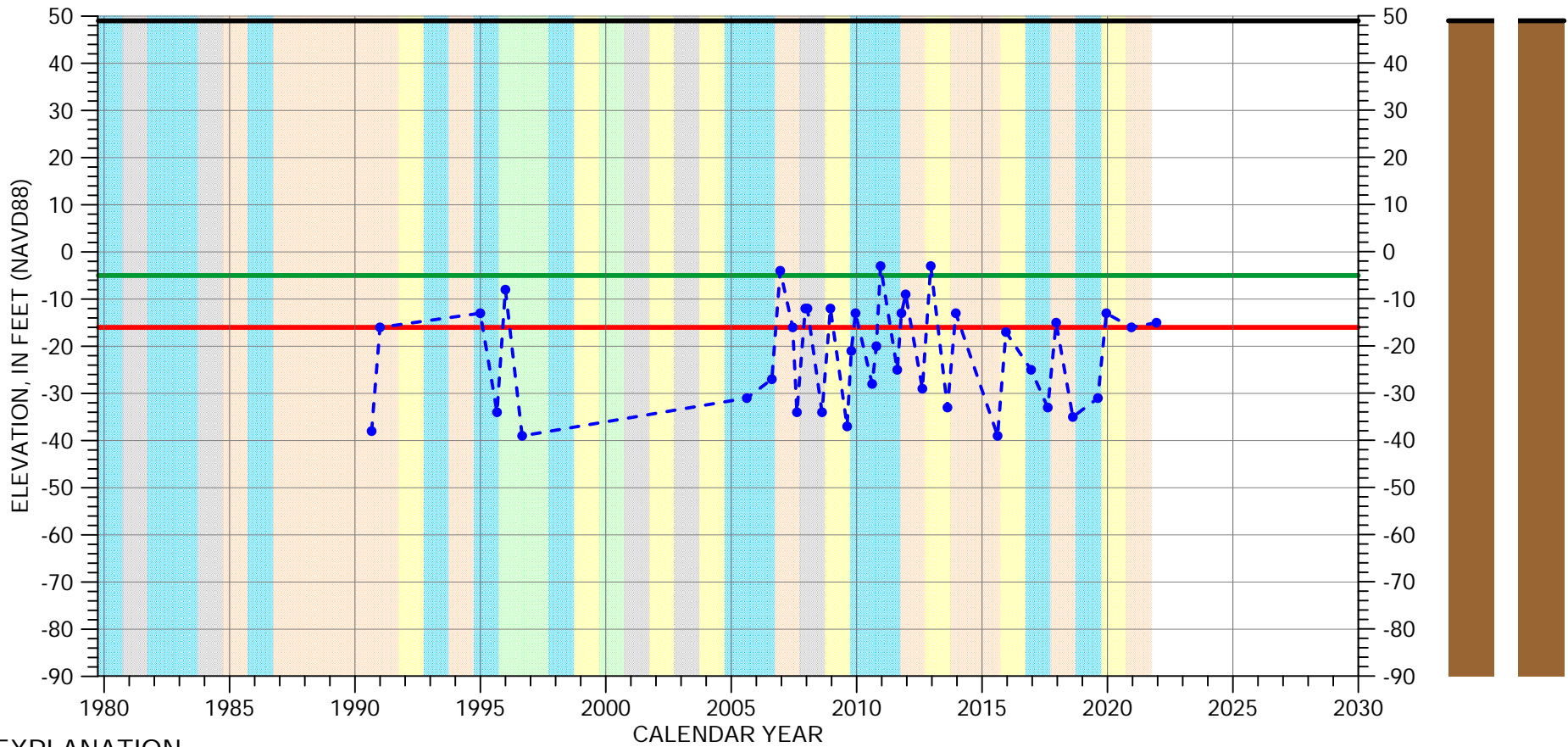
Multiple perforated intervals from -248 to -458 feet msl



Well bottom -478 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-05C02

180/400-Foot Aquifer Subbasin

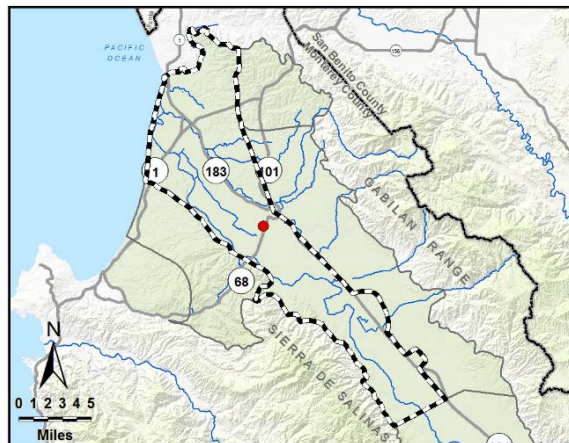


EXPLANATION

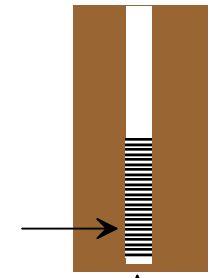
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



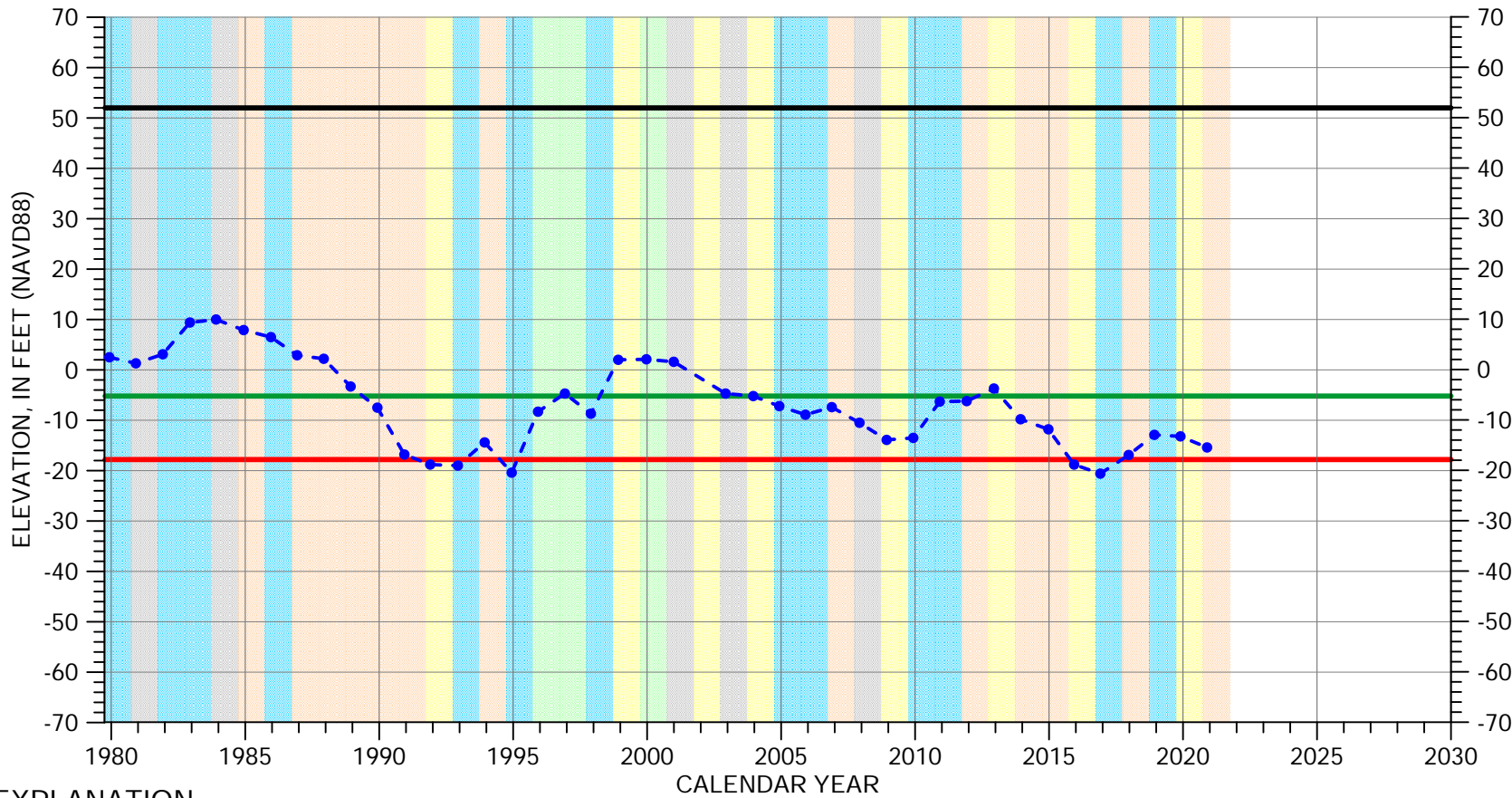
Multiple perforated intervals from -312 to -392 feet msl



Well bottom -569 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-08F01

180/400-Foot Aquifer Subbasin

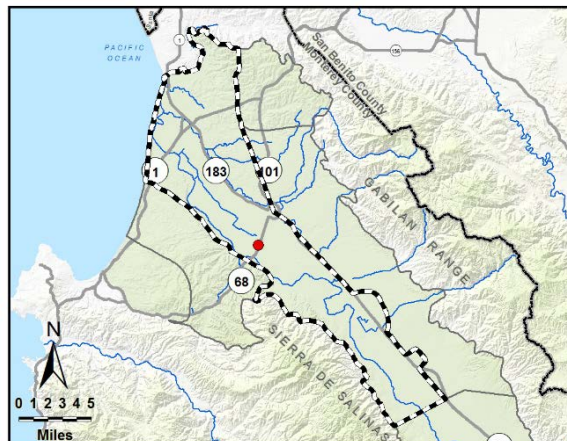


EXPLANATION

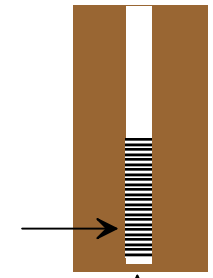
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



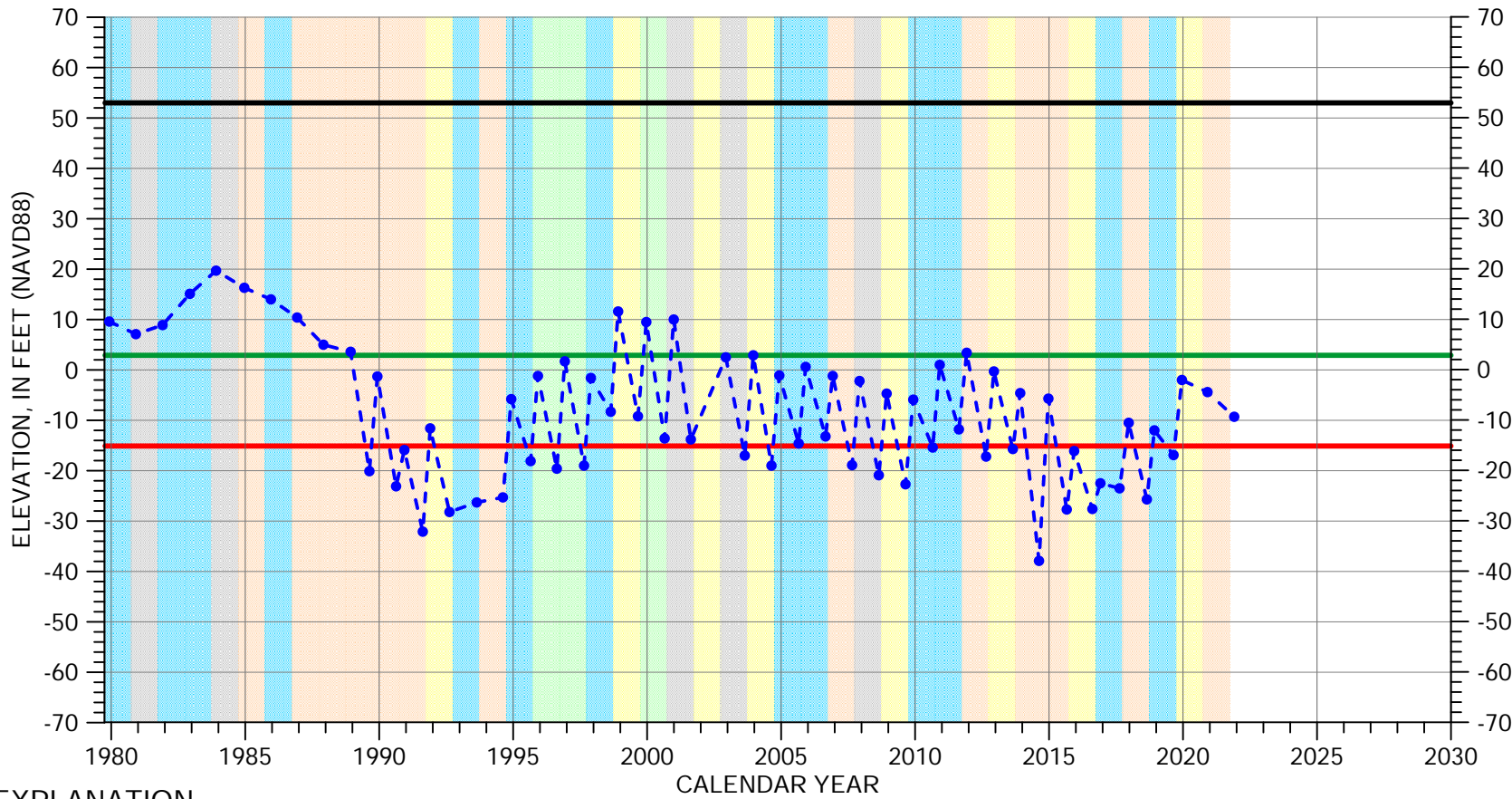
Multiple perforated intervals from -348 to -398 feet msl



Well bottom -400 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-09E03

180/400-Foot Aquifer Subbasin

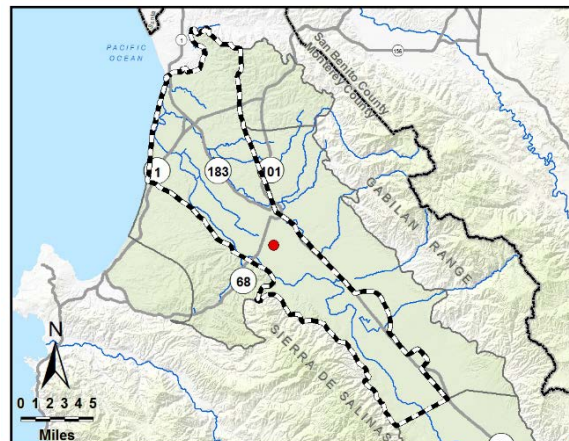


EXPLANATION

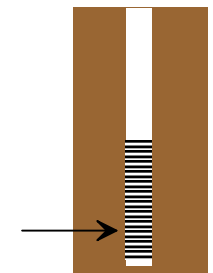
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



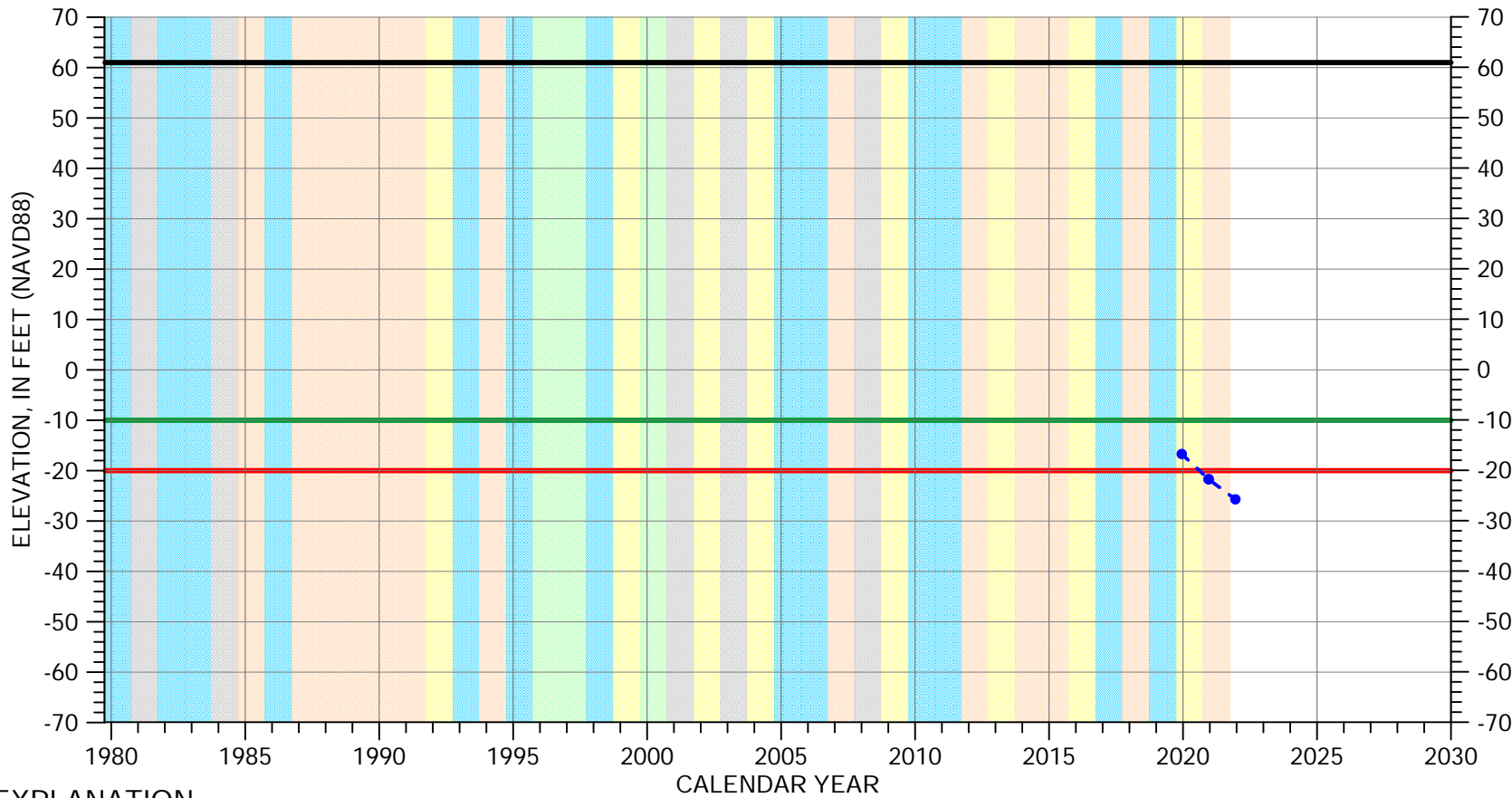
Multiple perforated intervals from -131 to -192 feet msl



Well bottom -195 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-10D04

180/400-Foot Aquifer Subbasin

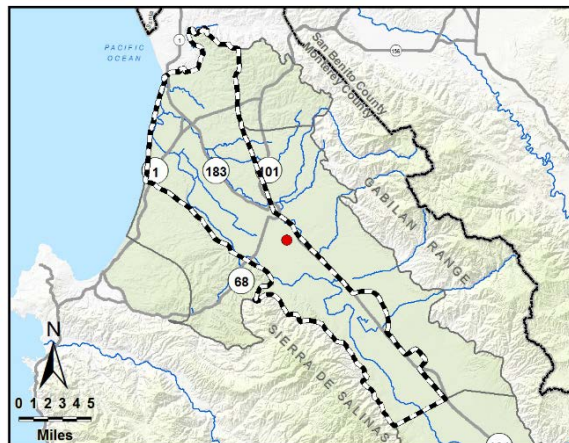


EXPLANATION

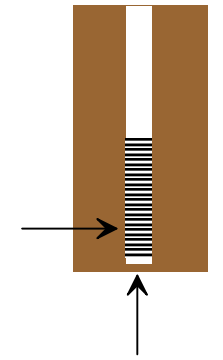
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | | | |
|--------|--------------|-------------|--------------|
| Orange | DRY | Light Green | WET - NORMAL |
| Yellow | DRY - NORMAL | Cyan | WET |
| Grey | NORMAL | | |



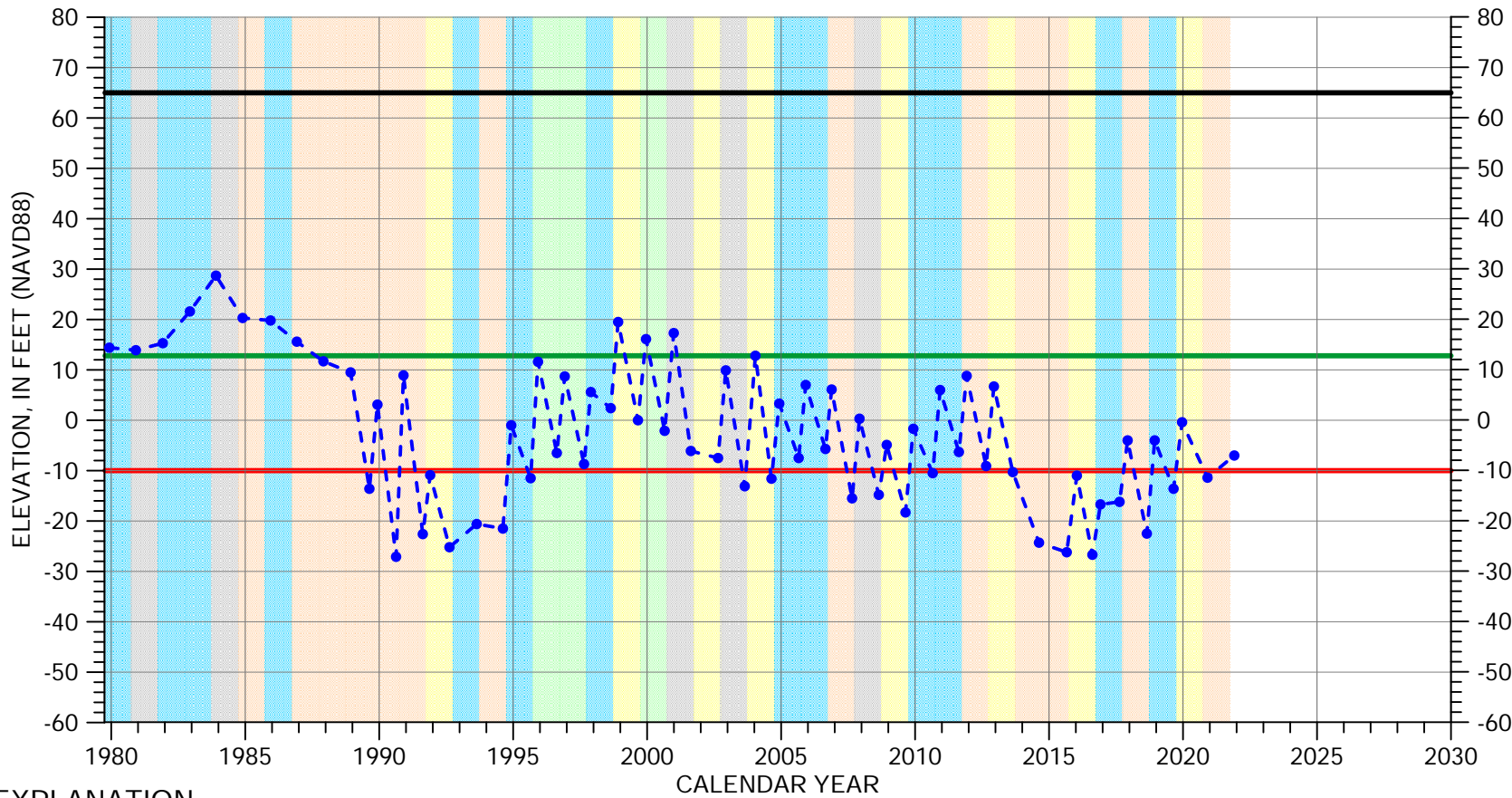
Perforated from -539 to -889 feet msl



Well bottom -919 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-13N01

180/400-Foot Aquifer Subbasin

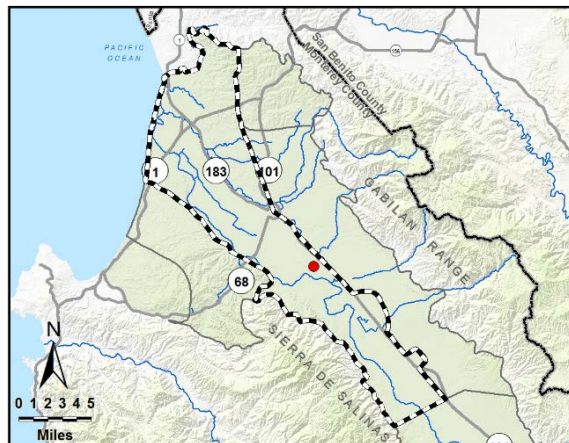


EXPLANATION

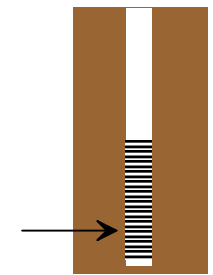
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



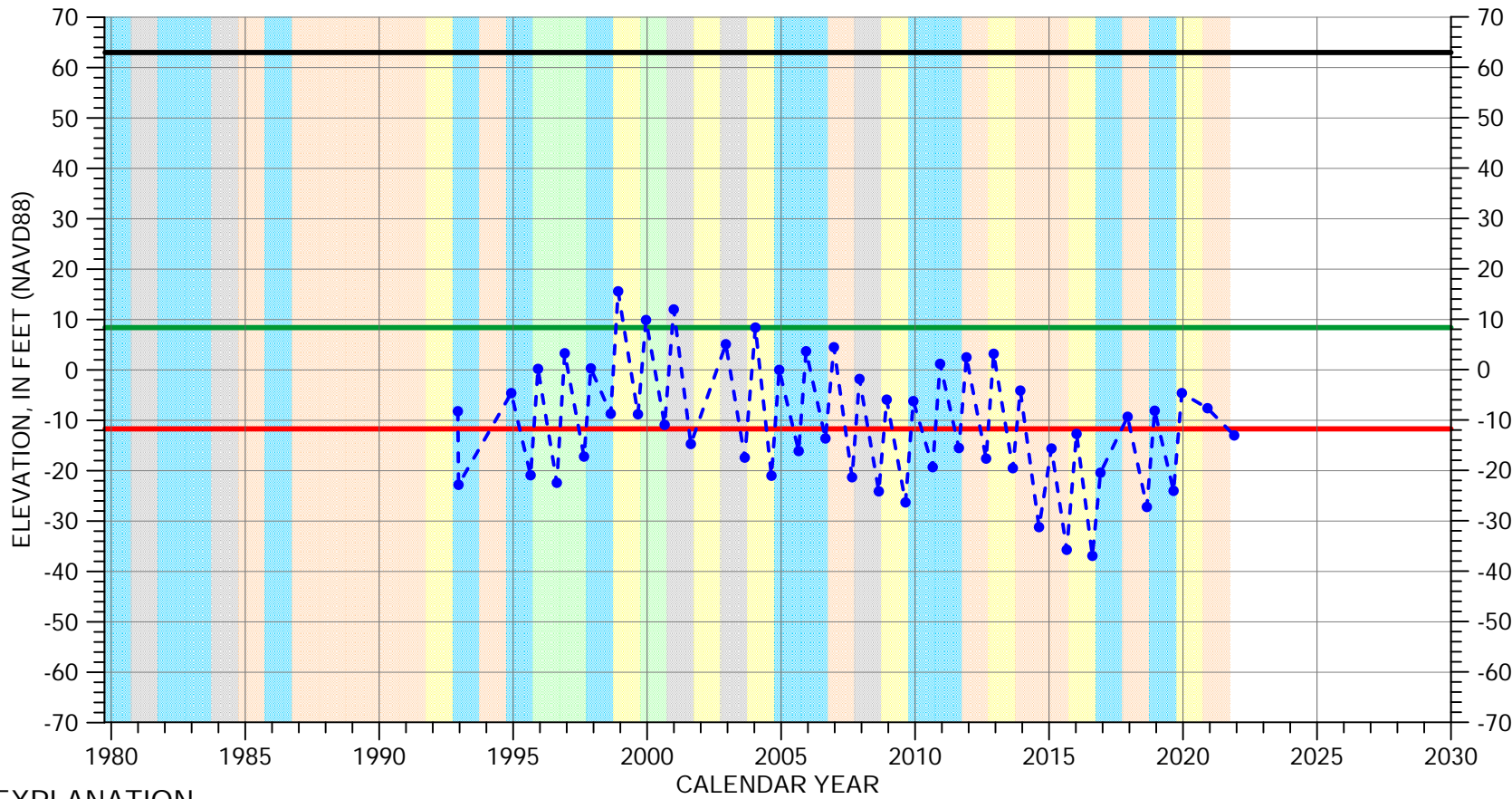
Multiple perforated intervals from -149 to -205 feet msl



Well bottom -208 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-14P02

180/400-Foot Aquifer Subbasin

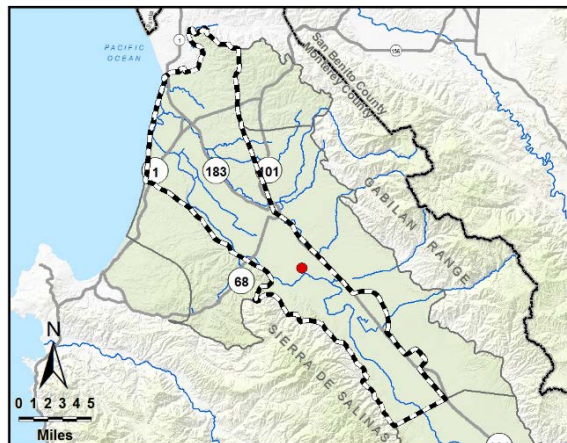


EXPLANATION

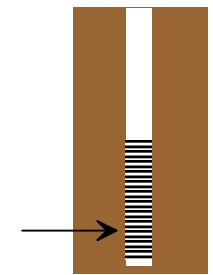
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



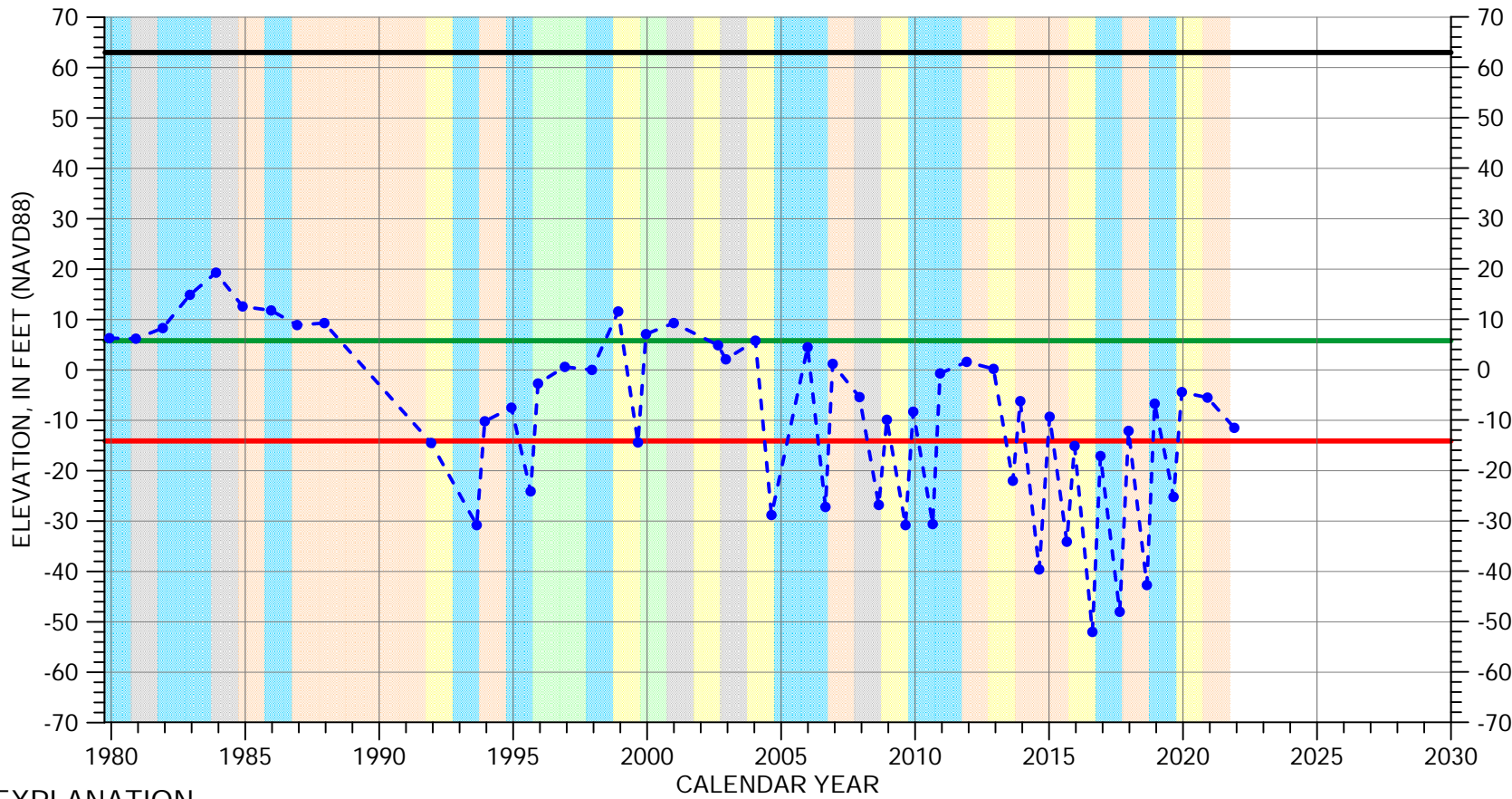
Multiple perforated intervals from -352 to -500 feet msl



Well bottom -543 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-15B01

180/400-Foot Aquifer Subbasin

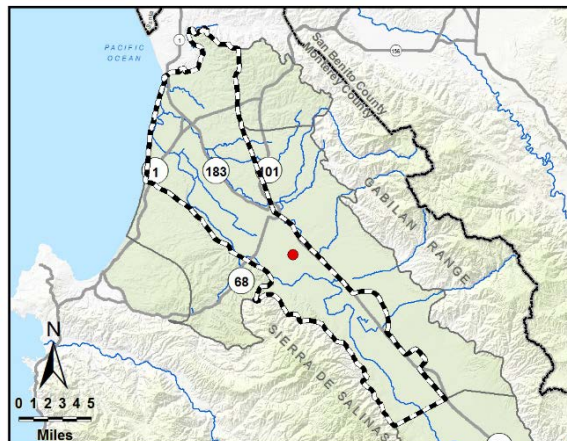


EXPLANATION

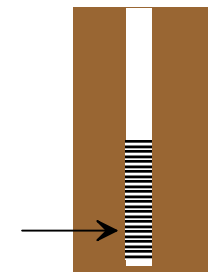
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



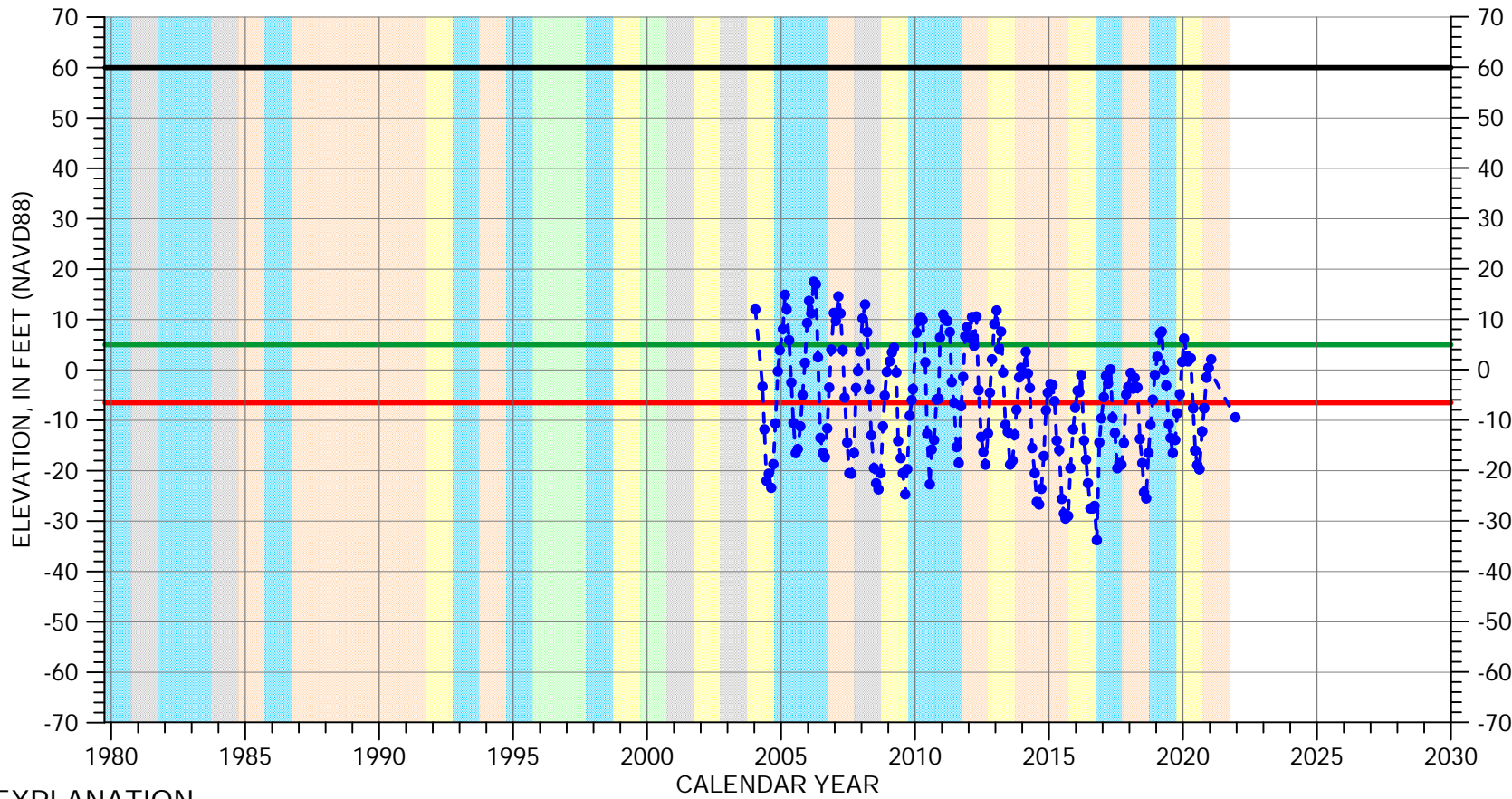
Multiple perforated intervals from -255 to -384 feet msl



Well bottom -389 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-16F02

180/400-Foot Aquifer Subbasin

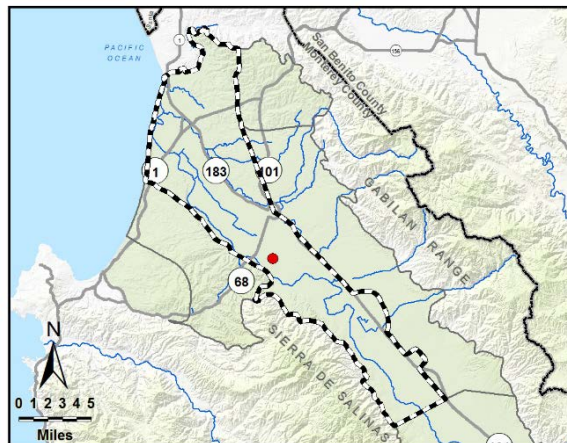


EXPLANATION

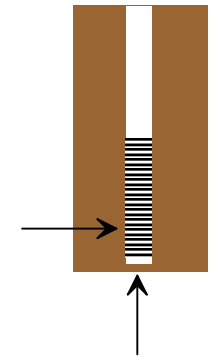
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



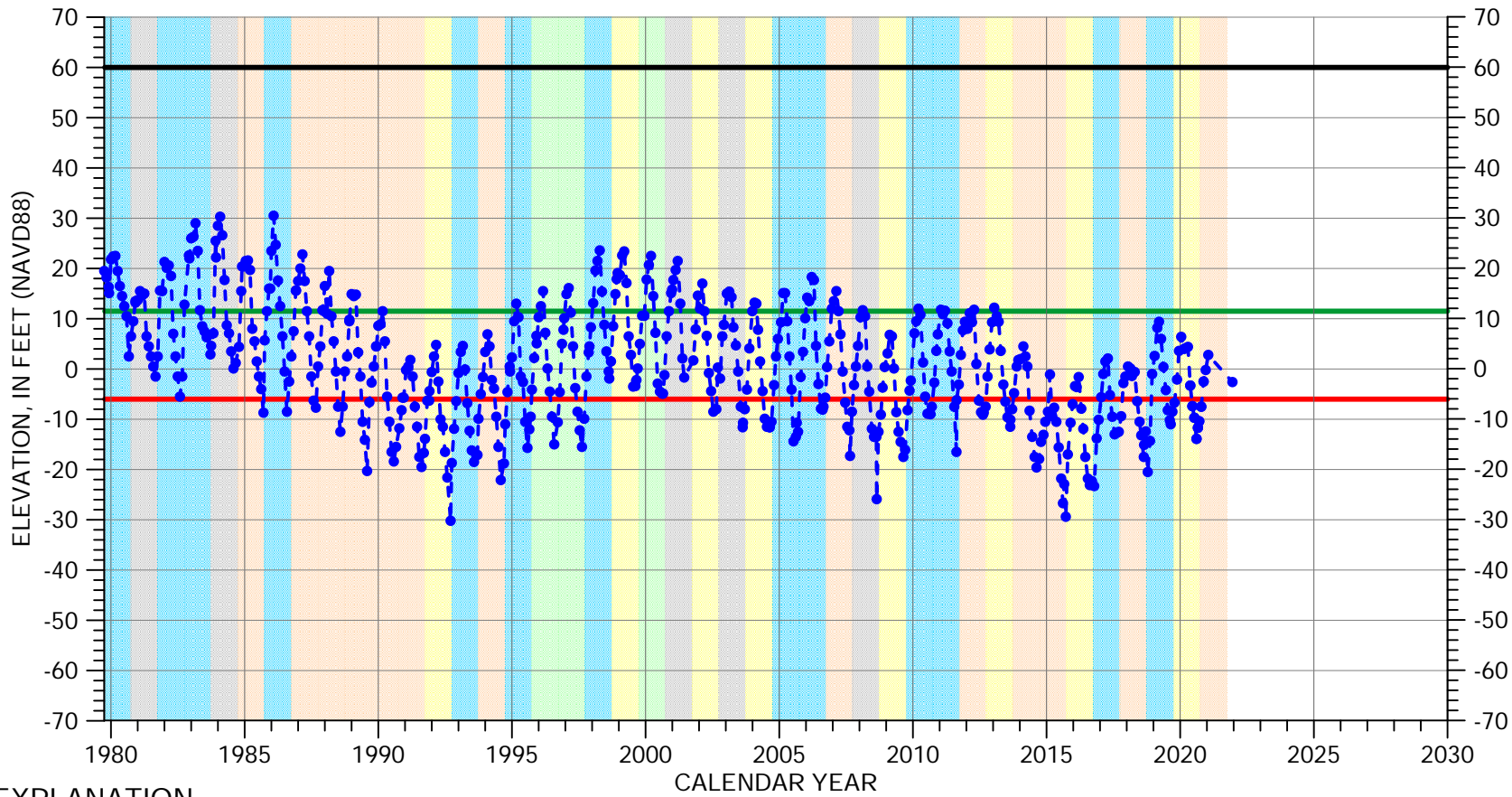
Perforated from
-368 to -511 feet msl



Well bottom
-533 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-16M01

180/400-Foot Aquifer Subbasin

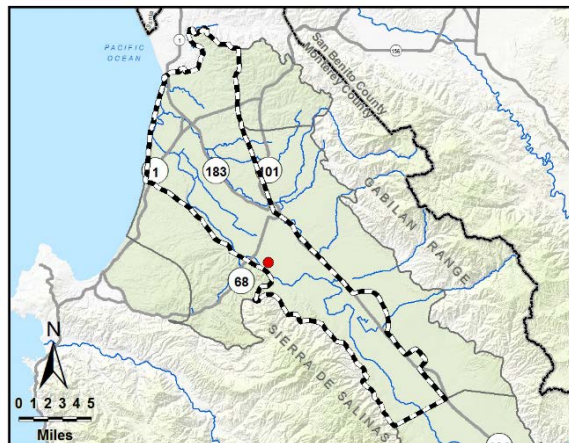


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|----------------|----------------|
| ■ DRY | ■ WET - NORMAL |
| ■ DRY - NORMAL | ■ WET |
| ■ NORMAL | |

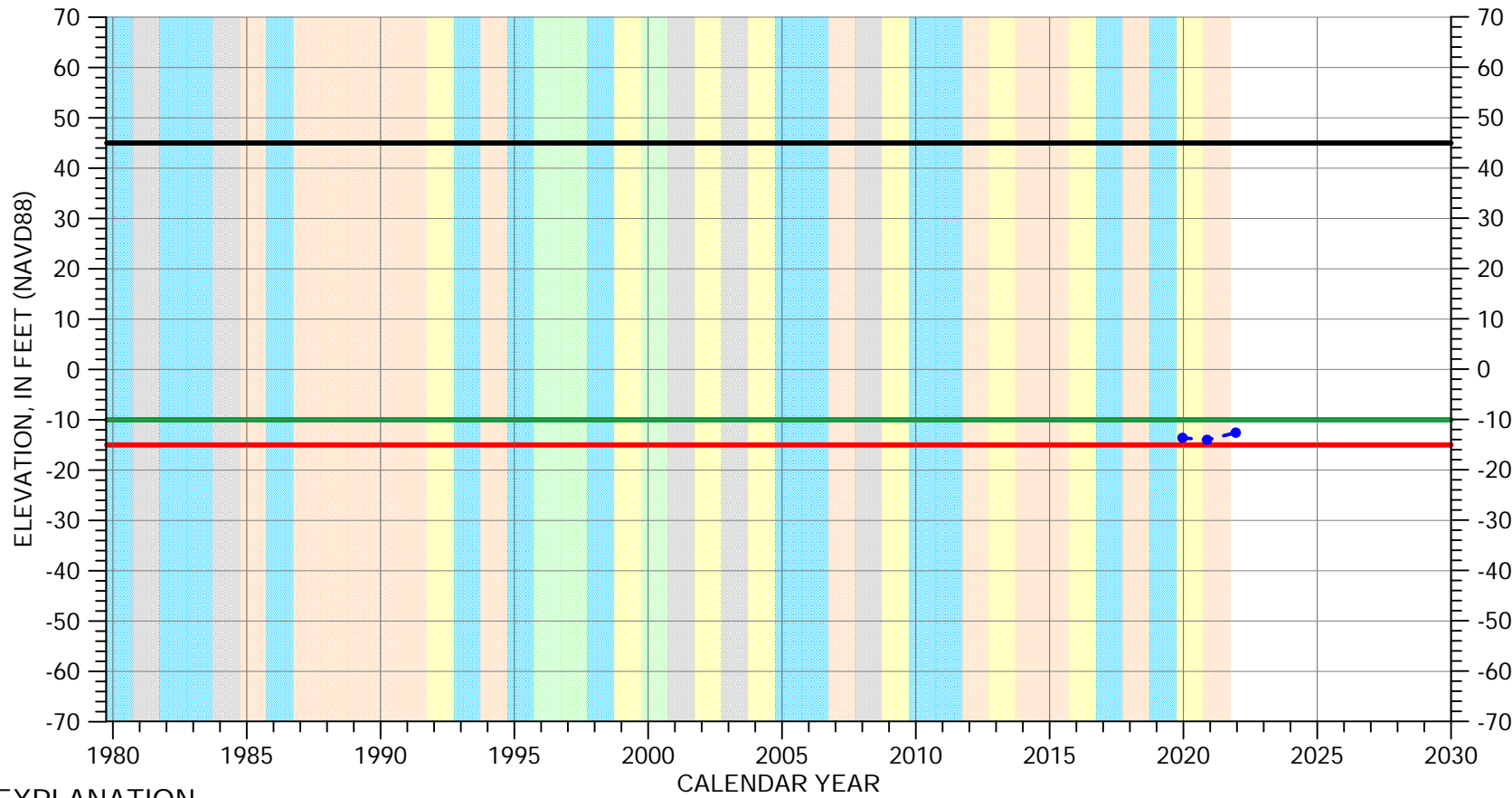


Perforated interval
unknown

Well bottom
elevation unknown

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-17E02

180/400-Foot Aquifer Subbasin

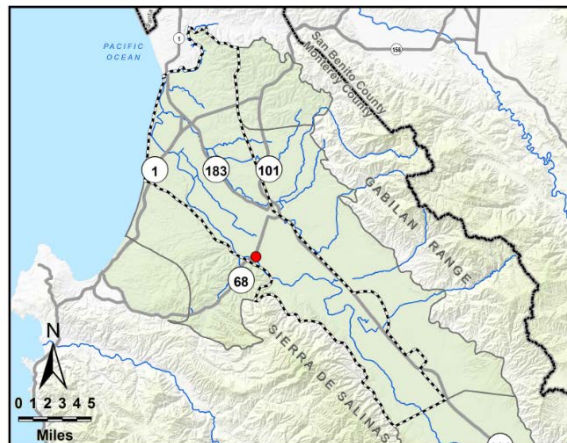


EXPLANATION

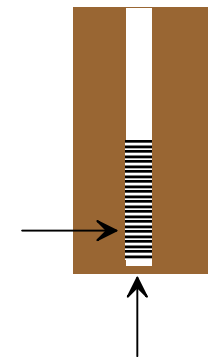
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



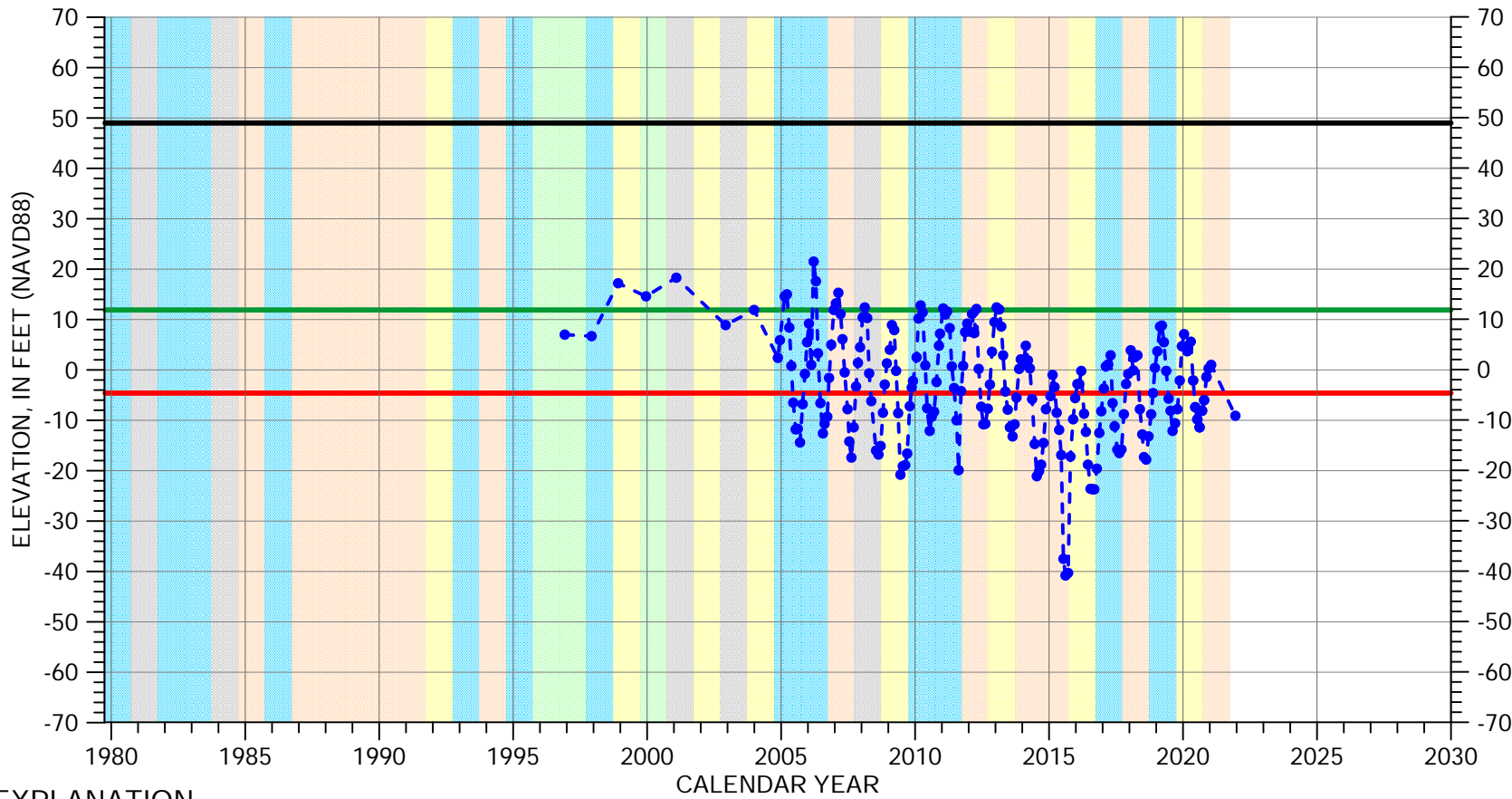
Perforated from
-535 to -635 feet msl



Well bottom
-655 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-17M01

180/400-Foot Aquifer Subbasin

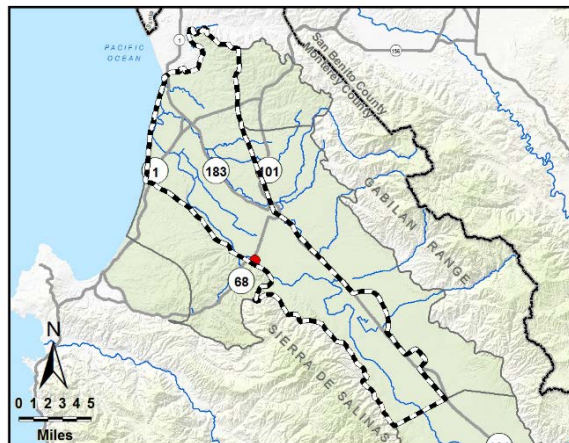


EXPLANATION

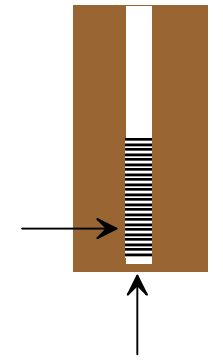
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



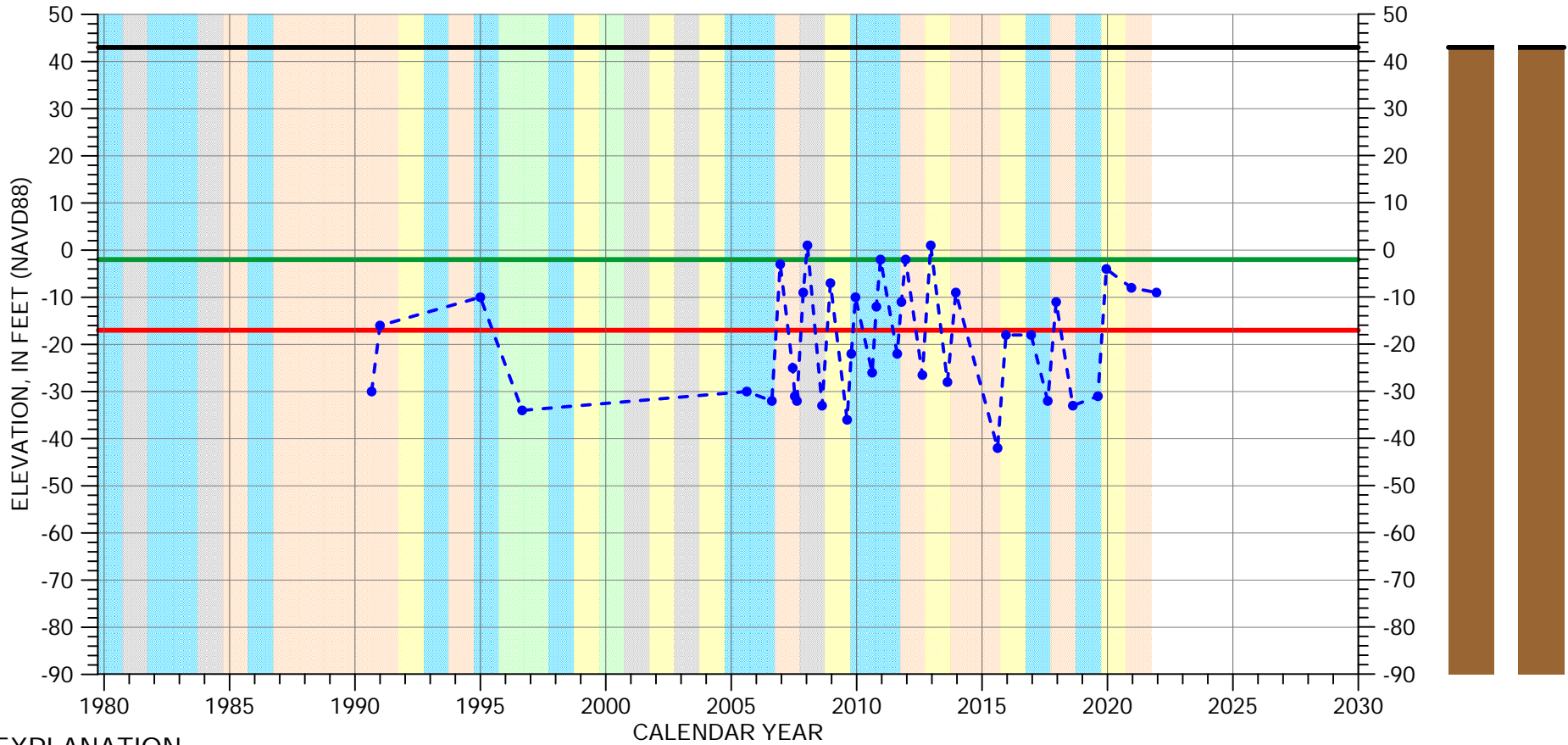
Perforated from
-79 to -131 feet msl



Well bottom
-222 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-17P02

180/400-Foot Aquifer Subbasin

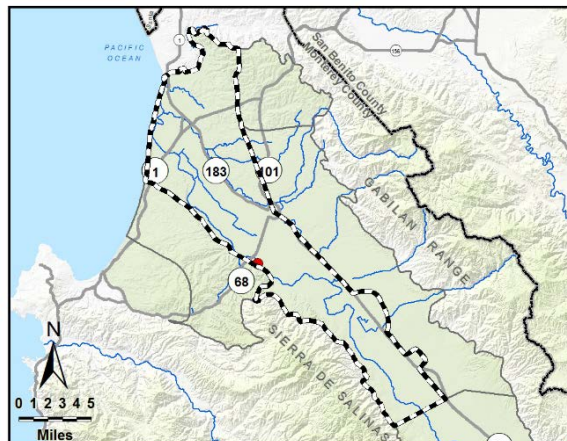


EXPLANATION

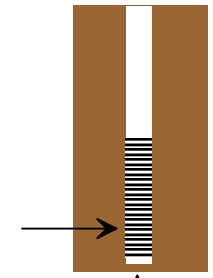
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



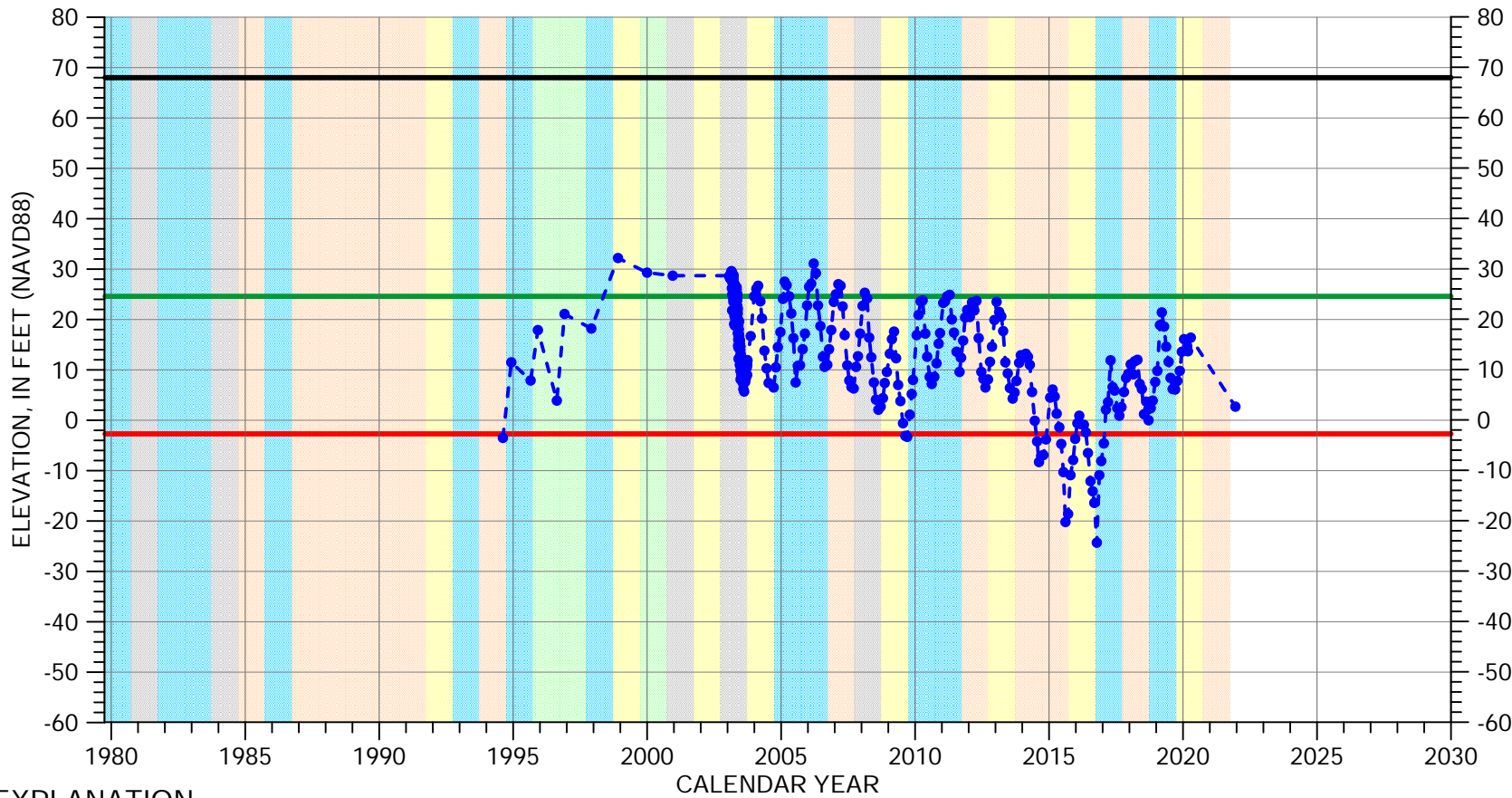
Multiple perforated intervals from -308 to -688 feet msl



Well bottom -708 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-25L01

180/400-Foot Aquifer Subbasin

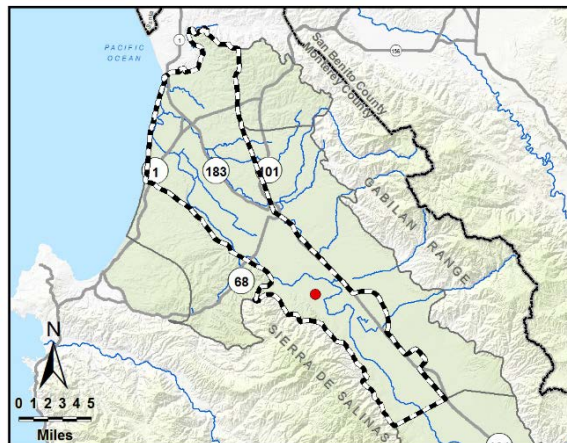


EXPLANATION

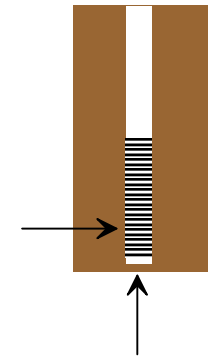
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



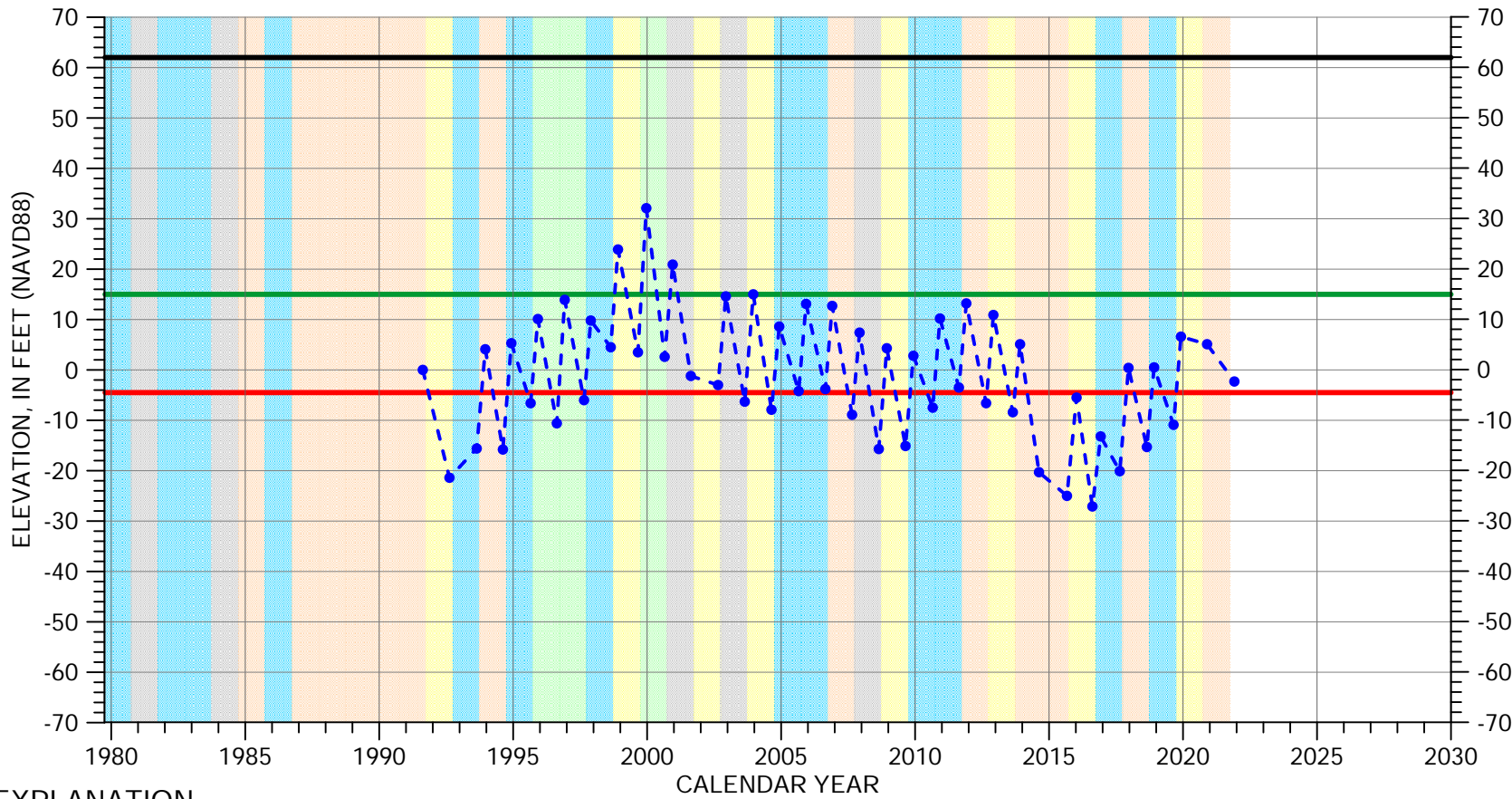
Multiple perforated intervals from -61 to -291 feet msl



Well bottom -320 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-26A01

180/400-Foot Aquifer Subbasin

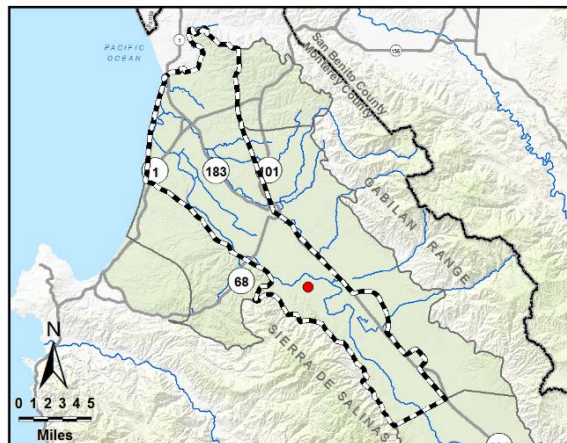


EXPLANATION

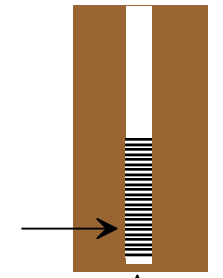
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|---|
| <ul style="list-style-type: none"> DRY DRY - NORMAL NORMAL | <ul style="list-style-type: none"> WET - NORMAL WET |
|--|---|



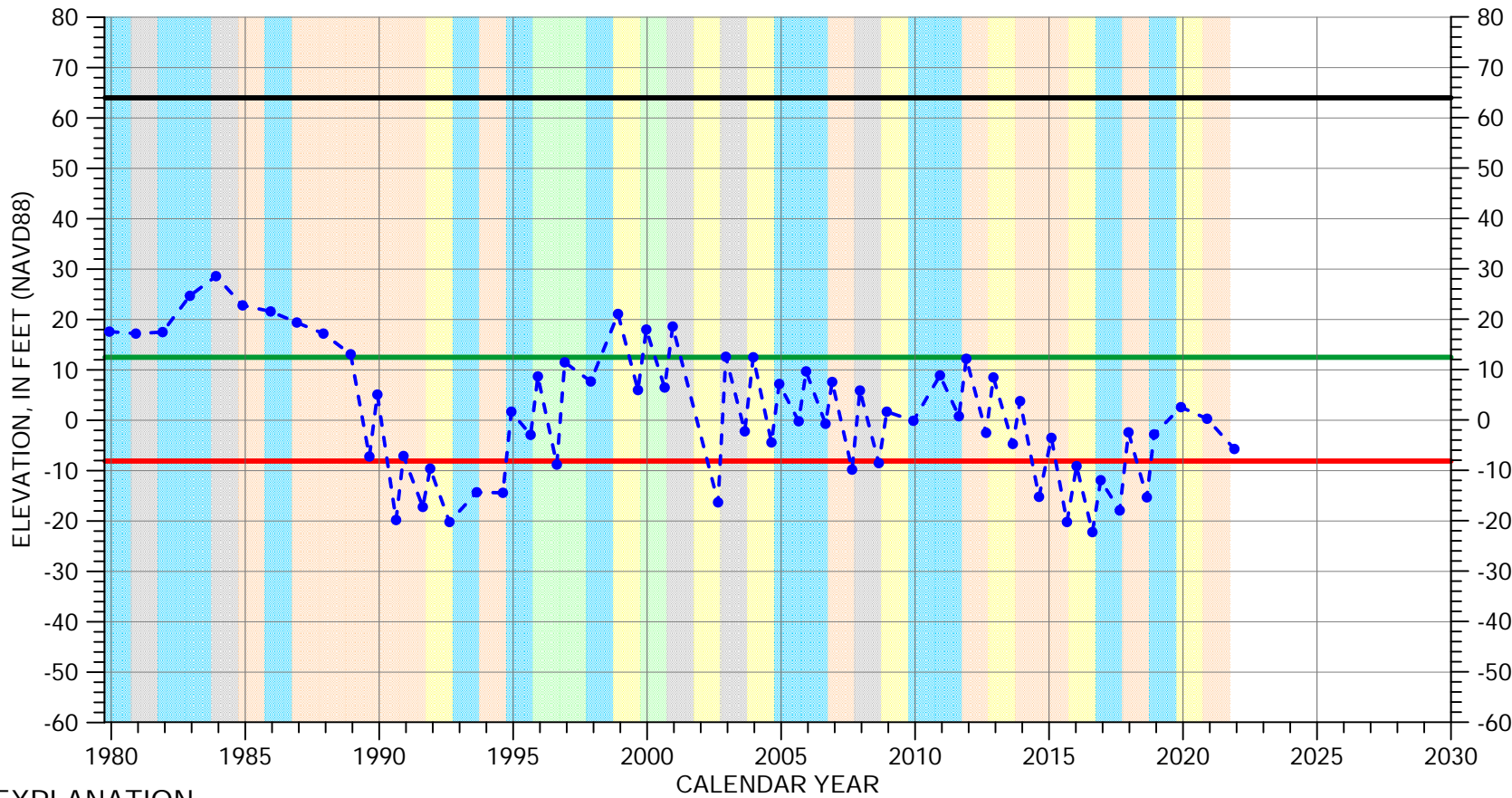
Multiple perforated intervals from -276 to -483 feet msl



Well bottom -513 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-26F01

180/400-Foot Aquifer Subbasin

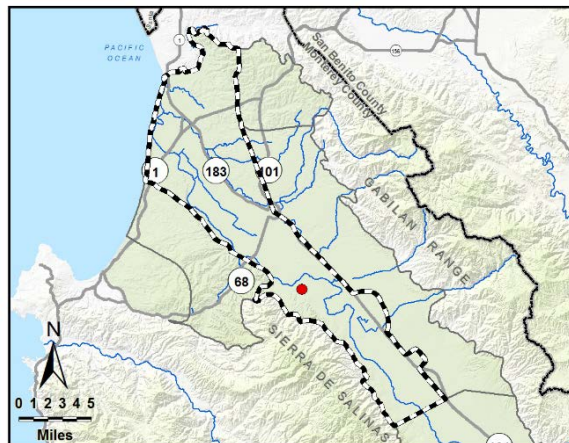


EXPLANATION

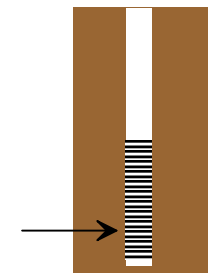
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



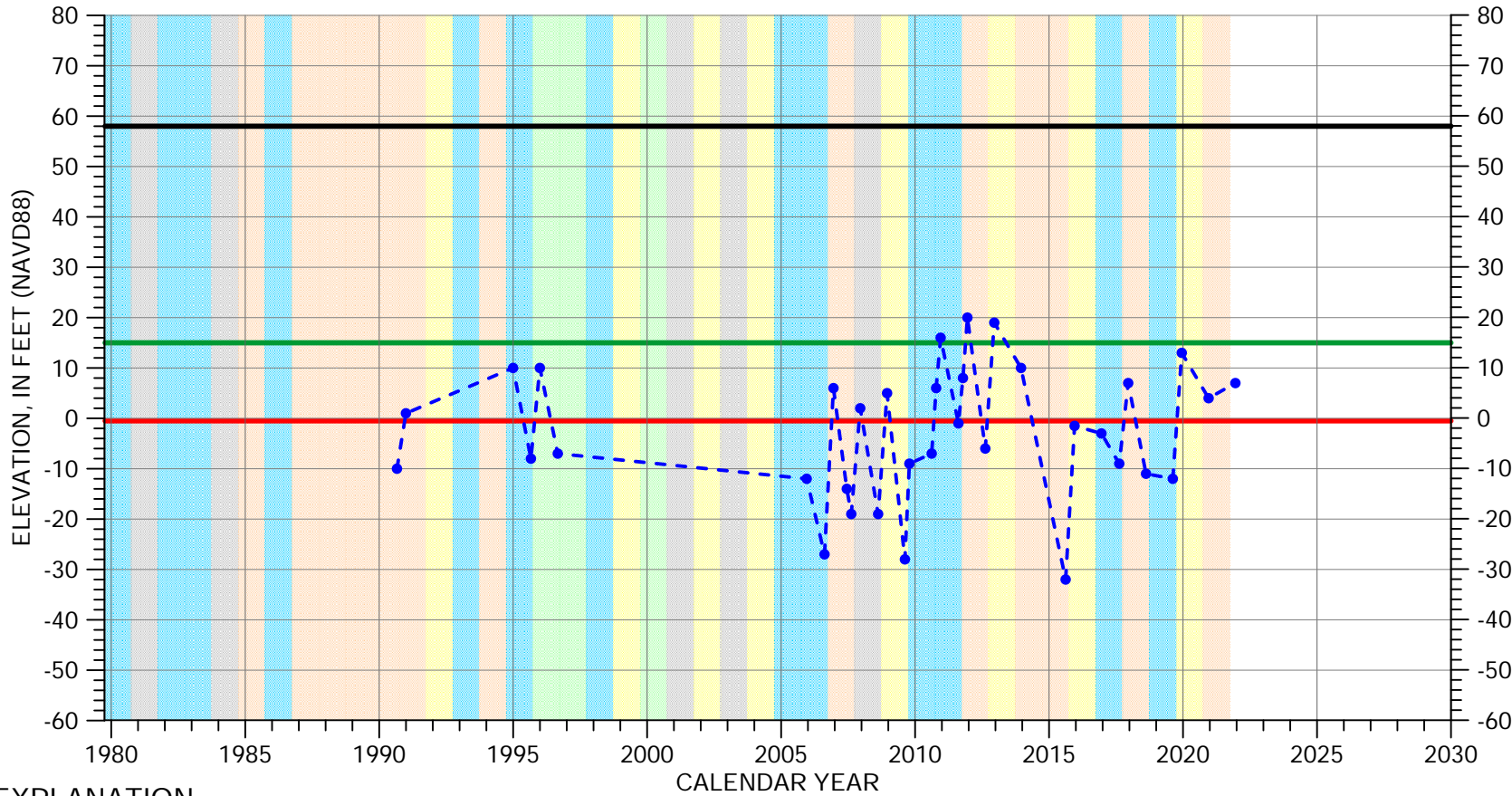
Multiple perforated intervals from -178 to -232 feet msl



Well bottom -254 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/03E-28B02

180/400-Foot Aquifer Subbasin

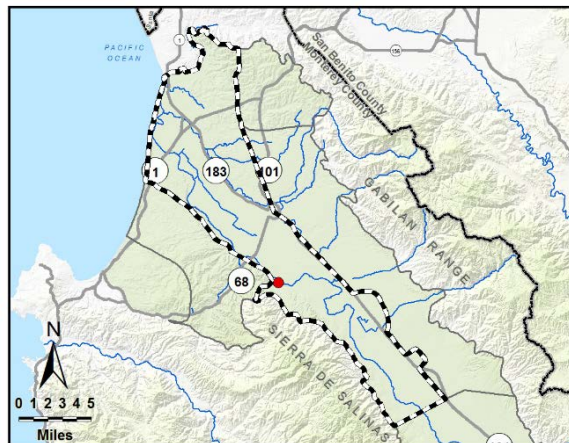


EXPLANATION

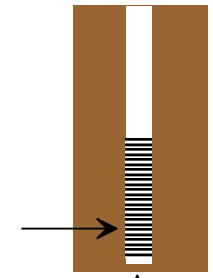
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



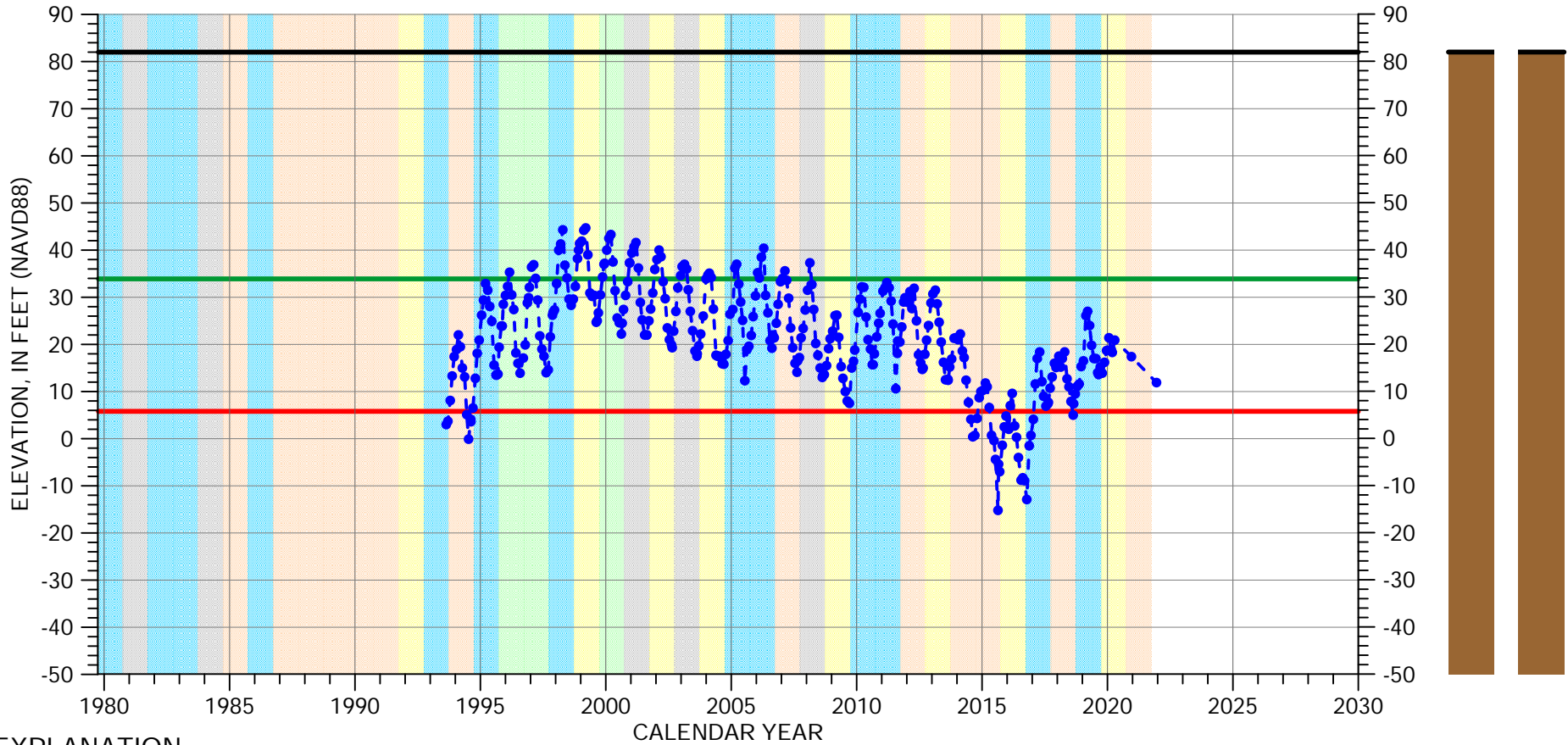
Multiple perforated intervals from -343 to -395 feet msl



Well bottom -420 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/04E-29Q02

180/400-Foot Aquifer Subbasin

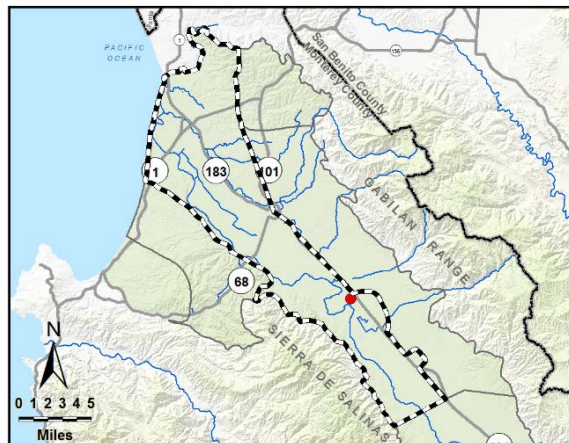


EXPLANATION

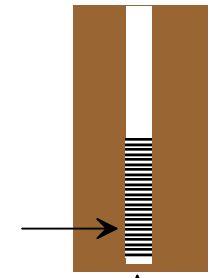
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



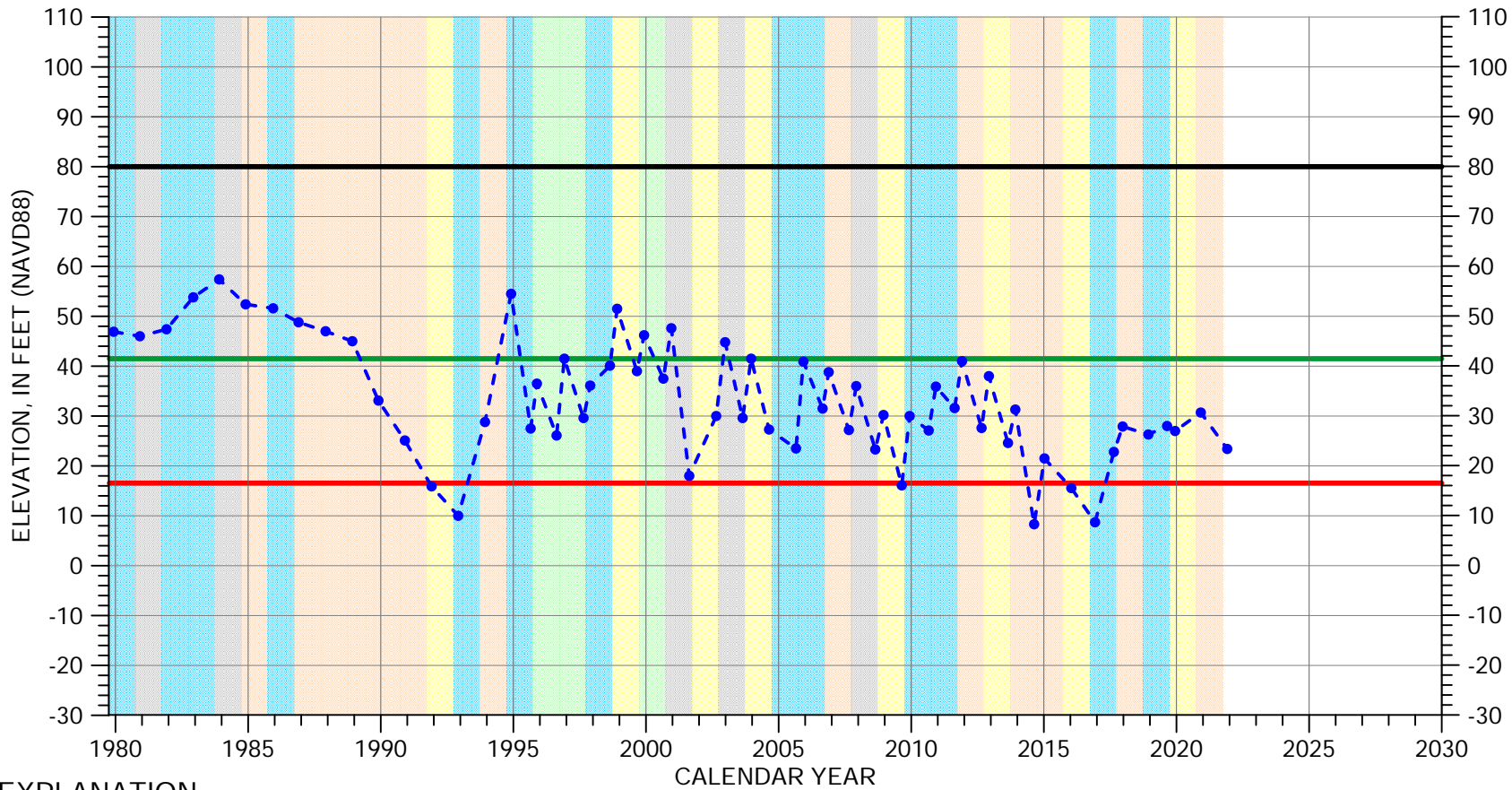
Multiple perforated intervals from -147 to -257 feet msl



Well bottom -473 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 15S/04E-31A02

180/400-Foot Aquifer Subbasin

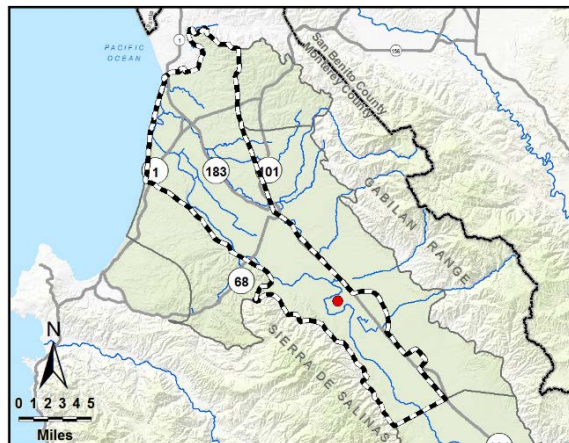


EXPLANATION

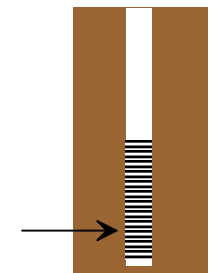
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



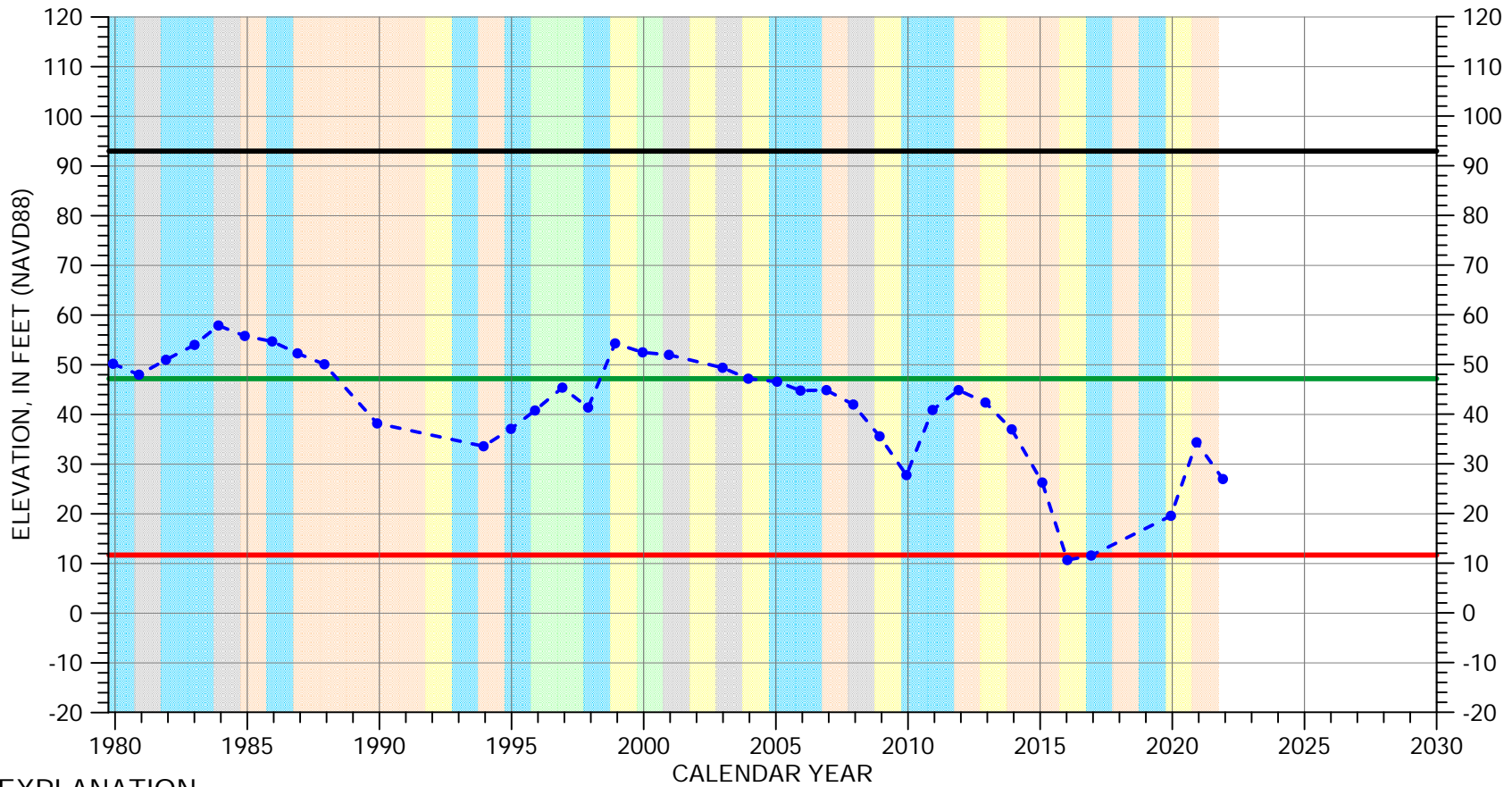
Multiple perforated intervals from -141 to -250 feet msl



Well bottom -258 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-04C01

180/400-Foot Aquifer Subbasin

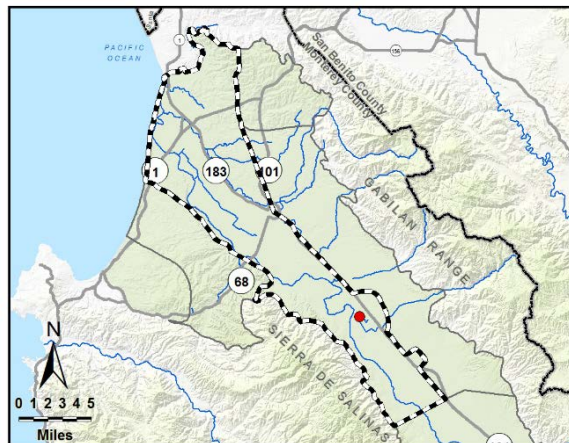


EXPLANATION

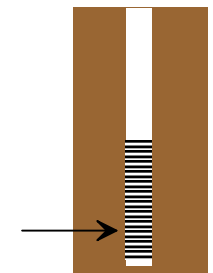
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



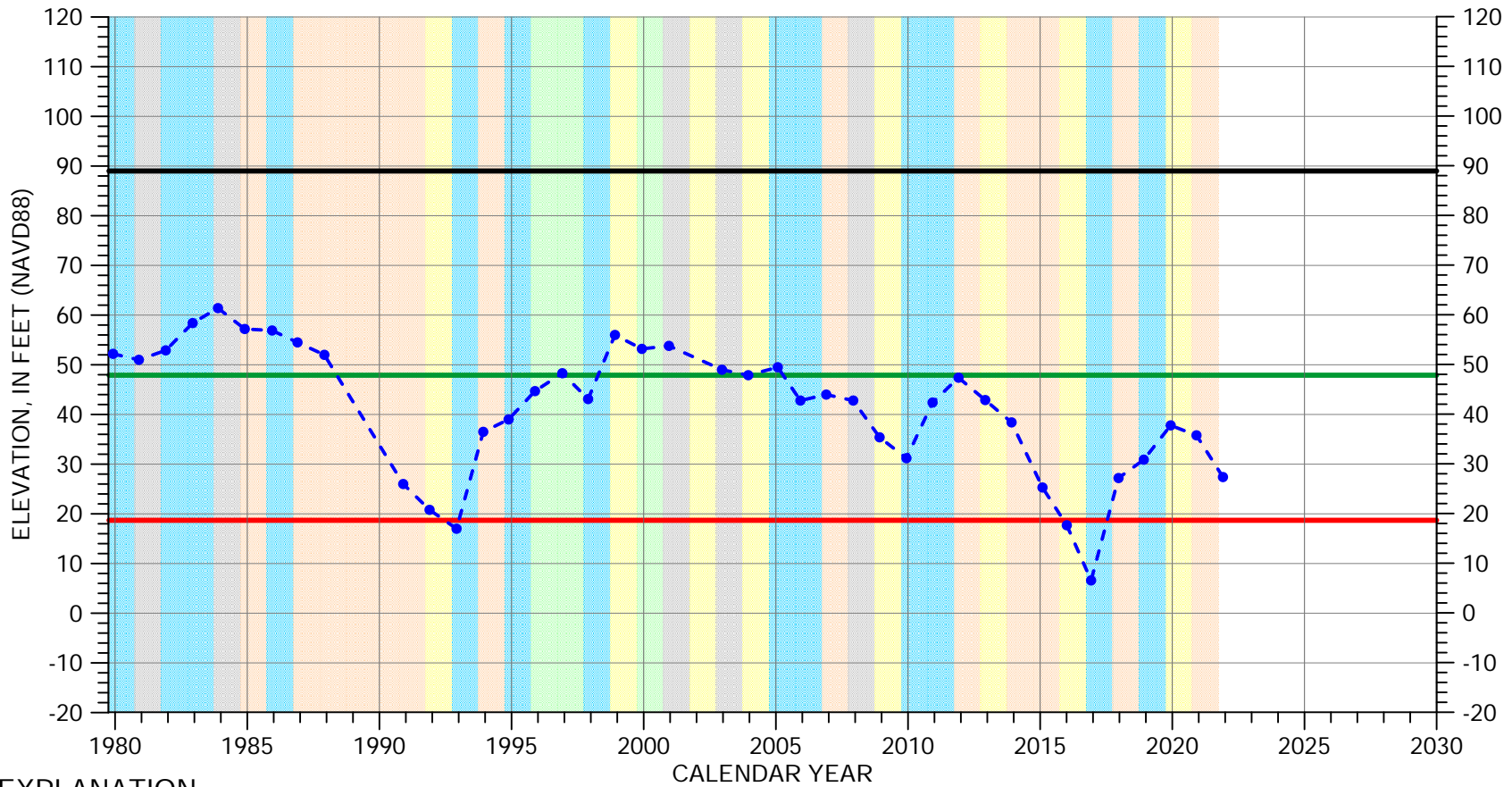
Multiple perforated intervals from -228 to -372 feet msl



Well bottom -379 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-05M02

180/400-Foot Aquifer Subbasin

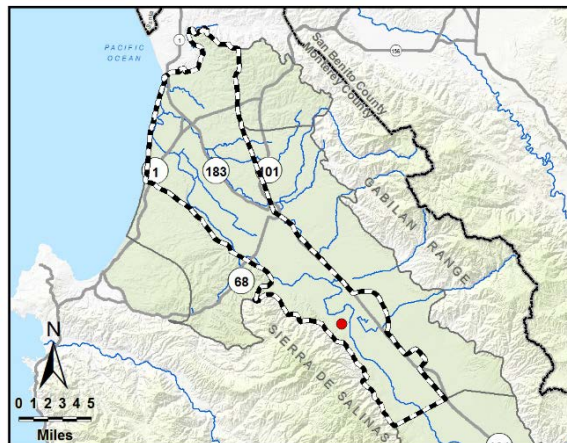


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



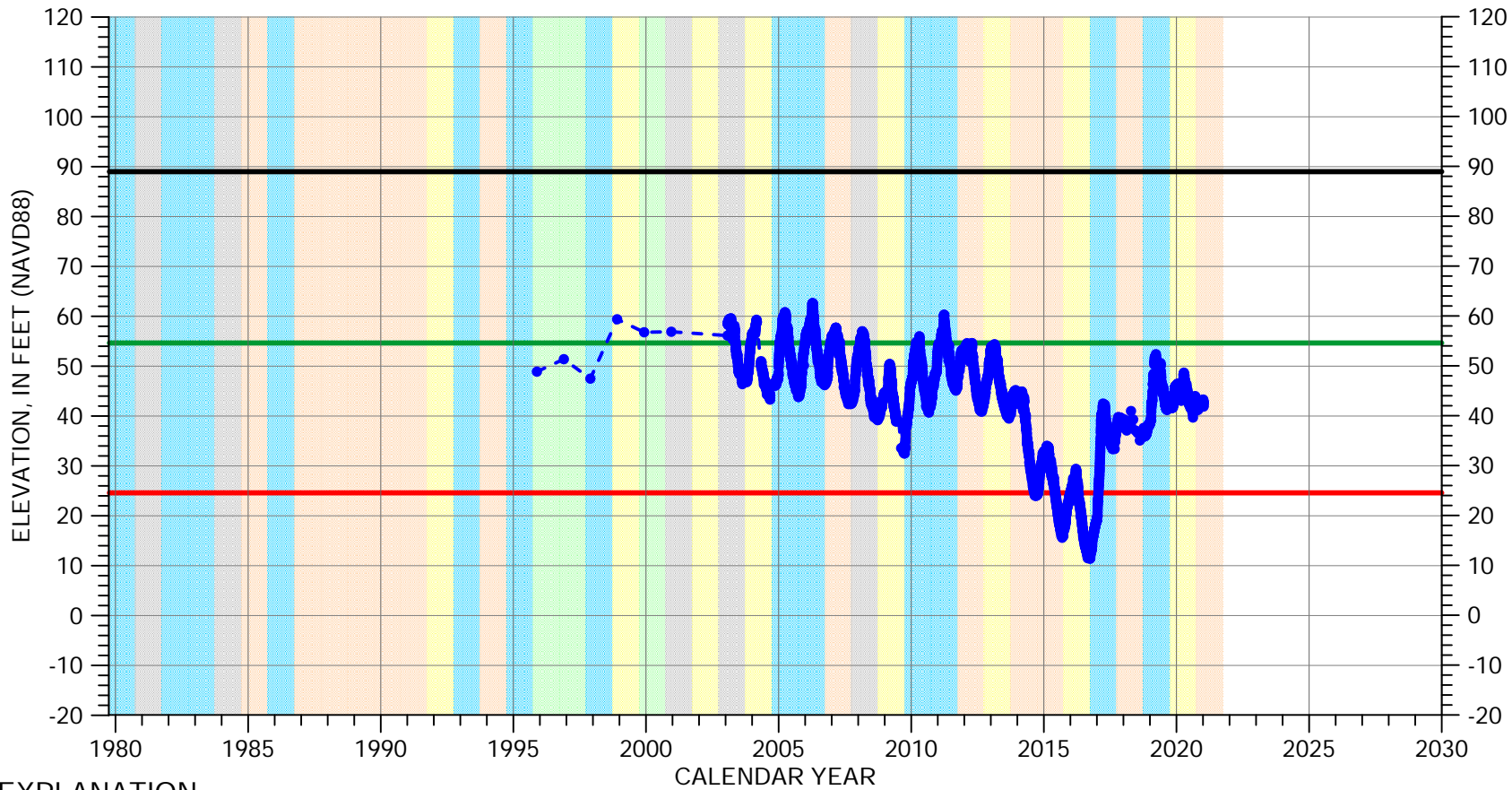
Perforated interval
unknown



Well bottom
-178 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-08H03

180/400-Foot Aquifer Subbasin

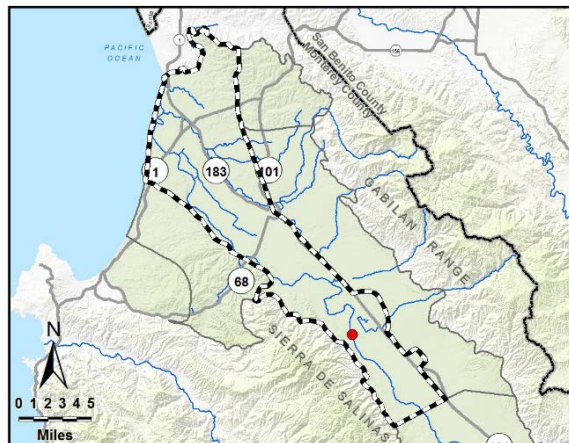


EXPLANATION

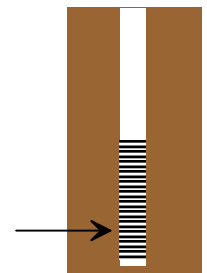
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



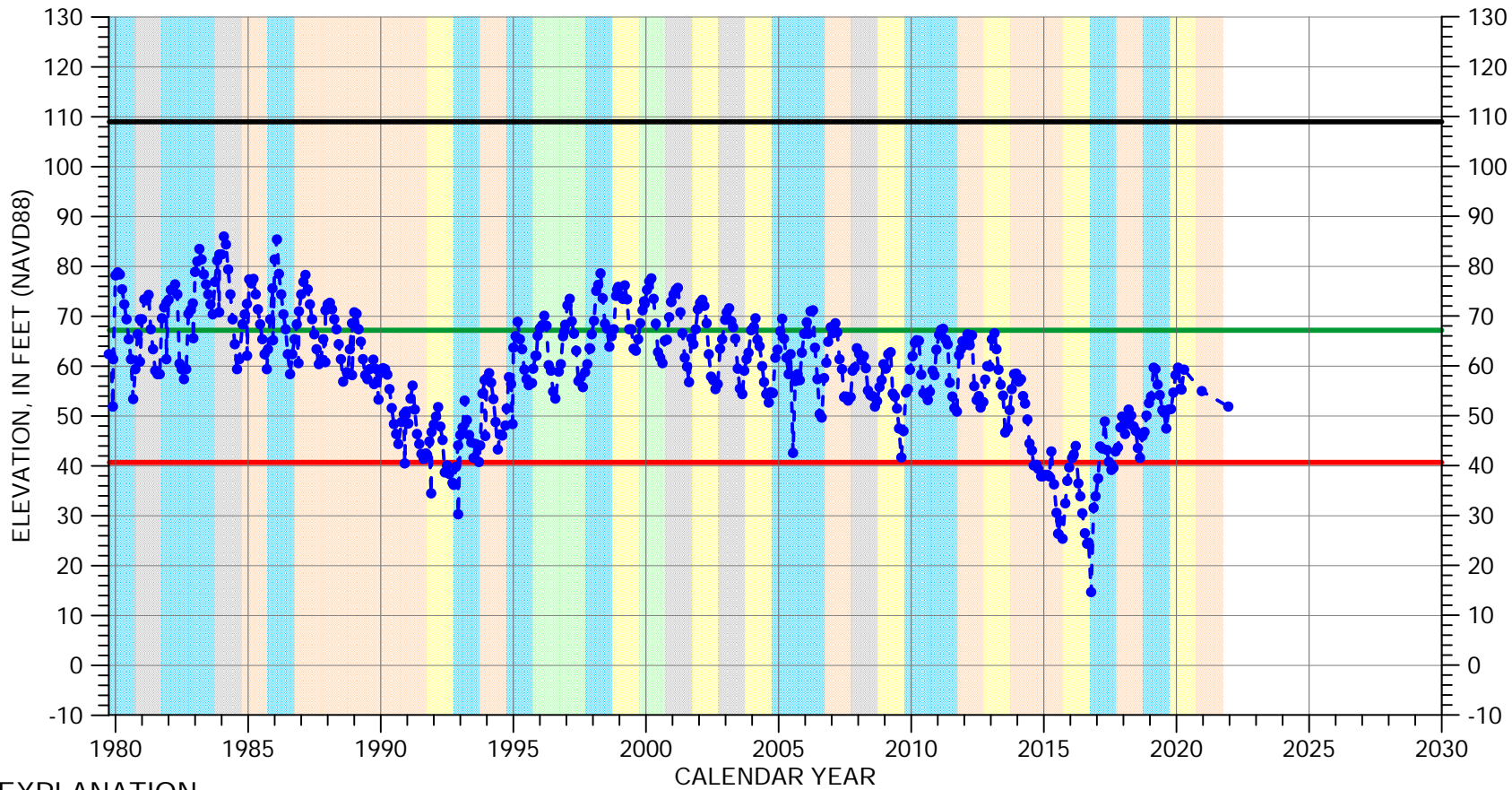
Perforated from
-152 to -202 feet msl



Well bottom
-207 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-10R02

180/400-Foot Aquifer Subbasin

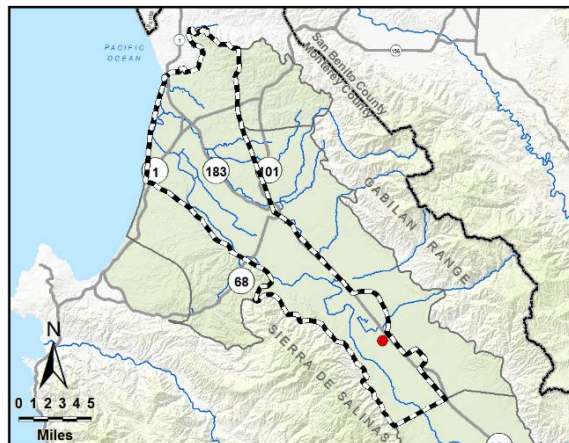


EXPLANATION

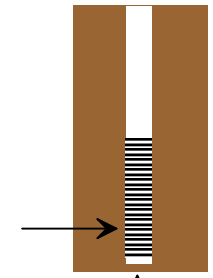
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



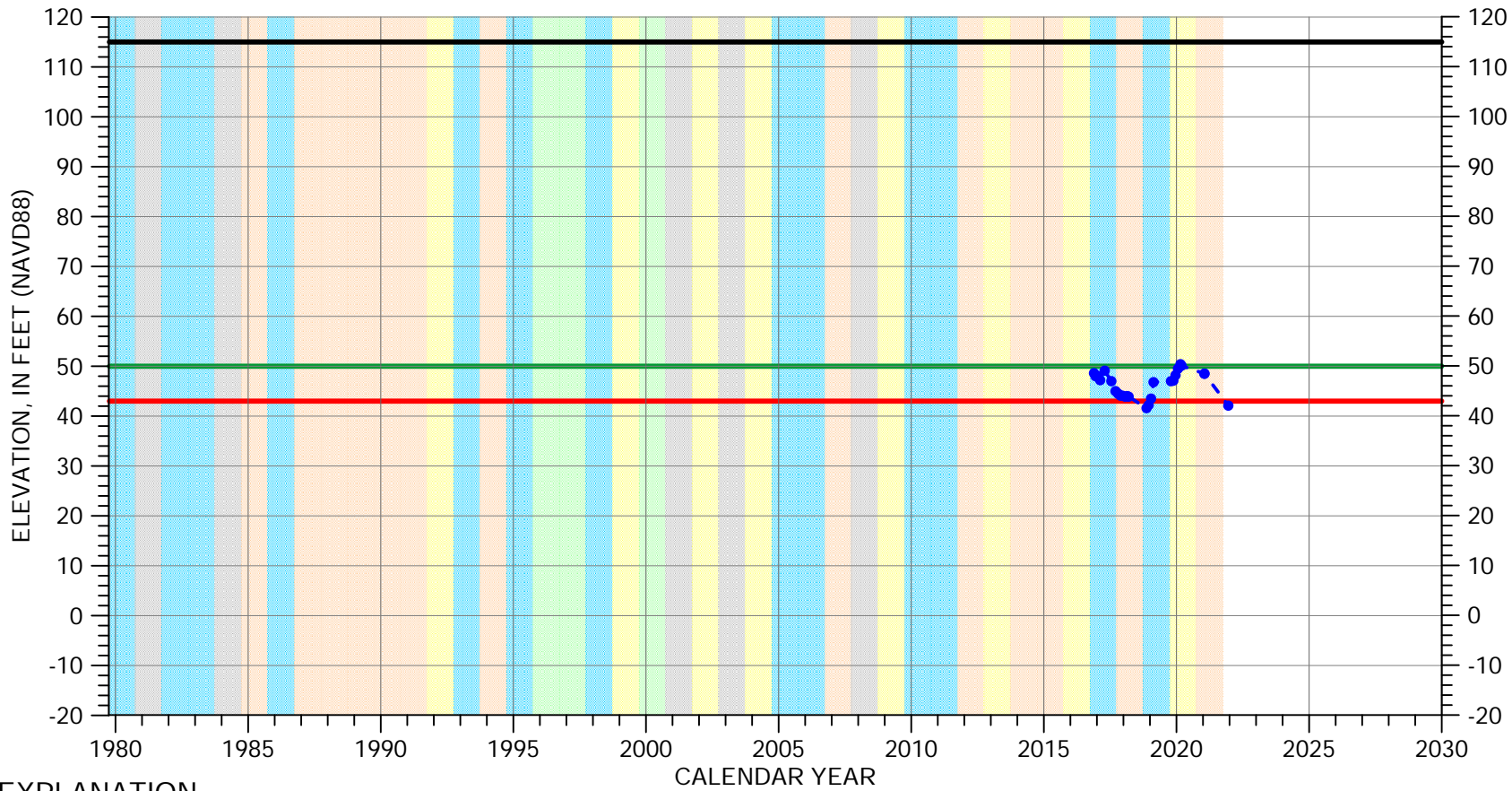
Multiple perforated intervals from -103 to -368 feet msl



Well bottom -375 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-11D51

180/400-Foot Aquifer Subbasin

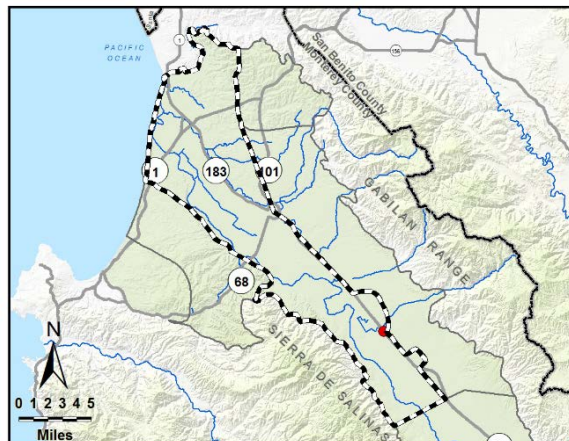


EXPLANATION

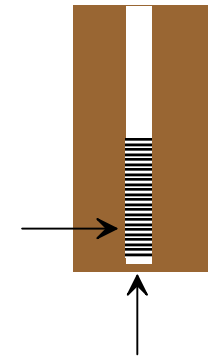
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



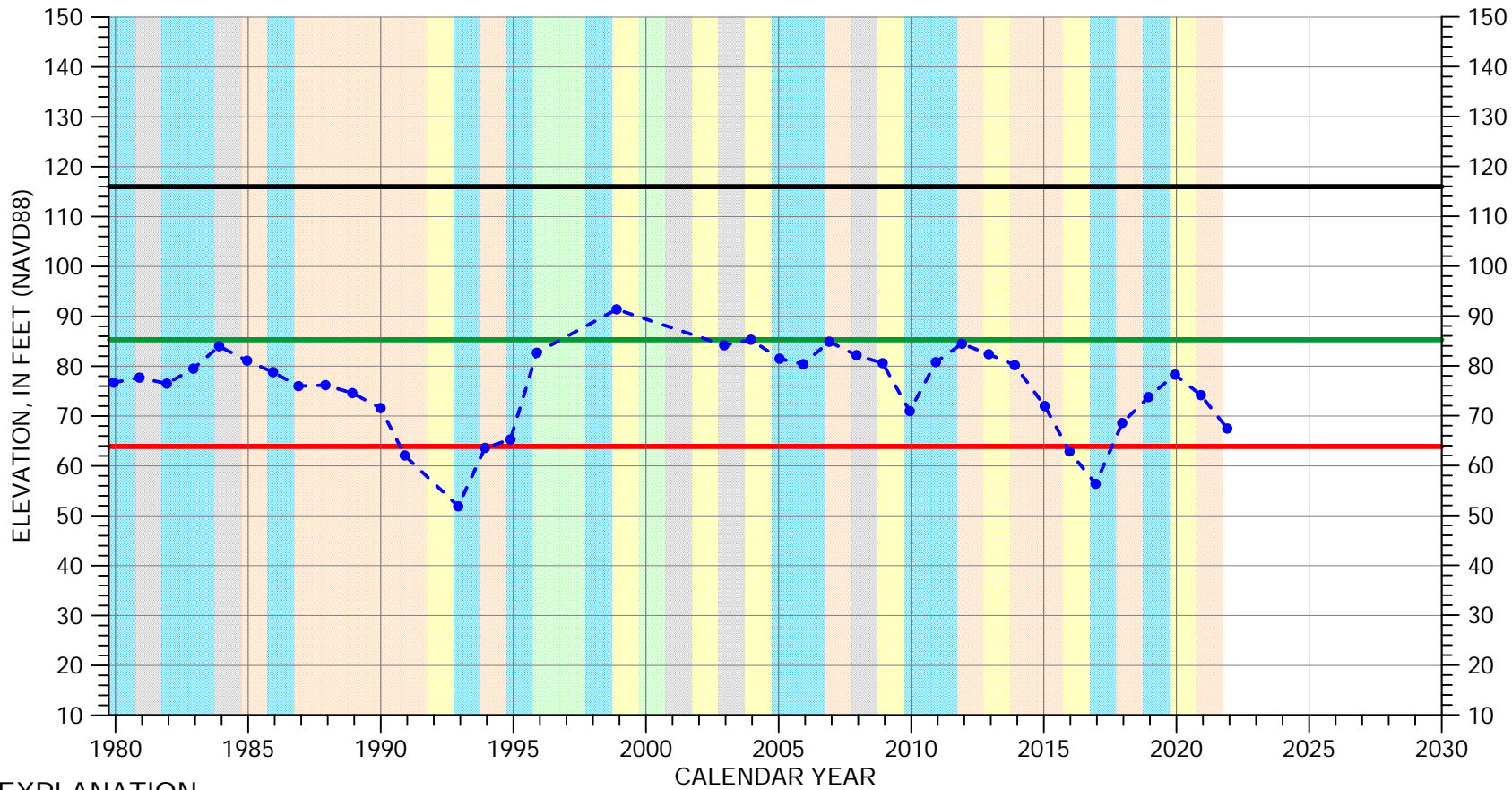
Perforated from
-425 to -875 feet msl



Well bottom
-885 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-13R02

180/400-Foot Aquifer Subbasin

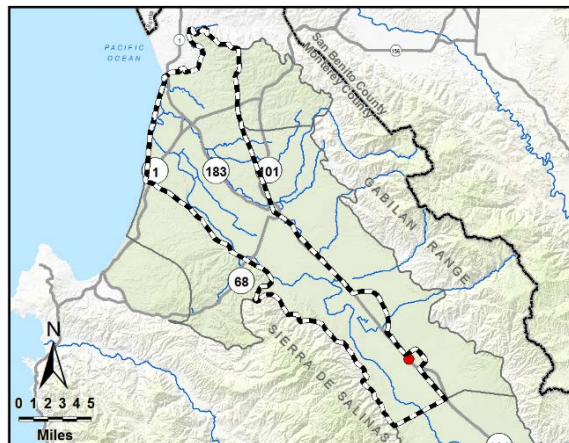


EXPLANATION

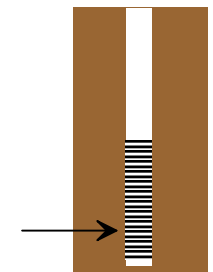
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



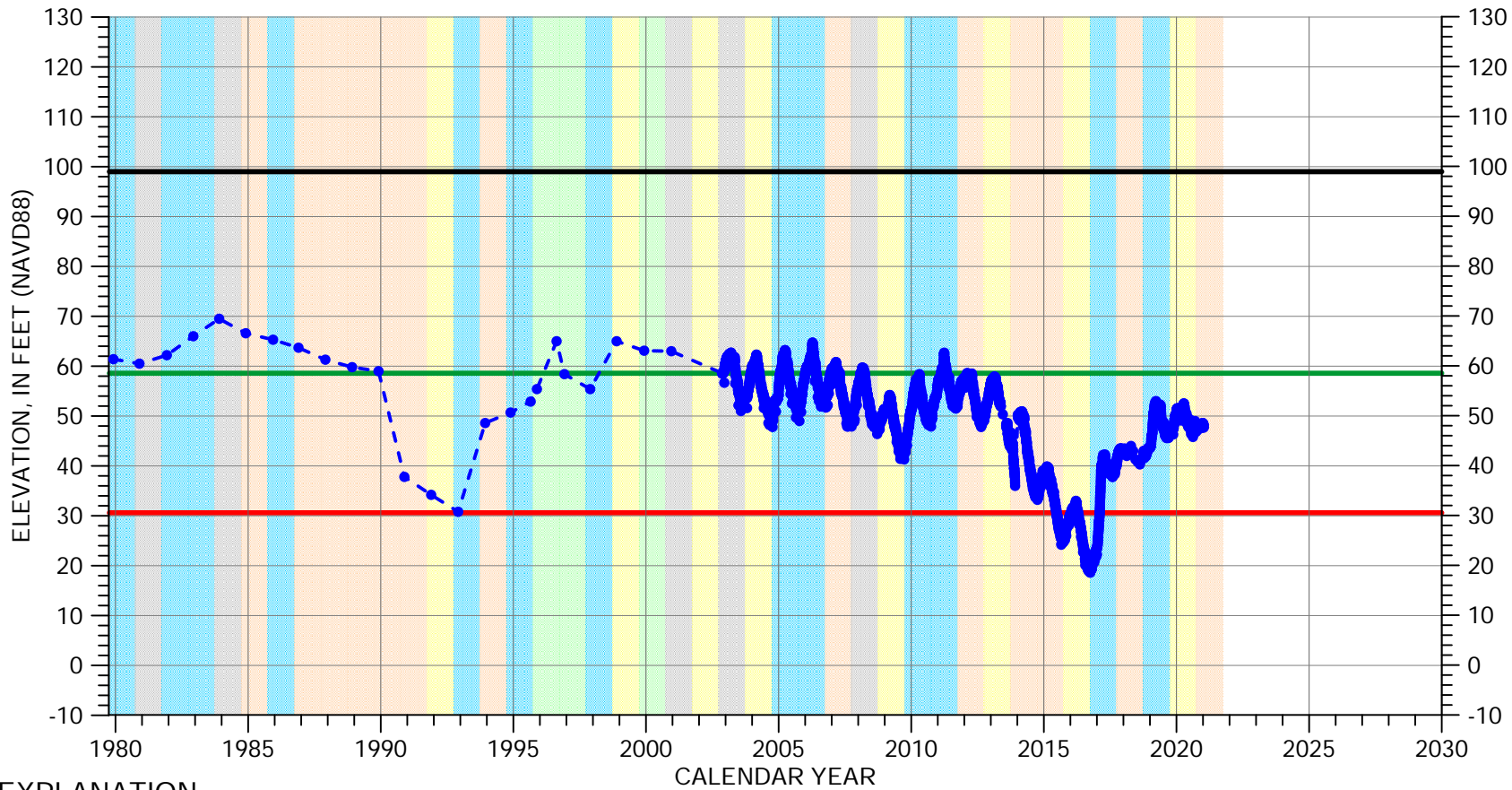
Multiple perforated intervals from -17 to -160 feet msl



Well bottom -161 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-15D01

180/400-Foot Aquifer Subbasin

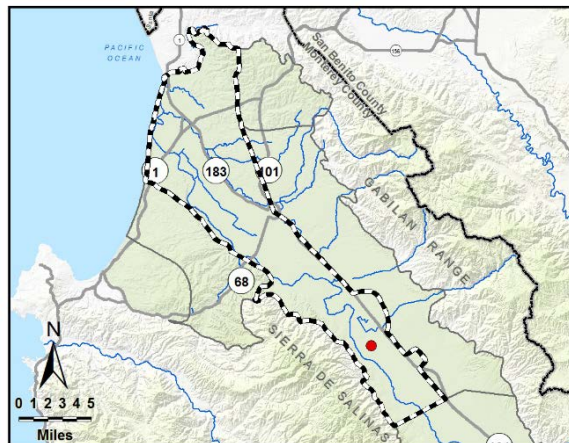


EXPLANATION

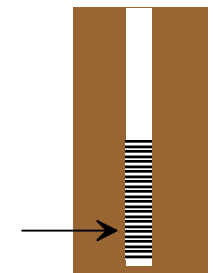
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



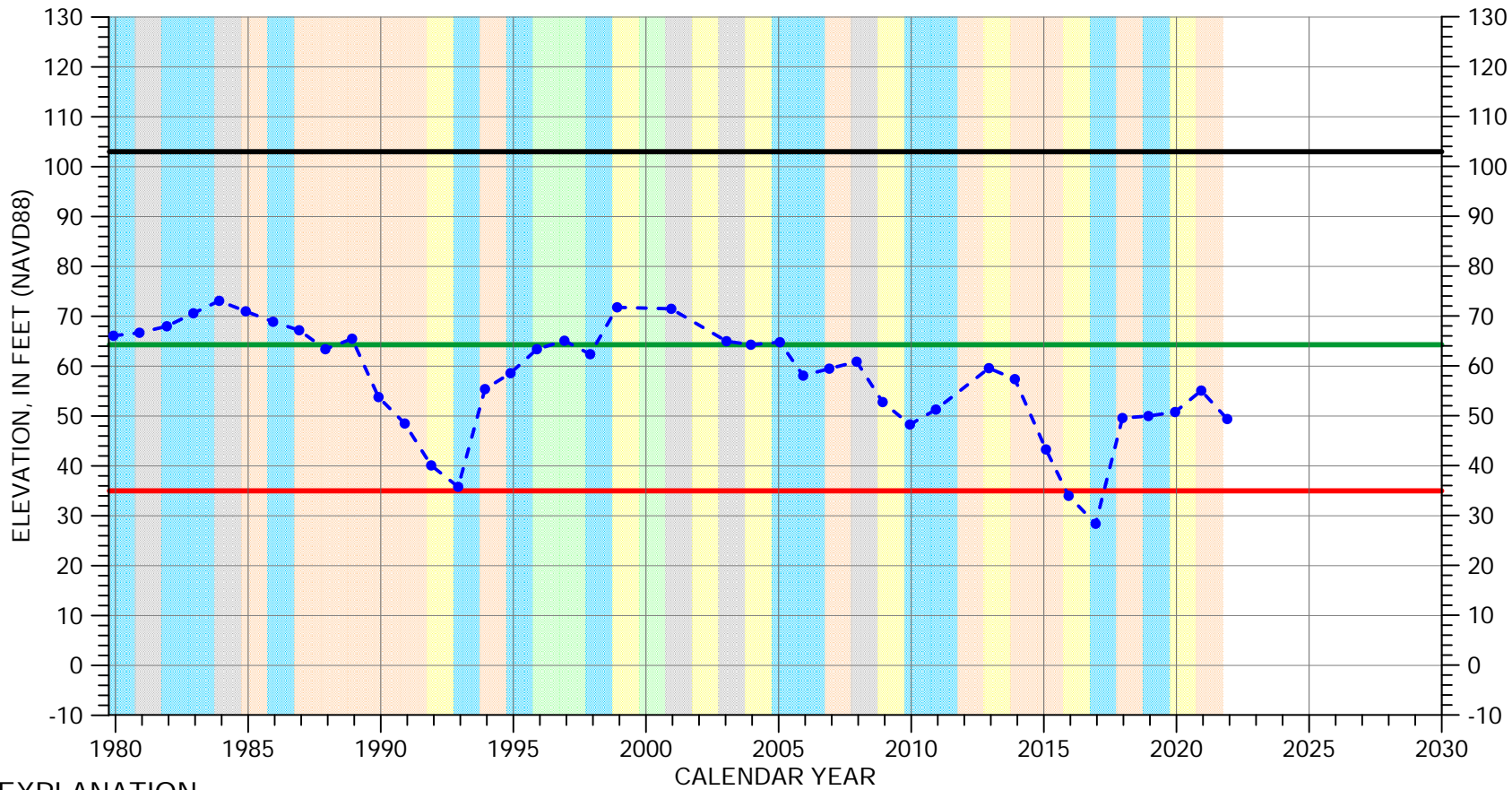
Perforated from
-71 to -259 feet msl



Well bottom
-285 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-15R02

180/400-Foot Aquifer Subbasin

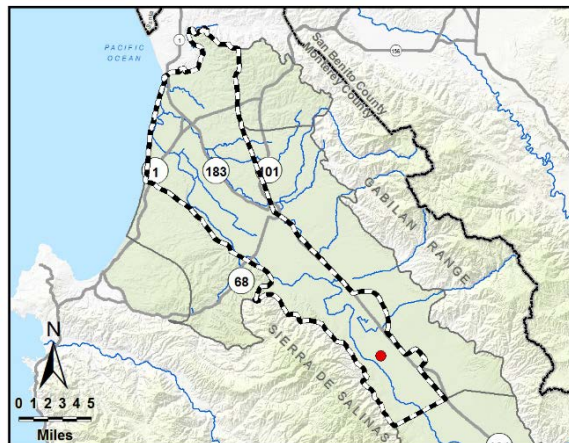


EXPLANATION

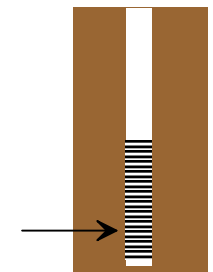
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



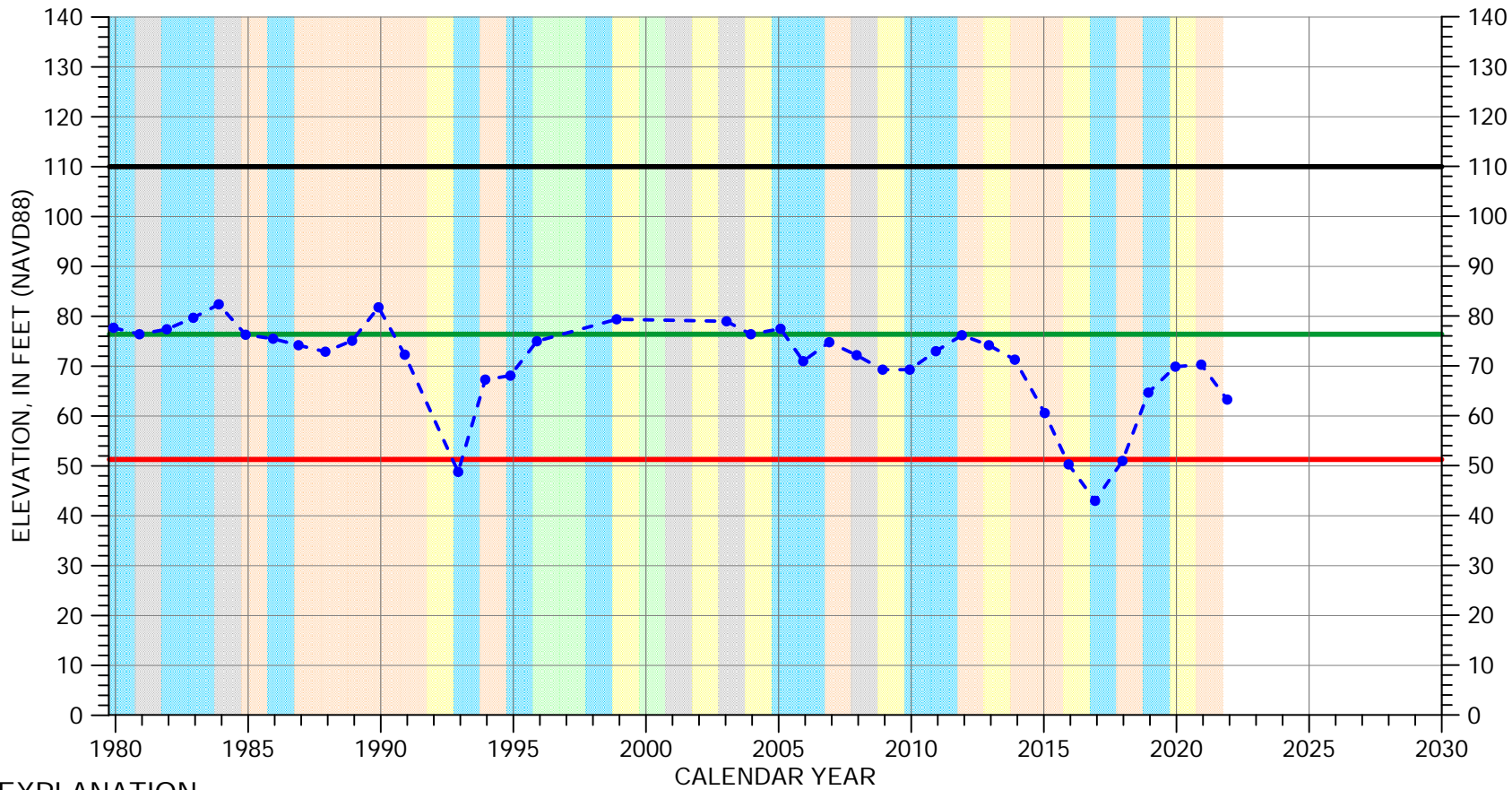
Multiple perforated intervals from -12 to -80 feet msl



Well bottom -200 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-25G01

180/400-Foot Aquifer Subbasin

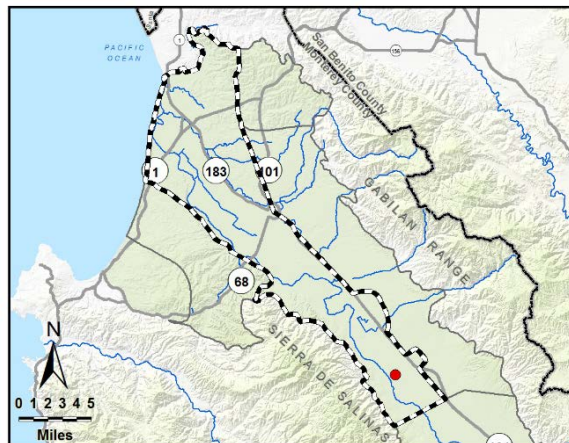


EXPLANATION

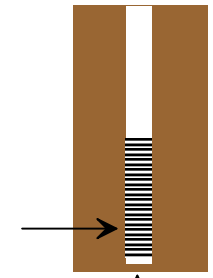
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



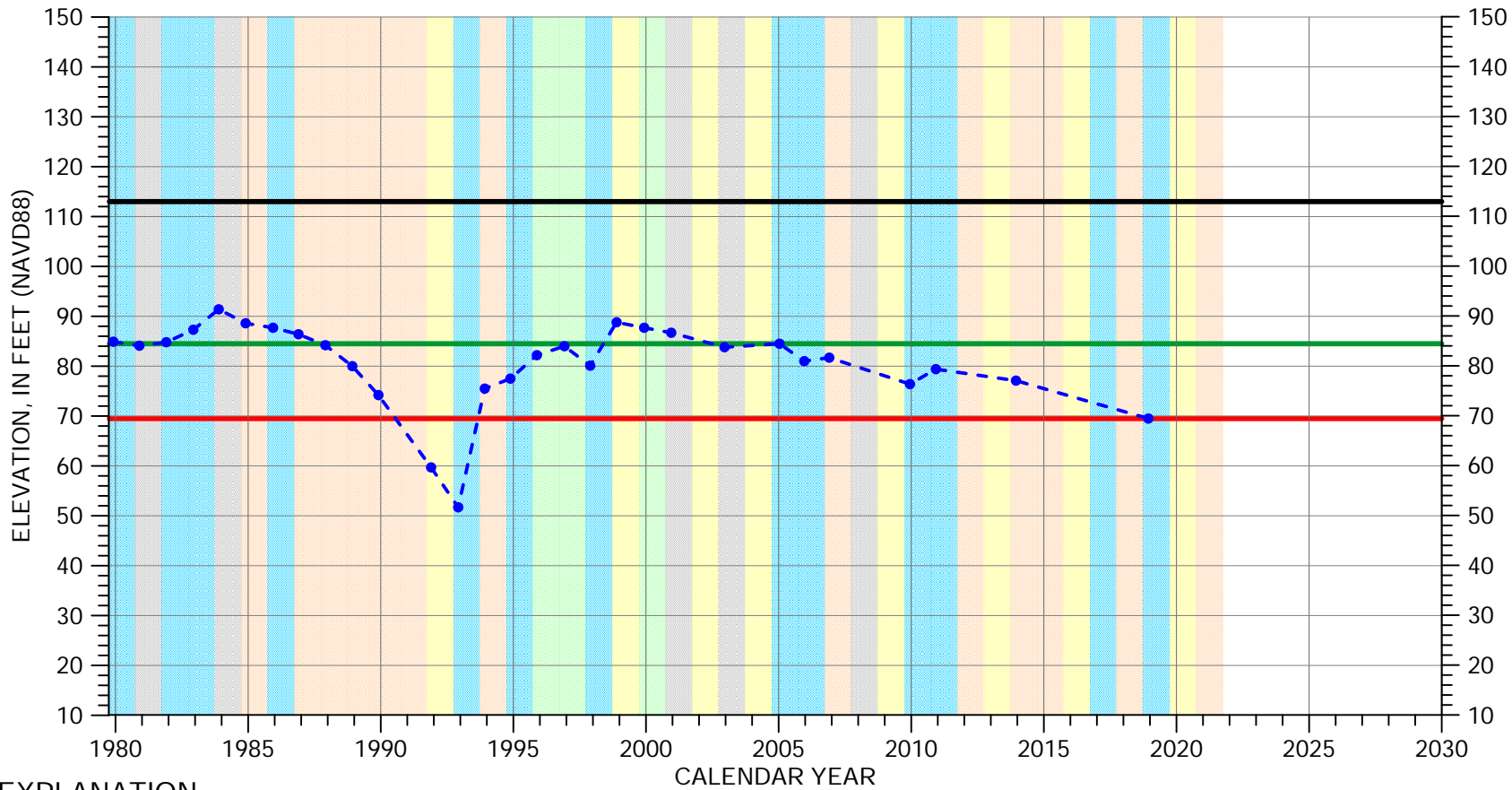
Multiple perforated intervals from -322 to -438 feet msl



Well bottom -452 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/04E-27B02

180/400-Foot Aquifer Subbasin

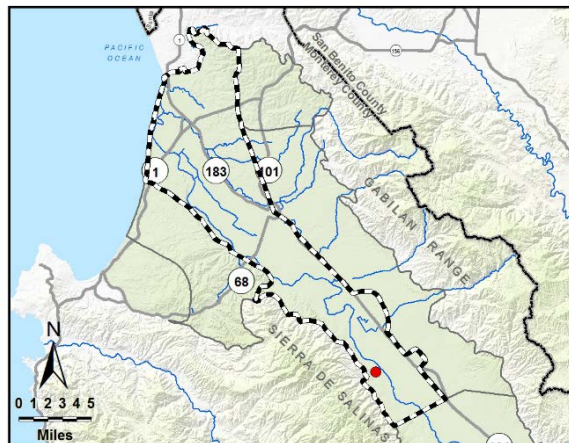


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



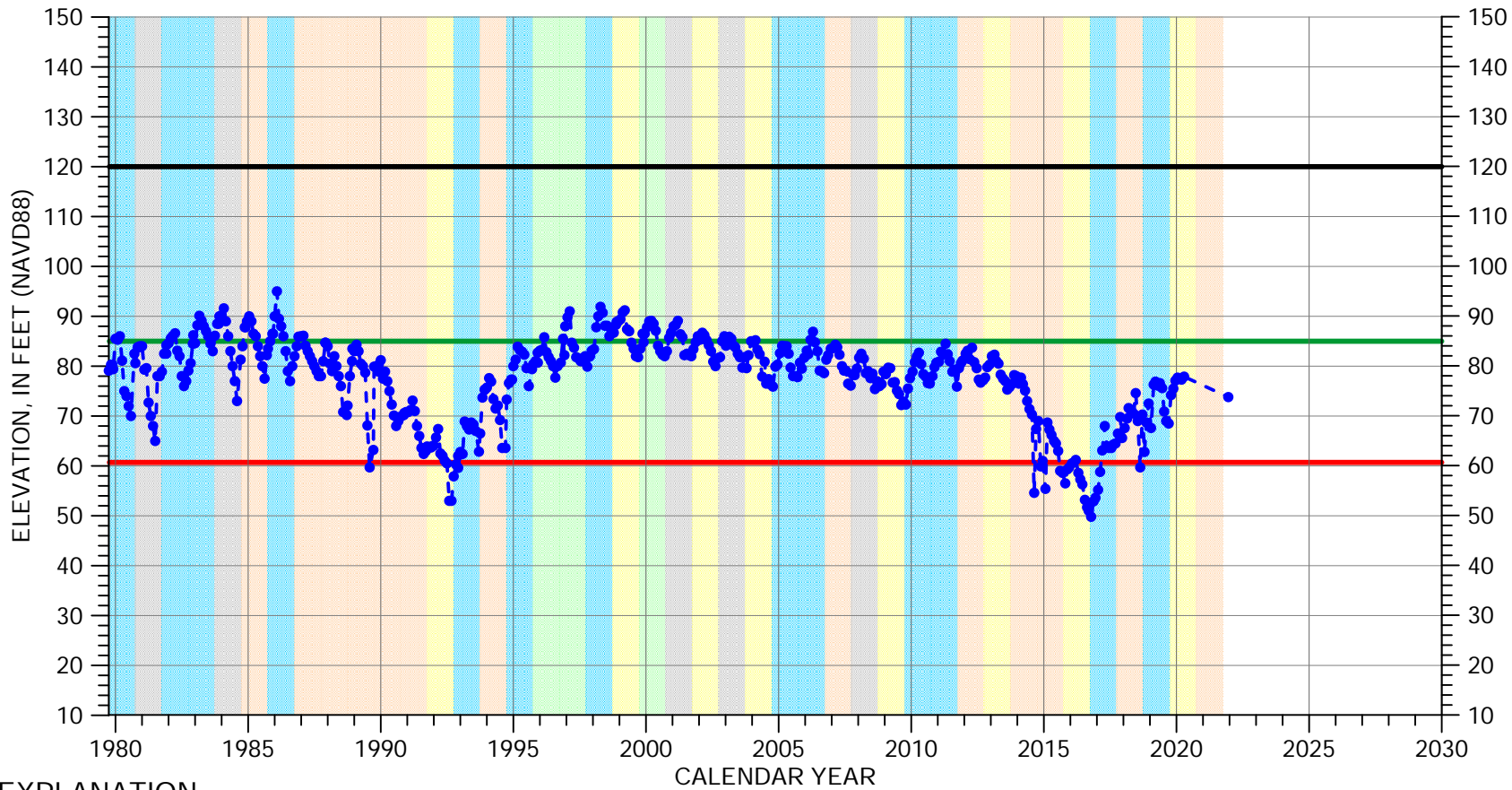
Perforated interval unknown



Well bottom
-192 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/05E-30E01

180/400-Foot Aquifer Subbasin

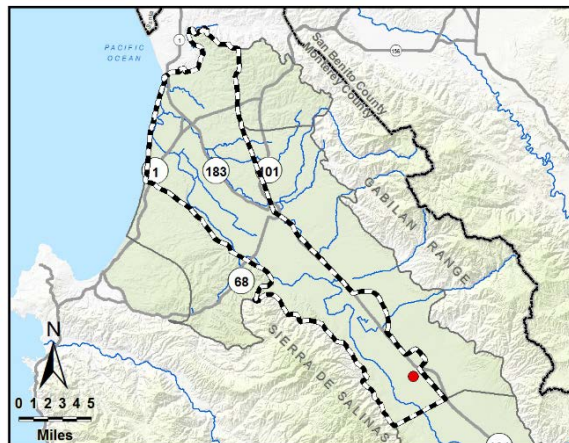


EXPLANATION

- - ● - - Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

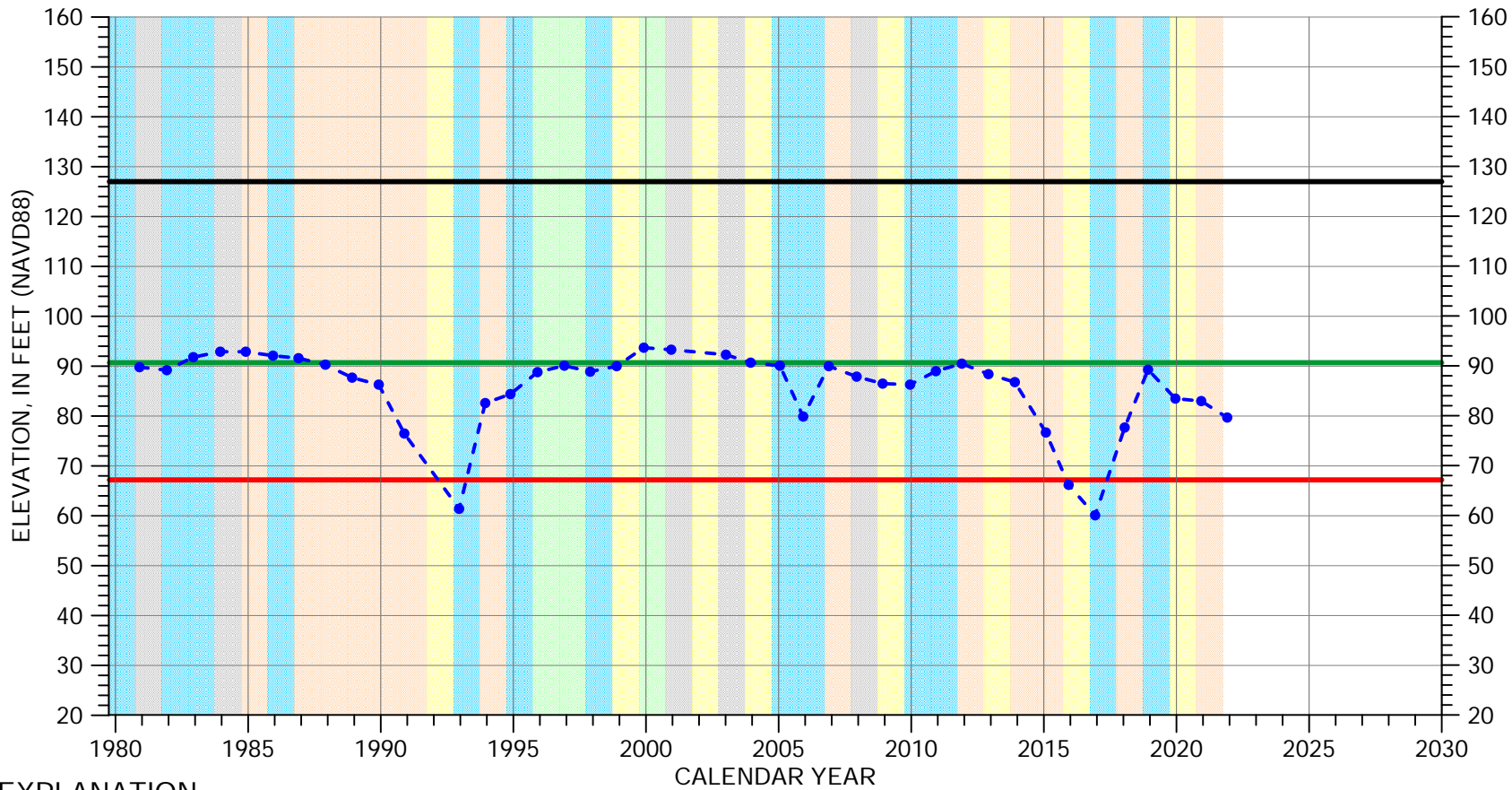
- | | |
|--|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



Well bottom
-145 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/05E-30J02

180/400-Foot Aquifer Subbasin

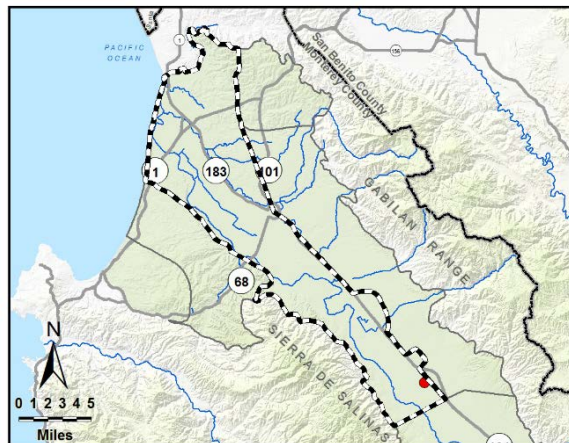


EXPLANATION

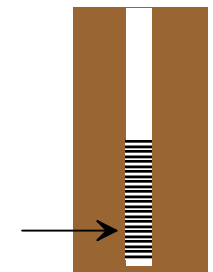
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|--|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



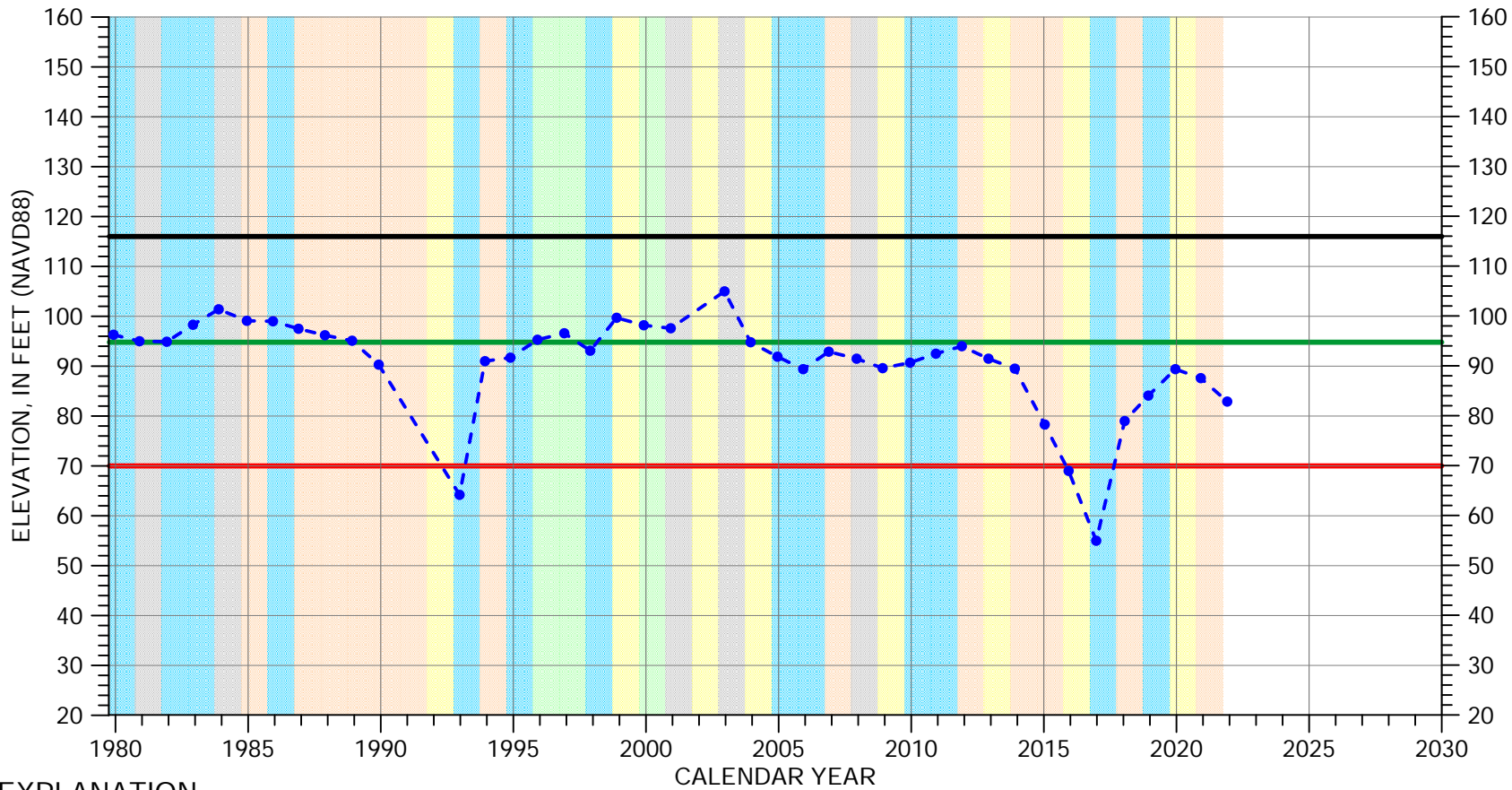
Multiple perforated intervals from -63 to -308 feet msl



Well bottom -316 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 16S/05E-31M01

180/400-Foot Aquifer Subbasin

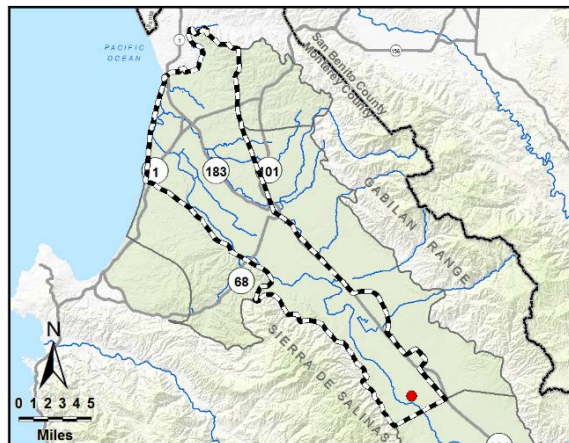


EXPLANATION

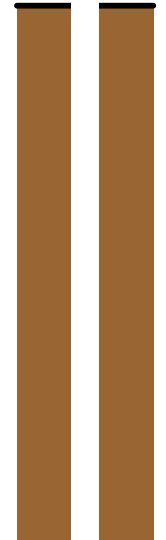
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



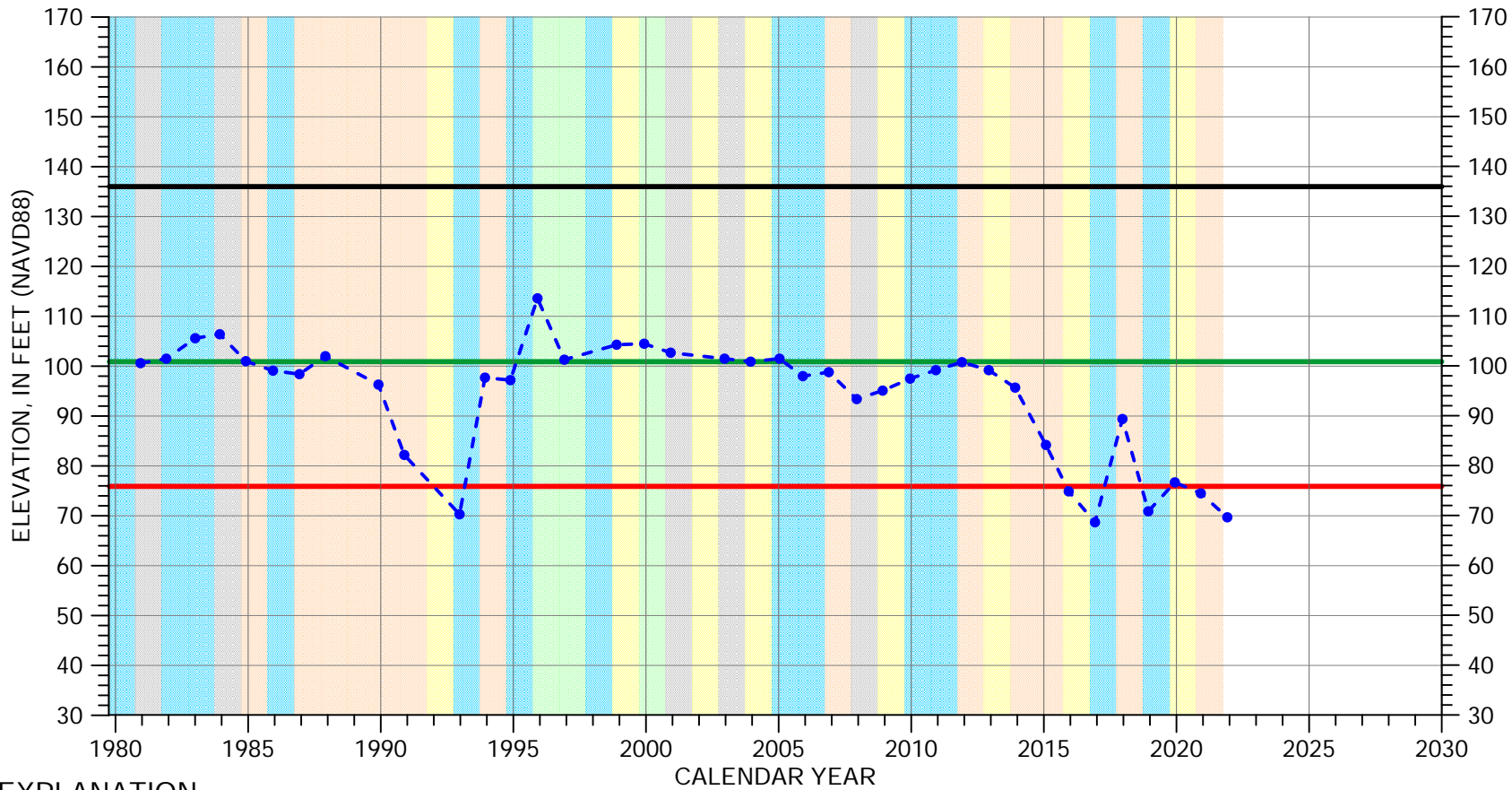
Perforated interval
unknown



Well bottom
-51 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 17S/04E-01D01

180/400-Foot Aquifer Subbasin

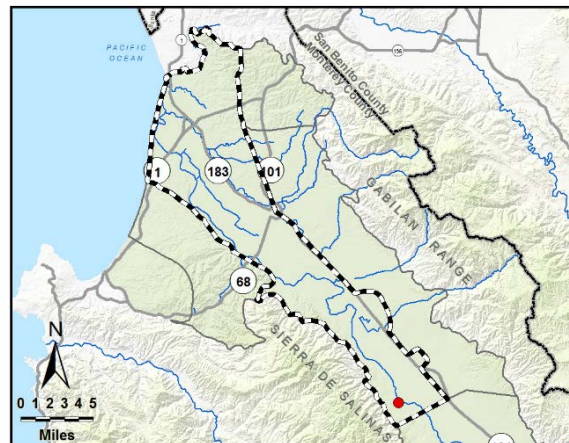


EXPLANATION

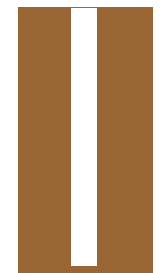
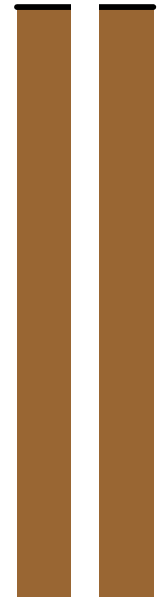
- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|---|---|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



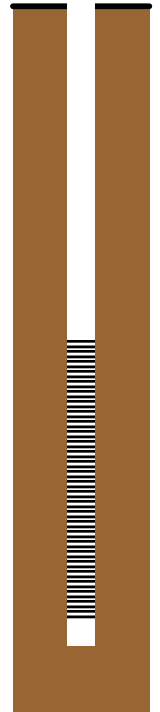
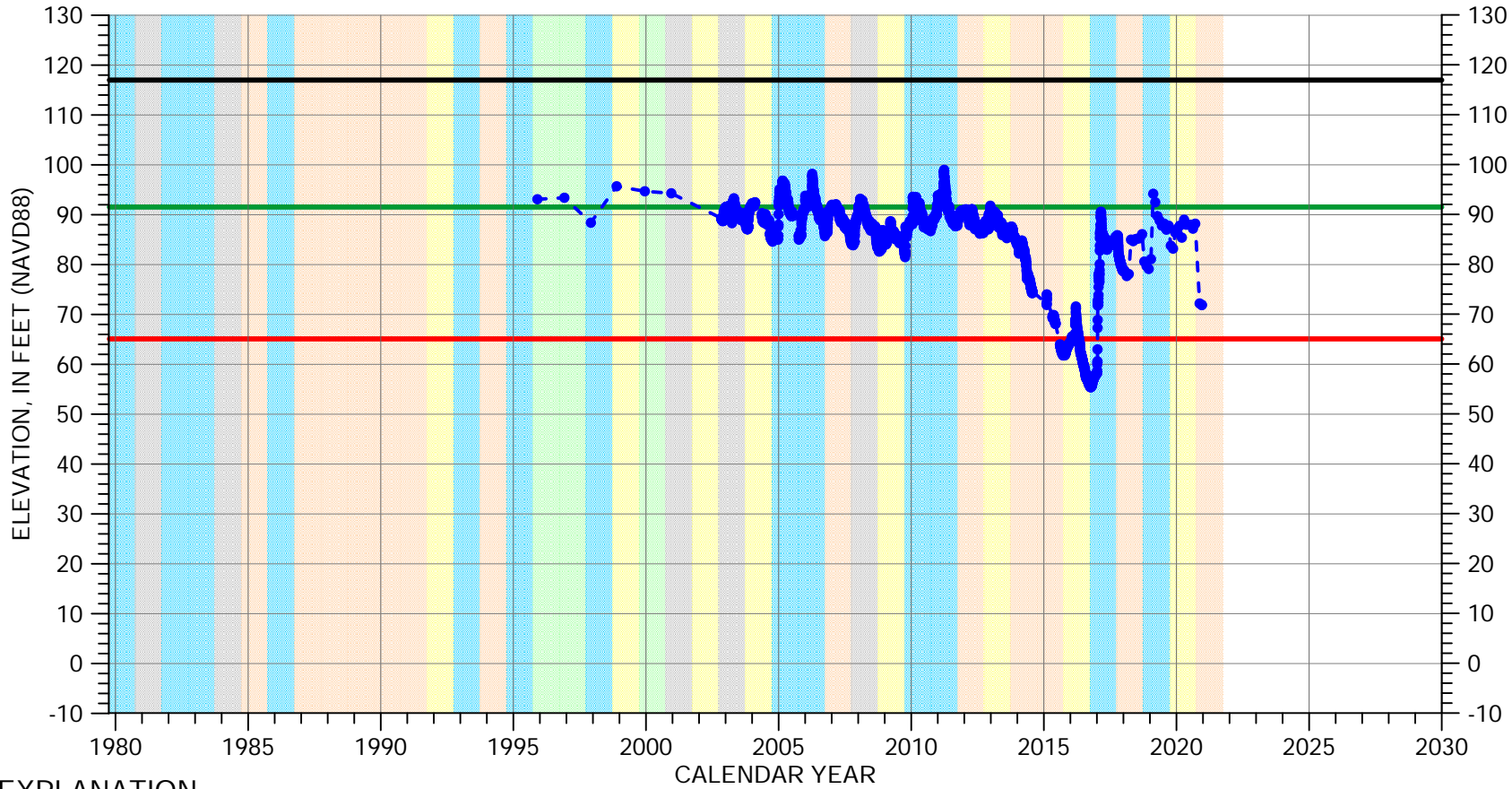
Perforated interval
unknown



Well bottom
-175 feet msl

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 17S/05E-06C02

180/400-Foot Aquifer Subbasin

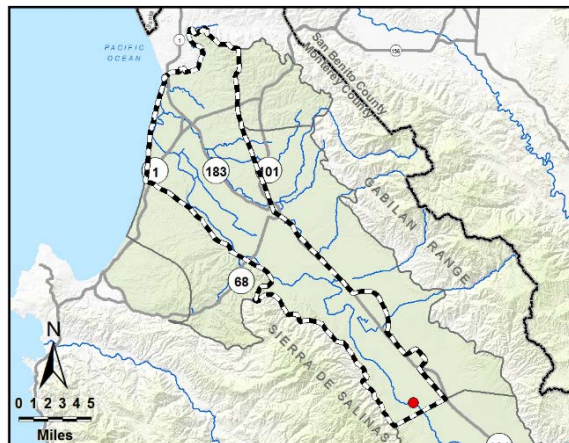


EXPLANATION

- Groundwater Elevation
- Suspect Measurement
- Land Surface
- Measurable Objective
- Minimum Threshold

WATER YEAR TYPE DESIGNATION

- | | |
|--------------|--------------|
| DRY | WET - NORMAL |
| DRY - NORMAL | WET |
| NORMAL | |



Chapter 9
Appendix 9-A

Cost Estimates for Projects

APPENDIX 9. COST ESTIMATES FOR PROJECTS AND MANAGEMENT ACTIONS

PROJECTS INCLUDED:

Project P1: Multi-benefit stream channel improvements

Project P2: CSIP System Optimization

Project P3: Modify M1W Recycled Water Plant- Winter Modifications

Project P4: CSIP Expansion

Project P5: Seawater Intrusion Extraction Barrier

Project P6: Regional Municipal Supply Project

Project P7: Seasonal Releases from Reservoirs, with Aquifer Storage and Recovery in the 180/400-Foot Aquifer Subbasin

Project P8: Irrigation Water Supply Project

Project ES1: Floodplain Enhancement and Recharge

Project ES2: 11043 Diversion at Chualar

Project ES3: 11043 Diversion at Soledad

Project M1: MCWD Recycled Water Reuse through Landscape Irrigation and Indirect Potable Reuse

Project P1: Multi-benefit stream channel improvements

Component 2

RCD Arundo Eradication Cost Estimate

Five-year cost for treating arundo (includes three herbicide treatments and mowing or hand-cutting if applicable)								
Work activity	Cost/acre for arundo control contractor	Cost/acre for biomonitoring	Cost/acre for biological surveys	Cost/acre for RCD program administration	Total Cost/acre	Estimated acres remaining	Total Cost (Low Estimate)	Total Cost (High Estimate)
Mowed arundo	\$ 10,350.00	\$ 356.04	\$ 2,127.50	\$ 2,495.50	\$ 15,329.04	700	\$ 10,730,328.00	\$ 13,949,426.40
Unmowed arundo	\$ 7,475.00	\$ 349.60	\$ 1,322.50	\$ 1,759.50	\$ 10,906.60	150	\$ 1,635,990.00	\$ 2,126,787.00
Hand-cut arundo	\$ 34,500.00	\$ 2,300.00	\$ 2,875.00	\$ 3,737.50	\$ 43,412.50	50	\$ 2,170,625.00	\$ 2,821,812.50
Est. cost of initial + retreatment							\$ 14,536,943.00	\$ 18,898,025.90

Cost of O&M	
WCS completed treatment on approximately 21 river miles in 2020	\$151,599.00
Cost per river mile of 2020 treatment	\$7,219.00
Cost per river mile rounded up	\$7,500.00
*Cost includes biological surveys and monitoring	
*90 miles of river in Monterey County	
Cost for retreating whole river 1 time	\$675,000.00
Cost to re-treat equivalent of whole river five times over 25 years	\$3,375,000.00
Cost of helicopter survey to re-map arundo over whole river	\$400,000.00
RCD admin costs @ 20% of contractor cost	\$755,000.00
Total cost for O&M	\$4,130,000.00
Average annual cost (total cost/25 years)	\$165,200.00

Capital and Annualized Costs
Multi-Benefit Stream Channel Improvement - Component 2 - Low Estimate
(Preliminary Cost Estimate)

SUMMARY					
Line No.	Description		Units		Total
1	Project Yield (high estimate)		acre-feet per year		20,880
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$14,536,943
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$1,100,000
7	Annual O&M Cost		\$		\$165,200
8	Total Annualized Cost		\$		\$1,265,200
9	Unit Cost		\$/AFY		\$60
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Mowed arundo	700	Acres	\$15,329	\$10,730,328
11	Unmowed arundo	150	Acres	\$10,907	\$1,635,990
12	Hand-cut arundo	50	Acres	\$43,413	\$2,170,625
13	Subtotal				\$14,536,943
OPERATIONS AND MAINTENANCE					
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
16	O&M Estimate	1	LS	\$165,200	\$165,200
17	Total O&M Cost				\$165,200

NOTES:

1. "Project Yield" based on: Range of 6,000 to 36,000 AF, assumed an average of 20,000 AF
2. "Facility Life" selected based on 25-yr anticipated life of facilities.
3. "Interest Rate" selected within expected range for public-financing options.
4. "Capital Cost" based on: Phase I and Phase II.
5. "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
6. "Annualized Capital Cost" based on facility life and interest rate.
7. "Annual O&M Cost" estimate based on average annual needs for on going monitoring and maintenance (chemical treatment every 3 to 5 years).

Capital and Annualized Costs
Multi-Benefit Stream Channel Improvement - Component 2 - High Estimate
(Preliminary Cost Estimate)

SUMMARY					
Line No.	Description		Units		Total
1	Project Yield (low estimate)		acre-feet per year		2,790
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$18,898,026
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$1,500,000
7	Annual O&M Cost		\$		\$165,200
8	Total Annualized Cost		\$		\$1,665,200
9	Unit Cost		\$/AFY		\$600
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Mowed arundo	700	Acres	\$19,928	\$13,949,426
11	Unmowed arundo	150	Acres	\$14,179	\$2,126,787
12	Hand-cut arundo	50	Acres	\$56,436	\$2,821,813
13	Subtotal				\$18,898,026
OPERATIONS AND MAINTENANCE					
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
16	O&M Estimate	1	LS	\$165,200	\$165,200
17	Total O&M Cost				\$165,200

NOTES:

1. "Project Yield" based on: Range of 6,000 to 36,000 AF, assumed an average of 20,000 AF
2. "Facility Life" selected based on 25-yr anticipated life of facilities.
3. "Interest Rate" selected within expected range for public-financing options.
4. "Capital Cost" based on: Phase I and Phase II.
5. "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
6. "Annualized Capital Cost" based on facility life and interest rate.
7. "Annual O&M Cost" estimate based on average annual needs for on going monitoring and maintenance (chemical treatment every 3 to 5 years).

Component 3

Capital and Annualized Costs
Multi-Benefit Stream Channel Improvements - Component 3
(Preliminary Opinion of Probable Cost)

Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		100
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$1,116,000
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$87,300
7	Annual O&M Cost		\$		\$6,000
8	Total Annualized Cost		\$		\$93,300
9	Unit Cost		\$/AF		\$930
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Mobilization/Demobilization	1	LS	\$52,000	\$52,000
11	Environmental and Stormwater	1	LS	\$103,000	\$103,000
12	Off-Stream Recharge Basin	8.5	AC	\$48,500	\$412,250
13	Land Acquisition	1	AC	\$45,000	\$45,000
14	<i>Subtotal</i>				\$612,250
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
15	Construction Contingency			30%	\$124,000
16	General Conditions			15%	\$92,000
17	Contractor Overhead and Profit			15%	\$92,000
18	Sales Tax			9.25%	\$11,300
19	Engineering, Legal, Administrative, Contingencies			30%	\$184,000
20	Total Capital Cost				\$1,116,000
OPERATIONS AND MAINTENANCE					
Line No.	Description	Quantity	Unit	Unit Cost	Total Cost
21	Detention Basin Maintenance	1	LS	\$4,300	\$4,300
22	Contingency			30%	\$1,300
23	Total O&M Cost				\$6,000

NOTES:

1. "Project Yield" based on: Assumed 100 acre-feet per year.
2. "Facility Life" selected based on 25-yr anticipated life of facilities.
3. "Interest Rate" selected within expected range for public-financing options.
4. "Capital Cost" includes land acquisition costs estimated for an area equivalent to 10% of required recharge basin area. Recharge basin unit cost assumes inclusion of site civil earthwork and access road improvements. Environmental and stormwater requirements are estimate at 15% of capital base costs for off-stream basins.
5. "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
6. "Annualized Capital Cost" based on facility life and interest rate.

Project P2: CSIP System Optimization

Capital and Annualized Costs P2. CSIP System Optimization (Preliminary Cost Estimate)

Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		5,000
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$24,300,000
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$1,901,000
7	Annual O&M Cost		\$		\$240,000
8	Total Annualized Cost		\$		\$2,141,000
9	Unit Cost		\$/AF/yr.		\$430
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Hydraulic Modeling & Irrigation S	1	EA	\$1,000,000	\$1,000,000
11	Upgrade A-1 Junction	1	EA	\$2,000,000	\$2,000,000
12	Additional Storage Reservoirs, 75 AF	1	EA	\$1,200,000	\$1,200,000
13	Pipeline - 36" Turnout Into New Basin	400	LF	\$400	\$160,000
14	Pipeline - 51" Pipe from Basin to CSIP Distribution	6,200	LF	\$600	\$3,720,000
15	Pipeline - Unknown Size	5,000	LF	\$500	\$2,500,000
16	Land Cost	12.5	AC	\$45,000	\$562,500
17	Subtotal (2019 estimate)				\$11,142,500
18	<i>Subtotal escalated by 20% for inflation</i>				\$13,371,000
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
19	Plumbing Appurtenance Contingency			30%	\$2,548,800
20	General Conditions			15%	\$2,005,700
21	Contractor Overhead and Profit			15%	\$2,005,700
22	Sales Tax			8.75%	\$351,000
23	Engineering, Legal, Administrative, Contingencies			30%	\$4,011,300
24	<i>Total Capital Cost escalated by 20% inflation</i>				\$24,300,000
OPERATIONS AND MAINTENANCE					
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
26	Irrigation Scheduling System (I&S)	1	LS	\$40,000	\$40,000
27	Labor	1	LS	\$115,200	\$115,200
28	Contingency			30%	\$46,600
29	Total O&M Annual Cost (2019 estimate)				\$200,000
30	<i>Total O&M Annual Cost escalated by 20% for inflation</i>				\$240,000

NOTES:

- "Project Yield" based on: 3700 AFY from avoided well pumping, 1800 AFY from additional extraction from SRDF.
- "Facility Life" selected based on 25-yr anticipated life of facilities.
- "Interest Rate" selected within expected range for public-financing options.
- "Capital Cost" does not include additional treatment costs.
- "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
- "Annualized Capital Cost" based on facility life and interest rate.
- "Annual O&M Cost" estimate does not include O&M cost for treatment components of project.
- "Unit Cost" estimate does not include unit cost for treatment components of project.
- 18, 24, 30. Costs escalated by 20% for inflation since original 2019 estimate.

Project P3: Modify M1W Recycled Water Plant- Winter Modifications

Capital and Annualized Costs P3. Modify M1W Recycled Water Plant - Winter Modifications (Preliminary Cost Estimate)

Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		800
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$8,967,402
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$701,500
7	Annual O&M Cost		\$		\$12,100
8	Total Annualized Cost		\$		\$713,600
9	Unit Cost		\$/AF/yr.		\$892
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Pipeline and Diversion Structures	1	LS	\$4,194,000	\$4,194,000
11	Chlorine Contact Structure Modifications	1	LS	443,000.00	\$443,000
12	Dry Scrubbers	1	LS	\$2,005,520	\$2,005,520
13	Subtotal				\$6,642,520
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
14	Engineering and Administration			35%	\$2,324,882
15	Total Capital Cost				\$8,967,402
OPERATIONS AND MAINTENANCE					
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
16	Labor and Media Replacement Costs	1	LS	12,100.00	\$12,100
17	Total O&M Annual Cost				\$12,100

NOTES:

- "Project Yield" based on: avoided wet weather groundwater pumping based on historical pumping records in the CSIP area.
- "Facility Life" selected based on 25-yr anticipated life .
- "Interest Rate" selected within expected range for public-financing options.
- "Capital Cost" based on M1W, 2018, Winter Recycled Water Use Efficiency Improvements: Technical Project Report, December, escalated by 20% for inflation.
- "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
- "Annual O&M Cost" based on M1W, 2018, Winter Recycled Water Use Efficiency Improvements: Technical Project Report, December, escalated by 20% for inflation.
- 13, 15, 17. Cost escalation by 20% for inflation where based on 2019 estimate.

Project P4: CSIP Expansion

Capital and Annualized Costs P4. CSIP Expansion (Preliminary Cost Estimate)

Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		7,000
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$88,039,000
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$6,887,300
7	Annual O&M Cost		\$		\$576,000
8	Total Annualized Cost		\$		\$7,463,300
9	Unit Cost		\$/AF/yr.		\$1,070
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Pipeline	68,640	LF	\$500	\$34,320,000
11	Booster Pump System, 5 MGD	3	EA	\$34,139	\$102,400
12	Turnouts	26	EA	\$2,500	\$65,000
13	Booster Station	2	EA	\$1,500,000	\$3,000,000
14	HDD	800	LF	\$750	\$600,000
15	Subtotal				\$38,087,400
16	Subtotal escalated by 20% for inflation				\$45,704,880
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
17	Plumbing Appurtenance Contingency			30%	\$13,711,440
18	General Conditions			15%	\$6,855,700
19	Contractor Overhead and Profit			15%	\$6,855,700
20	Sales Tax			8.75%	\$1,199,800
21	Engineering, Legal, Administrative, Contingencies			30%	\$13,711,500
22	Total Capital Cost escalated by 20% inflation				\$88,039,000
OPERATIONS AND MAINTENANCE					
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
23	Distribution System Maintenance	3500	Acre	\$138	\$480,000
24	Total O&M Annual Cost (2019 estimate)				\$480,000
25	Total O&M Annual Cost escalated by 20% for inflation				\$576,000

NOTES:

1. "Project Yield" based on: avoided wet weather groundwater pumping based on historical puming records, and updated by M1W based on average CSIP water demand.
2. "Facility Life" selected based on 25-yr anticipated life.
3. "Interest Rate" selected within expected range for public-financing options.
4. "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
5. "Unit Cost" estimate does not include unit cost for treatment components of project.
- 16, 22, 25. Costs escalated by 20% for inflation since original 2019 estimate.

Project P5: Seawater Intrusion Extraction Barrier

Capital and Annualized Costs P5. Seawater Intrusion Extraction Barrier (Preliminary Cost Estimate)

Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		-30,000
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$122,866,000
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$9,611,800
7	Annual O&M Cost		\$		\$11,731,700
8	Total Annualized Cost		\$		\$21,343,500
9	Unit Cost		\$/AFY		\$710
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Well Construction	18	EA	\$750,000	\$13,500,000
11	Well Pumps and Motors	18	EA	\$150,000	\$2,700,000
12	Well Head Infrastructure	18	EA	\$125,000	\$2,250,000
13	Electrical and Instrumentation	1	EA	\$3,500,000	\$3,500,000
14	Piping (8" to 36")	44,000	LF	\$600	\$26,400,000
15	Rehab Outfall	1	LS	\$2,500,000	\$2,500,000
16	Land Access	18	25%	\$187,500	\$3,375,000
17	Subtotal				\$54,225,000
18	<i>Subtotal escalated by 20% for inflation</i>				\$65,070,000
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
19	Plumbing Appurtenance Contingency			30%	\$17,046,000
20	General Conditions			15%	\$9,760,500
21	Contractor Overhead and Profit			15%	\$9,760,500
22	Sales Tax			8.75%	\$1,708,100
23	Engineering, Legal, Administrative, Contingencies			30%	\$19,521,000
24	<i>Total Capital Cost escalated by 20% inflation</i>				\$122,866,000
OPERATIONS AND MAINTENANCE					
Line No.	Description	Quantity	Unit	Unit Cost	Total Cost
25	Power	1	LS	\$2,652,590	\$2,652,600
26	Equipment Repair & Replacement	1	LS	\$1,366,200	\$1,366,200
27	Operations Labor	1	LS	\$3,324,420	\$3,324,400
28	Miscellaneous	1	LS	\$803,758	\$803,800
29	Contingency			20%	\$1,629,400
30	Total O&M Annual Cost (2019 estimate)				\$9,776,400
31	<i>Total O&M Annual Cost escalated by 20% for inflation</i>				\$11,731,680

NOTES:

- "Project Yield" based on: 1000 gpm/well, 22 wells, 365 days project operation (Jan - Dec), 100% project operational utilization.
- "Facility Life" selected based on 25-yr anticipated life of extraction wells.
- "Interest Rate" selected within expected range for public-financing options.
- "Capital Cost" based on: construction \$750,000/well, 22 wells, land acquisition at @25%, pumps & motors \$150,000/well, wellhead infrastructure \$125,000/well, electrical & instrumentation \$3,500,000.
- "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
- "Annualized Capital Cost" based on well facilities only; estimate does not include capital costs for conveyance and treatment components of project.
- "Annual O&M Cost" based on well operations and maintenance only; estimate does not include O&M cost for conveyance and treatment components of project.
- "Unit Cost" based on well facilities only; estimate does not include unit cost for conveyance and treatment components of project.
- 18, 24, 31. Costs escalated by 20% for inflation since original 2019 estimate.

Project P6: Regional Municipal Supply Project

Capital and Annualized Costs Regional Alternative Water Supply Project (Preliminary Cost Estimate)

Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		15,000
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$309,387,000
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$24,203,300
7	Annual O&M Cost		\$		\$11,874,000
8	Total Annualized Cost		\$		\$36,077,300
9	Unit Cost		\$/AFY		\$2,405
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	SWRO Facility	13	MGD	\$14,000,000	\$182,000,000
11	Source Water Pipeline	58,080	LF	\$400	\$23,232,000
12	Subtotal				\$205,232,000
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
13	General Conditions			15%	\$30,784,800
14	Contractor Overhead and Profit			18%	\$36,941,800
15	Sales Tax			8.75%	\$17,957,800
16	Engineering, Legal, Administrative, Contingencies			20%	\$12,313,900
17	Bonds and Insurance			3%	\$6,157,000
18	Total Capital Cost				\$309,387,000
OPERATIONS AND MAINTENANCE					
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
19	Desalination O&M	13	MGD	\$913,400	\$11,874,200
1	Total O&M Annual Cost				\$11,874,000

NOTES:

- "Facility Life" selected based on 25-yr anticipated life of extraction wells.
- "Interest Rate" selected within expected range for public-financing options.
- "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.

Project P7: Seasonal Releases from Reservoirs, with Aquifer Storage and Recovery in the 180/400-Foot Aquifer Subbasin

Capital and Annualized Costs P7. Seasonal Release with ASR (direct delivery option not estimated) (Preliminary Cost Estimate)					
Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		6,800
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$166,954,000
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$13,061,000
7	Annual O&M Cost		\$		\$4,349,000
8	Total Annualized Cost		\$		\$17,410,000
9	Unit Cost		\$/AF/yr.		\$2,560
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Well Construction	16	EA	\$618,340	\$9,893,400
11	Well Pumps and Motors	16	EA	\$150,000	\$2,400,000
12	Well Head Infrastructure	16	EA	\$125,000	\$2,000,000
13	Electrical and Instrumentation	16	10%	\$61,800	\$988,800
14	Percolation Basins, Site Civil Work	16	25%	\$154,600	\$2,473,600
15	Land Access	16	25%	\$154,600	\$2,473,600
16	Distribution Pipeline (4 mile)	21,120	LF	\$650	\$13,728,000
17	Filtration and Disinfection System	1	LS	\$70,000,000	\$70,000,000
18	Subtotal				\$103,957,400
19	Subtotal escalated by 20% for inflation				\$110,748,880
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
20	General Conditions			15%	\$16,612,300
21	Contractor Overhead and Profit			18%	\$19,934,800
22	Sales Tax			8.75%	\$9,690,500
23	Engineering, Legal, Administrative, Contingencies			20%	\$6,644,900
24	Bonds and Insurance			3%	\$3,322,500
25	Total Capital Cost escalated by 20% inflation				\$166,954,000
OPERATIONS AND MAINTENANCE					
Line No.	Description	Quantity	Unit	Unit Cost	Total Cost
26	Power	1	LS	\$1,152,800	\$1,152,800
27	Equipment Repair & Replacement	1	LS	\$1,188,000	\$1,188,000
28	Operations Labor	1	LS	\$211,200	\$211,200
29	Miscellaneous	1	LS	\$468,200	\$468,200
30	Contingency			20%	\$604,000
31	Total O&M Annual Cost escalated by 20% for inflation				\$4,349,000

NOTES:

1. "Project Yield" based on: 49 CFS radial collector (22,000 GPM) and 50% facility up time.
2. "Facility Life" selected based on 25-yr anticipated life of extraction wells.
3. "Interest Rate" selected within expected range for public-financing options.
4. "Capital Cost" based on: construction \$750,000/well, 22 wells, land acquisition @25%, pumps & motors \$150,000/well, wellhead infrastructure \$125,000/well, electrical & instrumentation \$3,500,000.
5. "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
6. "Annualized Capital Cost" based on well facilities only; estimate does not include capital costs for conveyance and treatment components of project.
7. "Annual O&M Cost" based on well operations and maintenance only; estimate does not include O&M cost for conveyance and treatment components of project.
9. "Unit Cost" based on well facilities only; estimate does not include unit cost for conveyance and treatment components of project.
17. "Filtration and Disinfection System" cost added to original estimate; cost estimate from 2021, so no inflation applied to this line.

Project P8: Irrigation Water Supply Project

Capital and Annualized Costs P8. Irrigation Water Supply Project (Preliminary Cost Estimate)

Line #	Description		Units		Total
1	Project Yield		acre-feet per year		3,000
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$5,925,000
5	Cost Recovery Factor		–		0.078
6	Annualized Capital Cost		\$		\$463,500
7	Annual O&M Cost		\$		\$867,600
8	Total Annualized Cost		\$		\$1,331,100
9	Unit Cost		\$/AF/yr.		\$444
CAPITAL COSTS					
Line #	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Well Construction	3	EA	\$750,000	\$2,250,000
11	Well Pumps and Motors	3	EA	\$200,000	\$600,000
12	Well Head Infrastructure	3	EA	\$125,000	\$375,000
13	Electrical and Instrumentation	1	EA	\$725,000	\$725,000
14	Land Access	1	25%	\$987,500	\$987,500
15	Subtotal				\$4,937,500
16	<i>Subtotal escalated by 20% for inflation</i>				\$5,925,000
Line #	Markups	Quantity	Unit	Unit Cost	Total Cost
17	General Conditions			15%	\$888,800
18	Contractor Overhead and Profit			18%	\$1,066,500
19	Sales Tax			8.75%	\$518,400
20	Engineering, Legal, Administrative, Contingencies			20%	\$1,185,000
21	Bonds and Insurance			3%	\$177,800
22	<i>Total Capital Cost escalated by 20% inflation</i>				\$9,762,000
OPERATIONS AND MAINTENANCE					
Line #	Description	Quantity	Unit	Unit Cost	Total Cost
23	Electrical power	1	LS	\$659,800	\$659,800
24	Labor	1	LS	\$28,800	\$28,800
25	Other ancillary services, equip	1	LS	\$34,400	\$34,400
26	<i>Total O&M Annual Cost escalated by 20% for inflation</i>				\$867,600

NOTES:

- "Project Yield" based on: 3000 AFY
- "Facility Life" selected based on 25-yr anticipated life of extraction wells.
- "Interest Rate" selected within expected range for public-financing options.
- "Capital Cost" based on: detail below; does not include additional treatment costs.
- "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
- "Annualized Capital Cost" based on detail below.
- "Annual O&M Cost" based on well operations and maintenance only; estimate does not include O&M cost for treatment components of project.
- "Unit Cost" estimate does not include unit cost for treatment components of project.
- 16, 22, 26. Costs escalated by 20% for inflation since original 2019 estimate.

Project ES1: Floodplain Enhancement and Recharge

Capital and Annualized Costs
Eastside Subbasin - Project No. 6, Eastside Floodplain Enhancement and Recharge
(Preliminary Opinion of Probable Cost)

Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		1,000
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$12,596,000
5	Cost Recovery Factor		--		0.078
6	Annualized Capital Cost		\$		\$985,400
7	Annual O&M Cost		\$		\$64,000
8	Total Annualized Cost		\$		\$1,049,400
9	Unit Cost		\$/AF		\$1,050
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
10	Mobilization/Demobilization	1	LS	\$328,000	\$328,000
11	Environmental and Stormwater	1	LS	\$1,313,000	\$1,313,000
11	No. 5, Natividad Road (Gabilan Ck)	40	AC	\$48,500	\$1,940,000
12	No. 6 Old Stage Natividad	1.1	AC	\$48,500	\$53,350
13	No. 7 Old Stage Alisal	7.1	AC	\$48,500	\$344,350
14	No 8 Old Stage Upper/Lower	18.1	AC	\$48,500	\$877,850
1	No. 11 Airport	32.7	AC	\$48,500	\$1,585,950
2	Land Access	1	LS	\$450,000	\$450,000
2	<i>Subtotal</i>				\$6,892,500
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
3	Construction Contingency			30%	\$1,440,000
4	General Conditions			15%	\$1,034,000
5	Contractor Overhead and Profit			15%	\$1,034,000
6	Sales Tax			9.25%	\$127,500
7	Engineering, Legal, Administrative, Contingencies			30%	\$2,068,000
8	Total Capital Cost				\$12,596,000
OPERATIONS AND MAINTENANCE					
Line No.	Description	Quantity	Unit	Unit Cost	Total Cost
9	Detention Basin Maintenance	1	LS	\$49,500	\$49,500
10	Contingency			30%	\$14,900
11	Total O&M Cost				\$64,000

NOTES:

1. "Project Yield" based on: Estimated detention basin benefits as provided in February 2021 presentation, *Salinas Valley Stormwater Plan Implementation*, Watershed Coordinator Support.
2. "Facility Life" selected based on 25-yr anticipated life of facilities.
3. "Interest Rate" selected within expected range for public-financing options.
4. Line 11, Environmental and stormwater requirements, are estimated at 25% of capital base costs for in-stream basins.
5. Line 12 includes construction of the recharge basin; this cost assumes inclusion of site civil earthwork and access road improvements.
6. Line 13 land access costs are those for acquiring access to land for construction through an easement, license, or other mechanism.
7. "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
8. "Annualized Capital Cost" based on facility life and interest rate.

Project ES2: 11043 Diversion at Chualar

Capital and Annualized Costs 11043 Diversion at Chualar (Preliminary Cost Estimate)

Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		4,600
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$55,684,000
5	Cost Recovery Factor		-		0.078
6	Annualized Capital Cost		\$		\$4,356,200
7	Annual O&M Cost		\$		\$1,538,700
8	Total Annualized Cost		\$		\$5,894,900
9	Unit Cost		\$/AFY		\$1,280
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
Phase I - Chualar Diversion					
10	Pipeline	23,750	LF	\$600	\$14,250,000
11	Radial Collector, Booster Pump System (32 MGD firm capacity)	1	LS	\$4,334,000	\$4,334,000
12	Radial Collector, Electrical and Controls	1	LS	\$2,332,000	\$2,332,000
13	Radial Collector, Concrete Structures and Laterals	1	LS	\$4,992,000	\$4,992,000
14	Infiltration Basins (including land costs)	1	EA	\$3,000,000	\$3,000,000
15	<i>Subtotal</i>				\$28,908,000
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
16	Plumbing Appurtenance Contingency			30%	\$8,672,400
17	General Conditions			15%	\$4,336,200
18	Contractor Overhead and Profit			15%	\$4,336,200
19	Sales Tax			8.75%	\$758,800
20	Engineering, Legal, Administrative, Contingencies			30%	\$8,672,400
21	Total Capital Cost				\$55,684,000
OPERATIONS AND MAINTENANCE					
Line No.	Description	Quantity	Unit	Unit Cost	Total Cost
22	Power	1	LS	\$181,200	\$181,200
23	Labor (Diversion Facilities, Basins)	1	LS	\$710,400	\$710,400
24	Equipment Repair & Replacement	1	LS	\$213,100	\$213,100
25	Miscellaneous Allowance	1	LS	\$78,860	\$78,900
26	Contingency			30%	\$355,100
27	Total O&M Cost				\$1,538,700

NOTES:

1. "Project Yield" based on: 25 cfs pumping 120 days per year at Chualar Diversion site with new radial collector well..
2. "Facility Life" selected based on 25-yr anticipated life of facilities.
3. "Interest Rate" selected within expected range for public-financing options.
4. "Capital Cost" does not include additional treatment costs.
5. "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
6. "Annualized Capital Cost" based on facility life and interest rate.
7. "Unit Cost" estimate does not include unit cost for treatment components of project.

Project ES3: 11043 Diversion at Soledad

Capital and Annualized Costs 11043 Diversion at Soledad (Preliminary Cost Estimate)

Line No.	Description		Units		Total
1	Project Yield		acre-feet per year		4,600
2	Facility Life		years		25
3	Interest Rate		%		6
4	Capital Cost		\$		\$104,688,000
5	Cost Recovery Factor		-		0.078
6	Annualized Capital Cost		\$		\$8,189,700
7	Annual O&M Cost		\$		\$1,538,700
8	Total Annualized Cost		\$		\$9,728,400
9	Unit Cost		\$/AFY		\$2,110
CAPITAL COSTS					
Line No.	Capital	Quantity	Unit	Unit Cost	Total Cost
Phase II - Soledad Diversion					
10	Pipeline	66,150	LF	\$600	\$39,690,000
11	Radial Collector, Booster Pump System (32 MGD firm capacity)	1	LS	\$4,334,000	\$4,334,000
12	Radial Collector, Electrical and Controls	1	LS	\$2,332,000	\$2,332,000
13	Radial Collector, Concrete Structures and Laterals	1	LS	\$4,992,000	\$4,992,000
14	Infiltration Basins (including land costs)	1	EA	\$3,000,000	\$3,000,000
15	<i>Subtotal</i>				\$54,348,000
Line No.	Markups	Quantity	Unit	Unit Cost	Total Cost
16	Plumbing Appurtenance Contingency			30%	\$16,304,400
17	General Conditions			15%	\$8,152,200
18	Contractor Overhead and Profit			15%	\$8,152,200
19	Sales Tax			8.75%	\$1,426,600
20	Engineering, Legal, Administrative, Contingencies			30%	\$16,304,400
21	Total Capital Cost				\$104,688,000
OPERATIONS AND MAINTENANCE					
Line No.	Description	Quantity	Unit	Unit Cost	Total Cost
22	Power	1	LS	\$181,200	\$181,200
23	Labor (Diversion Facilities, Basins)	1	LS	\$710,400	\$710,400
24	Equipment Repair & Replacement	1	LS	\$213,100	\$213,100
29	Miscellaneous Allowance	1	LS	\$78,860	\$78,900
30	Contingency			30%	\$355,100
31	Total O&M Cost				\$1,538,700

NOTES:

- "Project Yield" based on: 25 cfs pumping 120 days per year at Soledad Diversion site with new radial collector well.
- "Facility Life" selected based on 25-yr anticipated life of facilities.
- "Interest Rate" selected within expected range for public-financing options.
- "Capital Cost" does not include additional treatment costs.
- "Cost Recovery Factor" based on anticipated Facility Life and Interest Rate.
- "Annualized Capital Cost" based on facility life and interest rate.
- "Unit Cost" estimate does not include unit cost for treatment components of project.

Project M1: MCWD Recycled Water Reuse through Landscape Irrigation and Indirect Potable Reuse

Conceptual Cost Estimate
Project M3: Recycled Water Reuse Through Landscape Irrigation and Indirect Potable Reuse
 2,400 AFY 180/400 Foot Aquifer Injection Alternative

Description	Quantity	Units	Unit Cost	Total	Basis for Cost	
Capital Costs (a)						
<i>AWPF Facility Expansion</i>						
AWPF Expansion Construction Cost	1	LS	\$10,930,000	\$ 10,930,000	Costs for a 2,250 AFY expansion were presented in M1W Expansion Memo (M1W, 2018) based on a 30% design that was prepared. Costs were revised based on the increase in ENR CCI for San Francisco from February 2018 to October 2019 (approximately 2.9%) and then converted to a \$/AF unit cost. This unit cost was used to estimate the cost of a 2,745 AFY expansion. Rounded up to the nearest \$10,000.	
<i>Well Injection Facilities</i>						
Mobilization and Demobilization	5	%	\$16,983,216	\$ 849,161	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). For budgeting purposes, assumed same as M1W project.	
General Site Work and Piping	1	LS	\$1,891,000	\$ 1,891,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). Includes shoring, SWPPP, and traffic control. Costs for items such as paving and site preparation are assumed to be the same as the M1W project, but pipelines are assumed to be smaller as described in Section 3.2 of TM 3.	
Injection Well Installation and Testing	5	EA	\$960,000	\$ 4,800,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). Assumes 560-foot borehole and 550-foot deep well. 130-feet of screen.	
Production Well Installation and Testing	2	EA	\$620,000	\$ 1,240,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018) and similar recent projects. Assumes 560-foot borehole and 550-foot deep well. 130-feet of screen.	
Site Work at Each Well Site	7	EA	\$860,000	\$ 6,020,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). Includes site improvements, well pads and pedestals, well pumps, and site piping. For budgeting purposes, assume same sizes as M1W project	
Monitoring Wells	4	EA	\$100,000	\$ 400,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). Assumes 550-foot deep 4-inch monitoring well.	
Backflush Basin and Associated Appurtenances	1	LS	\$15,000	\$ 15,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). For budgeting purposes, assume same size as M1W project (125-ft x 125-ft x 5-ft), and cut/fill can be balanced.	
Electrical Building and Hydropneumatic Tank	1	LS	\$77,216	\$ 77,216	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). For budgeting purposes, assume same size as M1W project	
Electrical, Instrumentation, and Controls for Wells	1	LS	\$2,360,000	\$ 2,360,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). For budgeting purposes, assume same size as M1W project.	
Other Site Work (i.e. landscaping, road maintenance during construction, etc.)	1	LS	\$180,000	\$ 180,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). For budgeting purposes, assume same size as M1W project	
<i>Purified Recycled Water Pipeline</i>						
Purified Recycled Water Pipeline from AWPF to Injection Wells	23,760	LF	\$250	\$ 5,940,000	Assume 4.5-mile pipeline from AWPF to injection wells. Assumed maximum flow of 2,900 GPM. 16-inch diameter pipeline at \$12/in-diameter foot plus 30% for various appurtenances (\$250/LF). Rounded up to the nearest \$10,000.	
				Total Direct Costs	\$ 34,702,377	
Contingency on Infrastructure Costs	30	%	\$34,702,377	\$ 10,410,713	Based on a Class 5 level estimate for conceptual cost estimates (AACEI, 2019).	
Contingency for Electrical Connection with PG&E at Each Well Site	7	EA	\$200,000	\$ 1,400,000	Assumes \$200,000 per well site for connection and routing power lines to site.	
Soft Costs: Planning, Environmental, Permitting, Engineering, Legal, mitigation, etc.	30	%	\$45,113,090	\$ 13,533,927	Assumes 30% of capital costs	
Capital Costs Subtotal (rounded up to nearest \$100,000)				\$ 60,100,000		
Annualized over 25 year period at 6% interest				\$ 4,701,426		

Conceptual Cost Estimate
Project M3: Recycled Water Reuse Through Landscape Irrigation and Indirect Potable Reuse
2,400 AFY 180/400 Foot Aquifer Injection Alternative

Description	Quantity	Units	Unit Cost	Total	Basis for Cost
Operating Costs					
Annual Operating Costs for AWWPF, Injection wells, and Production Wells	1	LS	\$ 2,400,000	\$ 2,400,000	Costs for operation of a 2,250 AFY expansion were presented in M1W Expansion Memo (M1W, 2018). Operating costs were converted to a \$/AF unit cost and used to estimate the cost of a 2,745 AFY expansion. An additional 5% was also added to account for the operational cost of each new production well. Rounded up to the nearest \$10,000.
Annual Overhead costs for AWWPF, Injection wells, and Production Wells	1	LS	\$ 410,000	\$ 410,000	Costs for overhead of a 2,250 AFY expansion were presented in M1W Expansion Memo (M1W, 2018). Operating costs were converted to a \$/AF unit cost and used to estimate the cost of a 2,745 AFY expansion. An additional 5% was also added to account for the overhead cost of each new production well. Rounded up to the nearest \$10,000.
Annual Energy Costs for Production Wells	1	LS	\$ 300,000	\$ 300,000	Energy costs are based on 200 HP pumps and an electricity price of \$0.185/KWH. Energy costs for AWWPF and injection wells are included in operating costs listed above. Rounded up to the nearest \$10,000.
Annual Operating and Overhead Cost Subtotal				\$ 3,110,000	

Total Costs	
Total Annualized Cost	\$ 7,820,000 per year over 25 years. Rounded up to nearest \$10,000
Total 30-Year Average Cost Per Acre-Foot (2,400 AFY)	\$ 3,300 per acre-foot. Rounded up to nearest \$100

Abbreviations:

AFY: acre feet per year

AWWPF: advanced water purification facility

EA: each

ENR CCI: Engineering News-Record Construction Cost Index

gpm: gallons per minute

LF: lineal foot

LS: lump sum

M1W: Monterey One Water

MCWD: Marina Coast Water District

Notes

(a) Increase for general conditions, contractor overhead and profit, and sales tax are included in capital unit costs and thus are not added separately.

References

AACEI, 2019. *Recommended Practices and Standards*, Association for the Advancement of Cost Engineering International, March 2019 Update.

M1W, 2018. *Progress Report on Pure Water Monterey Expansion*, Monterey One Water, 10 May 2018.

Nellor et al, 2019. *Final Engineering Report, Pure Water Monterey Groundwater Replenishment Project*, Nellor Environmental Associates, Trussell Technologies, and Todd Groundwater, April 2019

SCI, 2018. *Schedule of Values for Pure Water Monterey, Injection Wells Ph2*, SCI Specialty Construction, May 2018.

Conceptual Cost Estimate
Project M3: Recycled Water Reuse Through Landscape Irrigation and Indirect Potable Reuse
2,400 AFY Deep Aquifer Injection Alternative

Description	Quantity	Units	Unit Cost	Total	Basis for Cost
Capital Costs (a)					
<i>AWPF Facility Expansion</i>					
AWPF Expansion Construction Cost	1	LS	\$10,930,000	\$ 10,930,000	Costs for a 2,250 AFY expansion were presented in M1W Expansion Memo (M1W, 2018) based on a 30% design that was prepared. Costs were revised based on the increase in ENR CCI for San Francisco from February 2018 to October 2019 (approximately 2.9%) and then converted to a \$/AF unit cost. This unit cost was used to estimate the cost of a 2,745 AFY expansion. Rounded up to the nearest \$10,000.
<i>Well Injection Facilities</i>					
Mobilization and Demobilization	5	%	\$21,933,216	\$ 1,096,661	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). For budgeting purposes, assumed same as M1W project.
General Site Work and Piping	1	LS	\$1,421,000	\$ 1,421,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). Includes shoring, SWPPP, and traffic control.
Injection Well Installation and Testing	5	EA	\$2,130,000	\$ 10,650,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). Assumes 1,510-foot borehole and 1,500-foot deep well. 270-feet of screen.
Production Well Installation and Testing	1	EA	\$1,270,000	\$ 1,270,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018) and similar recent projects. Assumes 1,510-foot borehole and 1,500-foot deep well. 130-feet of screen.
Site Work at Each Well Site	6	EA	\$860,000	\$ 5,160,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). Includes site improvements, well pads and pedestals, well pumps, and site piping. For budgeting purposes, assume same sizes as M1W project
Monitoring Wells	4	EA	\$200,000	\$ 800,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). Assumes 1,500-foot deep 4-inch monitoring well.
Backflush Basin and Associated Appurtenances	1	LS	\$15,000	\$ 15,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). For budgeting purposes, assume same size as M1W project (125-ft x 125-ft x 5-ft), and cut/fill can be balanced.
Electrical Building and Hydropneumatic Tank	1	LS	\$77,216	\$ 77,216	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). For budgeting purposes, assume same size as M1W project
Electrical, Instrumentation, and Controls for Wells	1	LS	\$2,360,000	\$ 2,360,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). Reduced by 40% due to half as many wells and one-quarter as many monitoring wells.
Other Site Work (i.e. landscaping, road maintenance during construction, etc.)	1	LS	\$180,000	\$ 180,000	Based on Pure Water Monterey Winning Bid Schedule (SCI, 2018). For budgeting purposes, assume same size as M1W project
<i>Purified Recycled Water Pipeline</i>					
Purified Recycled Water Pipeline from AWPF to Injection Wells	18480	LF	\$250	\$ 4,620,000	Assume 3.5-mile pipeline from AWPF to injection wells. Assumed maximum flow of 2,900 GPM. 16-inch diameter pipeline at \$12/in-diameter foot plus 30% for various appurtenances (\$250/LF). Rounded up to the nearest \$10,000.
<i>Total Direct Costs</i>				\$ 38,579,877	
Contingency on Infrastructure Costs	30	%	\$38,579,877	\$ 11,573,963	Based on a Class 5 level estimate for conceptual cost estimates (AACEI, 2019).
Contingency for Electrical Connection with PG&E at Each Well Site	6	EA	\$200,000	\$ 1,200,000	Assumes \$200,000 per well site for connection and routing power lines to site.
Soft Costs: Planning, Environmental, Permitting, Engineering, Legal, mitigation, etc.	30	%	\$50,153,840	\$ 15,046,152	Assumes 30% of capital costs
Capital Costs Subtotal (rounded up to nearest \$100,000)				\$ 66,400,000	
Annualized over 25 year period at 6% interest				\$ 5,194,254	

Conceptual Cost Estimate
Project M3: Recycled Water Reuse Through Landscape Irrigation and Indirect Potable Reuse
 2,400 AFY Deep Aquifer Injection Alternative

Description	Quantity	Units	Unit Cost	Total	Basis for Cost
Operating Costs					
Annual Operating Costs for AWWP, Injection wells, and Production Wells	1	LS	\$ 2,400,000	\$ 2,400,000	Costs for operation of a 2,250 AFY expansion were presented in M1W Expansion Memo (M1W, 2018). Operating costs were converted to a \$/AF unit cost and used to estimate the cost of a 2,145 AFY expansion. An additional 5% was also added to account for the operational cost of each new production well. Rounded up to the nearest \$10,000.
Annual Overhead costs for AWWP, Injection wells, and Production Wells	1	LS	\$ 410,000	\$ 410,000	Costs for overhead of a 2,250 AFY expansion were presented in M1W Expansion Memo (M1W, 2018). Operating costs were converted to a \$/AF unit cost and used to estimate the cost of a 2,145 AFY expansion. An additional 5% was also added to account for the overhead cost of each new production well. Rounded up to the nearest \$10,000.
Annual Energy Costs for Production Wells	1	LS	\$ 370,000	\$ 370,000	Energy costs are based on 250 HP pumps and an electricity price of \$0.185/KWH. Energy costs for AWWP and injection wells are included in operating costs listed above.
Annual Operating and Overhead Cost Subtotal				\$ 3,180,000	
Total Costs					
Total Annualized Cost				\$ 8,380,000	per year over 25 years. Rounded up to nearest \$10,000
Total 30-Year Average Cost Per Acre-Foot (2,400 AFY)				\$ 3,500	per acre-foot. Rounded up to nearest \$100

Abbreviations:

AFY: acre feet per year	gpm: gallons per minute	MCWD: Marina Coast Water District
AWWP: advanced water purification facility	LF: lineal foot	
EA: each	LS: lump sum	
ENR CCI: Engineering News-Record Construction Cost Index	M1W: Monterey One Water	

Notes

(a) Increase for general conditions, contractor overhead and profit, and sales tax are included in capital unit costs and thus are not added separately.

References

AACEI, 2019. *Recommended Practices and Standards*, Association for the Advancement of Cost Engineering International, March 2019 Update.
 M1W, 2018. *Progress Report on Pure Water Monterey Expansion*, Monterey One Water, 10 May 2018.
 Nellor et al, 2019. *Final Engineering Report, Pure Water Monterey Groundwater Replenishment Project*, Nellor Environmental Associates, Trussell Technologies, and Todd Groundwater, April 2019
 SCI, 2018. *Schedule of Values for Pure Water Monterey, Injection Wells Ph2*, SCI Specialty Construction, May 2018.

Chapter 9
Appendix 9-B

MCWRA Drought TAC

Drought Operations Technical Advisory Committee

Standards and Guiding Principles of Reservoir Operations During Drought Conditions

This document provides a foundation of standards and guiding principles to be used in the development of a proposed reservoir release schedule triggered under specific, seasonally defined conditions.

Standards: a level of quality or achievement that is considered acceptable or desirable.

Standards are in place to ensure that basic needs are met by partners through clearly defined behaviors that are acceptable. The drought operations technical advisory committee will strive to have attainable standards.

Guiding Principles: guide an organization towards its goals.

Guiding Principles are in place to ensure we continue to move toward our goals with flexibility and unity of effort.

Introduction

Prior to being formally established in 1991, the Monterey County Water Resources Agency (MCWRA) was the Monterey County Flood Control and Water Conservation District, established in 1947 and organized as a division of the Public Works Department of the County of Monterey. MCWRA provides services related to the control of flood and storm waters in Monterey County, conservation, protection of water quality, reclamation of water and the exchange of water. MCWRA is a public agency created by the State of California pursuant to the Monterey County Water Resources Agency Act (California Water Code, Appendix 52).

MCWRA owns and operates two dams along with associated reservoirs. Nacimiento Dam is on the Nacimiento River, a tributary to the Salinas River. Nacimiento Dam is approximately 12.3 river miles upstream of its confluence with the Salinas River and forms the Nacimiento Reservoir, with a maximum storage capacity of approximately 377,900 acre-feet. San Antonio Dam, on the San Antonio River is approximately 8.6 river miles upstream of its confluence with the Salinas River. San Antonio Dam forms the San Antonio Reservoir, with a maximum storage capacity of approximately 335,000 acre-feet of water. The Nacimiento and San Antonio Rivers enter the Salinas River at river miles 108 and 104, respectively, from its mouth at the Pacific Ocean in Monterey Bay.

The purpose of the Drought Operations Technical Advisory Committee (D-TAC) is to provide, when drought triggers occur, technical input and advice regarding the operations of Nacimiento and San Antonio Reservoirs. This document was developed by the members of the D-TAC to

Attachment 1

provide a foundation of Standards and Guiding Principles to be used in the development of a proposed reservoir release schedule triggered under specific, seasonally defined conditions. A Habitat Conservation Plan (HCP) is currently being developed to address the effects of reservoir operations and other actions on Federally endangered species and will further address drought operations in the Salinas River system. Documents and procedures developed by the D-TAC will be considered during development of the HCP. MCWRA will convene with stakeholders to determine if modifications to these drought procedures are warranted in light of the terms of the final HCP. Drought operations developed by the D-TAC will also consider management actions and sustainability criteria within the Groundwater Sustainability Plans for the Salinas Valley groundwater basin.

Formation of the D-TAC

The D-TAC was formed through a settlement agreement (Appendix A) to develop Standards and Guiding Principles and proposed reservoir release schedules for MCWRA drought operations. The D-TAC is an ad hoc committee of independent third-party experts with expertise in any of the following fields: hydrology, hydrogeology, hydrologic modeling, civil engineering, ecology, or fish and wildlife biology. The experts are retained and paid for, but not employed by any interested person or organization. The U.S. Fish and Wildlife Service, National Marine Fisheries Service, California Department of Fish and Wildlife, State Water Resources Control Board, Salinas Valley Basin Groundwater Sustainability Agency and the Monterey County Water Resources Agency are using in-house staff as D-TAC members. Each time a Drought Trigger occurs, the chair of the D-TAC shall rotate, in alphabetical order, by the name of the organization D-TAC members represent. Organizations with multiple members will only have one-person chair in the rotation.

D-TAC Members (ordered alphabetically by organization):

- Donald Baldwin, Environmental Scientist, - California Department of Fish and Wildlife
- Dennis Michniuk, District Biologist Coastal Fisheries - California Department of Fish and Wildlife
- Robert Abrams, PhD, PG, CHg – Grower-Shipper Association
- William Stevens, Natural Resource Management Specialist - National Marine Fisheries Service
- Shaunna Murray, Senior Water Resources Engineer – Monterey County Water Resources Agency
- Germán Criollo, PE, Associate Hydrologist – Monterey County Water Resources Agency
- Jason Demers, Associate Engineer – Monterey County Water Resources Agency
- Emily Gardner, Dep. General Manager – Salinas Valley Basin Groundwater Sustainability Agency
- Curtis Weeks, PE, - Salinas Valley Water Coalition
- Mark Ogonowski, Senior Fish and Wildlife Biologist – U.S. Fish and Wildlife Service

Attachment 1

Facilitation and Support:

- Howard Franklin, PG, Senior Hydrologist – Monterey County Water Resources Agency
- Nicole Koerth, GIT, Hydrologist – Monterey County Water Resources Agency

D-TAC Triggers

Drought Triggers, or reservoir storage thresholds for when the D-TAC shall meet to develop a release schedule, are defined in Exhibit B of the Settlement Agreement (Appendix A). These triggers are based on operational considerations and not water year type. The storage thresholds defined assume that MCWRA can make conservation releases to the Salinas River Diversion Facility (SRDF) for two months and maintain minimum releases until September.

A Drought Trigger occurs if the following criteria is met:

- At the October Reservoir Operations Advisory Committee meeting of each year, MCWRA staff will present an updated reservoir release schedule and the then-current forecast for December 1st storage at Nacimiento and San Antonio Reservoirs. If the December 1st forecasted combined reservoir storage volume at Nacimiento and San Antonio Reservoirs is below 220,000 acre-feet and the San Antonio Reservoir's December 1st forecasted storage is below 82,000 acre-feet, the D-TAC process shall commence.
- The MCWRA will schedule the first D-TAC meeting to occur no earlier than February 15th and the D-TAC will meet as needed through March 31st. The D-TAC will develop a recommended release schedule that is consistent with the Standards and Guiding Principles.
- If at any time between December 1st and March 31st the actual reservoir storage volumes equals or exceeds the combined or individual minimum storage thresholds, the D-TAC process will terminate, and no release schedule will be prepared by the D-TAC.

Standards:

- The proposed reservoir release operations schedule triggered under specific, seasonally defined conditions of drought will be developed based on the best available scientific knowledge, data, and understanding of the environmental biology, hydrology and hydrogeology of the Salinas Valley; under the technical expertise of the members of the D-TAC.
- The proposed reservoir release schedule will be implemented based on specific tools and templates made available to the D-TAC. These are discussed further in the Implementation Procedures section.
- The proposed reservoir release schedule will acknowledge, address, and balance the water needs of various stakeholders for limited resources during a drought.

Attachment 1

Guiding Principles:

- MCWRA is a public agency charged with the long-term management of water resources in the Salinas Valley and is also the flood control agency for Monterey County. Therefore, any releases of water from Nacimiento or San Antonio Reservoirs will be made with consideration given first to safety, including flow conditions and the structural integrity of Nacimiento and San Antonio Dams.
- MCWRA operates Nacimiento and San Antonio Reservoirs under regulatory authorizations; as well as through legal agreements (Appendix C).
- Any reservoir release schedule developed by the D-TAC should:
 - When conservation releases are made, maintain geographic equity to fullest extent possible;
 - Comply with applicable regulations and agreements relating to the operation of Nacimiento and San Antonio Reservoirs;
 - Avoid, to the extent possible, consecutive years where only minimum releases are made from the reservoirs;
 - Avoid, to the extent possible, adverse effects to native species and their habitats;
 - Safely use existing MCWRA infrastructure while balancing water availability and use; and
 - Avoid, to the extent possible, adverse impacts to valley-wide agricultural operations.

Implementation Procedures:

- The D-TAC will use a MCWRA provided template when developing the release schedule. The specific actions will also be described in a narrative form to expound upon the actions taken for each month shown in the release schedule.
- The release schedule will be developed for April through December of the current year. If significant inflow occurs during this period, then modifications to the release schedule will be made through existing MCWRA protocols.
- The D-TAC will develop a dry winter scenario narrative for the following January- March period to allow for the possibility of multiple dry winter release operations.
- The reservoir release schedule includes estimated values for demands, releases and associated reservoir elevations and storage volumes. It serves as a guideline for reservoir operations. Actual operations will require the flexibility to respond to current hydrologic and facility conditions.
- The release schedule will be updated on a monthly basis for discussion at the Reservoir Operations Committee.
- Reservoir releases will be made under direction of the MCWRA Board of Directors or Board of Supervisors through the adoption of a reservoir release schedule or dry winter release priorities, to be executed by MCWRA staff.

Attachment 1

Summary Actions

The Standards and Guiding Principles Document and any recommended release schedule prepared by the D-TAC will first be received by the Reservoir Operations Advisory Committee. The Reservoir Operations Advisory Committee will meet to discuss the Standards and Guiding Principles or release schedule and will solicit information, data and public comment regarding appropriate MCWRA operations during droughts. Following receipt of public input regarding the Standards and Guiding Principles or any subsequent release schedule, the Reservoir Operations Advisory Committee will then prepare a written recommendation regarding reservoir operations which will be transmitted to the MCWRA Board of Directors for consideration and action. Any interested party that dissents from the Reservoir Operations Committee's recommendation may submit separate written comments to the MCWRA Board of Directors. The MCWRA Board of Directors will determine, in accordance with applicable law, whether MCWRA will adopt and implement the Standards and Guiding Principles or release schedule, provided the MCWRA General Manager may, in his sole discretion, refer the question of whether MCWRA should adopt and implement the Standards and Guiding Principles or a release schedule to the MCWRA Board of Supervisors for final determination. In the event the MCWRA General Manager elects not to refer the question of adoption and implementation of Standards and Guiding Principles or a release schedule to the MCWRA Board of Supervisors, the decision of the MCWRA Board of Directors regarding such questions shall constitute final agency action for all purposes. The MCWRA Board of Directors (or MCWRA Board of Supervisors, if applicable) will retain full discretion and authority to accept or reject, in whole or in part, the written recommendations of the Reservoir Operations Advisory Committee.

APPENDICES

Appendix A: *Settlement Agreement Between Monterey County Water Resources Agency, The Agency Board of Supervisors, the Agency Board of Directors, the County of Monterey, the County Board of Supervisors, and the Salinas Valley Water Coalition; November 15, 2019*

- <https://www.co.monterey.ca.us/Home/ShowDocument?id=98911>

Documents referenced in Exhibit B of the Settlement Agreement

- *Salinas Valley Water Project, Engineer's Report, January 2003*
 - <https://www.co.monterey.ca.us/home/showdocument?id=24202>
- *Final Environmental Impact Report/Environmental Impact Statement for the Salinas Valley Water Project*
 - *Draft, June 2001:*
<https://www.co.monterey.ca.us/home/showdocument?id=24180>
 - *Final Volume 1, April 2002:*
<https://www.co.monterey.ca.us/home/showdocument?id=24186>
 - *Final Volume 2, April 2002:*
<https://www.co.monterey.ca.us/home/showdocument?id=24188>
- *Salinas Valley Water Project EIR Addendum, July 17, 2007*
 - <https://www.co.monterey.ca.us/home/showpublisheddocument?id=98572>

Appendix B: *Definition of Terms*

Appendix C: *Monterey County Water Resources Agency's Water Rights and Agreements*

Appendix B: Definition of Terms

Adult Steelhead Upstream Migration Releases – Reservoir releases made to facilitate upstream migration of adult steelhead between February 1st- March 31st, when triggers are met. If the 1) combined storage of Nacimiento and San Antonio reservoirs is greater than 220,000 AF, 2) 340 cfs or higher flows are present at the Arroyo Seco near Soledad gage (USGS streamflow gage 11152000), and 3) 173 cfs or higher flows are present at the Arroyo Seco below the Reliz Creek gage (USGS streamflow gage 11152050), MCWRA will provide flows of at least 260 cfs at the Salinas River near Chualar (USGS streamflow gage 11152300) for five or more consecutive days, when the river mouth is open to the ocean.

Block Flow Releases – Reservoir releases made to facilitate the downstream migration of smolts and rearing juvenile steelhead in the Salinas River beginning March 15th in normal-category type years. The following triggers must be met for releases to be made 1) water year type is dry-normal, normal or wet-normal, 2) combined storage of Nacimiento and San Antonio reservoirs is 150,000 AF or more on March 15th, and 3) 125 cfs or higher at the Nacimiento River below Sapaque Creek gage (USGS streamflow gage 111489000) or 70 cfs at the Arroyo Seco below Reliz Creek gage (USGS streamflow gage 11152050). Amount and duration of block flow depends on when the flows are triggered.

Conservation Pool – Water in reservoirs used for groundwater recharge, operation of the Salinas River Diversion Facility, water supply, fish migration, and fish habitat requirements. Volume of 289,013 acre-feet between 687.8 feet and 787.75 feet in Nacimiento Reservoir and volume of 282,000 acre-feet between 666 feet and 774.5 feet in San Antonio Reservoir.

Conservation Releases – Water discharged for the purpose of recharging the groundwater basin.

Dead Pool – The storage between the bottom of the reservoir and elevation 670 feet for Nacimiento Reservoir, the invert of the intake structure of the low-level outlet works, and elevation 645 feet for San Antonio Reservoir, the invert of the intake structure of the outlet works. The volume of the Dead Pool is 10,300 acre-feet in Nacimiento Reservoir and 10,000 acre-feet in San Antonio Reservoir. Water cannot flow out by gravity out of Nacimiento Reservoir below 670 feet elevation and out of San Antonio below 645 feet elevation.

Downstream Migration of Juvenile Steelhead and Kelts Releases – Reservoir releases and SRDF bypass flows made to enhance migration opportunities for juvenile steelhead and post-spawn adult steelhead (kelts) made in years when block flow releases for smolt migration don't occur by April 1st.

Dry Year – Water year in which unimpaired annual mean flow at the USGS streamgage on the Arroyo Seco near Soledad (USGS streamgage 11152000) falls in the 75-100% percentile of mean annual flows ranked in descending order (as defined in the Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River).

Environmental Compliance – Conforming to any environmental regulatory requirements currently imposed or those that become imposed in the future.

Attachment 1

Flood Pool – Water used to temporarily store flood water during the winter. Volume of 66,587 acre-feet between 787.75 feet and 800 feet in Nacimiento Reservoir and volume of 30,000 acre-feet between 774.5 feet and 780 feet in San Antonio Reservoir.

Maximum Reservoir Elevation – Maximum reservoir elevation that can be sustained, and the level at which the reservoir is considered full. Elevation of 800 feet in Nacimiento Reservoir and 780 feet in San Antonio Reservoir.

Minimum Releases – Reservoir releases made to provide steelhead spawning and rearing habitat flows. Minimum releases are 60 cfs from Nacimiento Dam as long as the water surface elevation of Nacimiento Reservoir is above 687.8 feet, and 10 cfs from San Antonio Dam as long as the water surface elevation of San Antonio Reservoir is above 666 feet.

Minimum Pool – The storage above Dead Pool and below Conservation Pool. This is between elevation 670 feet and 687.8 feet in Nacimiento Reservoir. The volume of this pool is 12,000 acre-feet which is reserved for use by the County of San Luis Obispo per the 1959 San Luis Obispo County Agreement. In San Antonio Reservoir, minimum pool is between elevation 670 feet and 687.7 feet, with a volume of 12,000 acre-feet.

Minimum Recreation Elevation – Lowest Nacimiento Reservoir elevation at which most of the boat ramps around the reservoir are useable and which most private property owners have access to the reservoir.

Natural Flow – Water that would exist in a stream at a given point in time in the absence of human activity (Source: https://www.waterboards.ca.gov/waterrights/board_info/faqs.html)

NWP Intake Elevation – Lowest Nacimiento Reservoir elevation at which San Luis Obispo County can take water through the Nacimiento Water Project. Elevation of 670 feet.

Operations Ratio – The ratio of empty space in the conservation pools of San Antonio and Nacimiento Reservoirs, with Nacimiento as the numerator. Historically, this ratio was defined as 3 to 1, and reservoir releases were made in such a manner that the ratio was reached prior to halting releases at onset of the rainy season.

Salinas River Diversion Facility (SRDF) – A component of the Salinas Valley Water Project that consists of an inflatable Obermeyer dam and a river intake structure to provide treated river water to growers within the Castroville Seawater Intrusion Project service area. This facility is located approximately 5 river miles upstream of the mouth of the Salinas River.

Salinas Valley Water Project (SVWP) – A project developed by MCWRA and Salinas Valley interests that consists of the modifications of the spillway at Nacimiento Dam and the construction of the Salinas River Diversion Facility, near the city of Marina. The goals of the project are to help stop seawater intrusion, improve flood control, recharge Salinas Valley groundwater, and improve conditions for steelhead trout.

Top of Dam – The dam crest. Elevation of 825 feet at Nacimiento Dam and 802 feet at San Antonio Dam.

Water Year – The 12-month period from October 1st through September 30th. The water year is designated by the calendar year in which it ends, and which included 9 out of the 12 months. For examples, the year ending on September 30th, 1959 is called “1959 water year”.

Attachment 1

Water Year Type – Determination of water year type (e.g. dry, normal, wet) is made based on unimpaired annual mean flows at the USGS streamgage on the Arroyo Seco near Soledad (USGS Streamgage 11152000). Annual mean flows are ranked in descending order and stream flow corresponding to the 25th and 75th percentile are selected as the thresholds. Wet years are defined as flows below the 25th percentile, Normal years between the 25th and 75th percentile, and Dry years above the 75th percentile. Year type determinations are made on March 15th (preliminary) and April 1st (official) of each year. (as defined in the Salinas Valley Water Project Flow Prescription for Steelhead Trout in the Salinas River).

Appendix C: Monterey County Water Resources Agency's Water Rights and Agreements

Nacimiento Reservoir

Water Rights License 7543 – License for Diversion and Use of Water, No. 7543, from the California State Water Resources Control Board, was issued November 4, 1965.

This license was last amended September 5, 2008 to specify that the place of use of water from this license changed to include 421,435 acres of land comprising MCWRA's Zone 2C assessment zone, to add a point of rediversion at the Salinas River Diversion Facility (SRDF), and to add fish flow requirements that were consistent with the June 21, 2007, National Marine Fisheries Service (NMFS) biological opinion issued to the U.S. Army Corps of Engineers (biological opinion).

License No. 7543 gives MCWRA the right to store 350,000 AF from October 1 of each year to July 1 of the succeeding year and to withdraw a maximum of 180,000 AF per year. The purpose of use are for irrigation, domestic, municipal, industrial, and recreational uses.

Documents for this can be found in Appendix B of the Nacimiento Dam Operation Policy:

<https://www.co.monterey.ca.us/Home/ShowDocument?id=63151>

Water Rights Permit 21089 – Permit for Diversion and Use of Water, No. 21089, from the California State Water Resources Control Board, was issued March 23, 2001. This permit was last amended September 5, 2008, to specify that the place of use of water from this license changed to include 421,435 acres of land comprising MCWRA's Zone 2C assessment zone, to add a point of rediversion at the SRDF, and to add fish flow requirements that were consistent with the NMFS biological opinion.

The original reservoir volume computations submitted and subsequently approved in License No. 7543, were based on United States Geological Survey (USGS) Quad sheets from the 1940s. In the early 1990s, aerial surveys with increased accuracy showed that the actual volume of Nacimiento Reservoir was greater than the 350,000 AF in License 7543. In order to correct this discrepancy, MCWRA filed water rights Application No. 30532. Nacimiento Dam has never been modified in any way to increase storage and the reservoir volume is unchanged from the time of the dam's construction, with the exception of the inflow of silt from natural runoff which has decreased storage volume.

As a result of this application, MCWRA has a permit to collect to storage 27,900 AF per annum from October 1 of each year to July 1 of the succeeding year. The total quantity of water collected to storage under this permit and License 7543 shall not exceed 377,900 AF per year.

Attachment 1

Documents for this can be found in Appendix B of the Nacimiento Dam Operation Policy:

<https://www.co.monterey.ca.us/Home/ShowDocument?id=63151>

Water Rights Permit 19940 – Permit for Diversion and Use of Water, No. 19940, from the California State Water Resources Control Board, was issued December 31, 1986. Permit 19940 gives MCWRA the right to divert up to 500 cfs through the Hydroelectric Plant from January 1 to December 31 of each year for irrigation, domestic, municipal, industrial and recreational uses. Diversion under this permit is incidental to releases being made for other purposes.

Documents for this can be found in Appendix B of the Nacimiento Dam Operation Policy:

<https://www.co.monterey.ca.us/Home/ShowDocument?id=63151>

San Luis Obispo County Agreement – MCWRA's Water Rights License No. 7543 is subject to an agreement between MCWRA and SLO District which gives SLO District the right to use 17,500 AF of water annually from Nacimiento Reservoir. The SLO District Board has adopted a policy designating a portion of the total, approximately 1,750 acre-feet per year (AFY), for use around Nacimiento Reservoir; Heritage Ranch Community Services District (HRCSD) has agreements with SLO District which collectively entitle HRCSD to use 889 AFY of the 1,750 AFY; pursuant to these agreements, HRCSD takes its allotment from a well gallery in the Nacimiento River downstream of the Dam. SLO District can use up to the remaining 15,750 AF per water year through the NWP. The agreement also provides that MCWRA shall not make conservation releases during the water year that result in a reservoir elevation below 687.8 feet on September 30 of each year in order to assure SLO District of its rights and entitlements to water under the terms of the agreement (i.e. in order to assure the maintenance of a minimum storage pool of 12,000 AF above the present low-level outlet works for SLO District use). The original agreement is dated October 19, 1959, and it has been amended six different times in 1959, 1967, 1970, 1977, 1988, and 2007. These documents are collectively referred to as the SLO County Agreement.

Documents for this can be found in Appendix C of the Nacimiento Dam Operation Policy:

<https://www.co.monterey.ca.us/Home/ShowDocument?id=63151>

Nacimiento Water Company Agreement – The 1984 agreement with MCWRA allows the Nacimiento Water Company a water allocation of up to 600 AF per year to be extracted from wells within the floodage easement of Nacimiento Reservoir. The Nacimiento Water Company shall pay MCWRA quarterly for water from the allocation on the basis of AF used at a rate determined by this agreement.

Documents for this can be found in Appendix D of the Nacimiento Dam Operation Policy:

<https://www.co.monterey.ca.us/Home/ShowDocument?id=63151>

Attachment 1

San Antonio Reservoir

Water Rights License 12624 - License for Diversion and Use of Water, No. 12624, from the California State Water Resources Control Board, was issued December 2, 1965 and amended April 22, 1990. This license was most recently amended September 5, 2008 to specify that the place of use of water from this license changed to include 421,435 acres of land comprising MCWRA's Zone 2C assessment zone, to add a point of rediversion at the SRDF, and to add fish flow requirements consistent with the June 21, 2007, National Marine Fisheries Service BO.

License No. 12624 gives MCWRA the right to store 220,000 AF from October 1 of each year to July 1 of the succeeding year and to withdraw a maximum of 210,000 AF per year for municipal, domestic, industrial, irrigation, and recreational uses.

The amended license can be found on the CA State Water Resources Control Board website:
https://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/orders/2008/wro2008_0037dwr.pdf