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TECHNICAL MEMORANDUM

DATE: March 6, 2026 **PROJECT #:** 9100.82

TO: Salinas Valley Basin Groundwater Sustainability Agency

FROM: Jonathan Reeves, P.G., Abby Ostovar, Ph.D., and Staffan Schorr

PROJECT: Round 2 Sustainable Groundwater Management Implementation Grant for the Salinas Valley

SUBJECT: Modeling Impacts of Demand Management

INTRODUCTION

In 2026, the Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) developed the Demand Management Framework (SVBGSA, 2026). The Framework defines Valley-wide stages and triggers to indicate where and when demand management may be an appropriate tool and help prioritize where to focus demand management efforts. Once stages are identified, groundwater modeling can then be used to estimate the volume of pumping reductions that would enable each subbasin to meet its Sustainable Groundwater Management Act (SGMA) sustainable management criteria (SMC).

This memorandum uses the Salinas Valley Operational Model (SVOM)—the projected version of the Salinas Valley Integrated Hydrologic Model (SVIHM)—to evaluate how varying levels of groundwater pumping reductions affect groundwater levels. SGMA requires subbasins to be sustainably managed by 2040 for the 180/400-Foot Aquifer (180/400) Subbasin and 2042 for all other subbasins. The analysis estimates the magnitude of reductions that would be required, if demand management were used alone, to avoid undesirable results by an average of 2040 and 2041 (2040/2041) to represent SGMA deadlines.

The approach reduces pumping incrementally within each respective subbasin, while holding reservoir releases and pumping constant in the others, to identify a range of reduction levels needed to achieve sustainability through demand management alone. Demand management is 1 potential tool that can be used alone or at lower levels in combination with other projects and management actions (PMAs). This modeling provides pumping reduction ranges per subbasin and provides a basis for further modeling that combines pumping reductions in multiple subbasins simultaneously, combines lower levels of reductions with specific PMAs, or increases pumping after sustainability is met.

Prior modeling using the Seawater Intrusion Model (SWIM) demonstrated that demand management results in minimal improvement in the 500 mg/L chloride isocontour, the key metric for seawater intrusion sustainability (M&A, 2025; 2026a forthcoming). For this reason, this memorandum focuses solely on groundwater level responses and sustainability metrics.

Modeling scenarios focused on the 4 primary agricultural subbasins in the Salinas Valley: 180/400-Foot Aquifer (180/400), Eastside Aquifer (Eastside), Forebay Aquifer (Forebay), and Upper Valley Aquifer (Upper Valley) Subbasins. Demand reductions for the Corral de Tierra Area within the Monterey Subbasin will be evaluated using the SWIM following completion of current model updates. In the Langley Area (Langley) Subbasin, uncertainty surrounding projected groundwater elevations due to the fractured bedrock aquifer warrant further analysis; future assessment may require alternate, non-model-based approaches.

Scenarios began pumping reductions in 2030 and evaluated the range of reductions needed to avoid undesirable results by 2040/2041, assuming no other project or management actions were implemented. Additional modeling could further refine the level of pumping that may be sustained beyond that date as well as assess the effect on reservoir releases and river diversions.

Key findings of this modeling are:

1. 180/400 Subbasin: 18%-36% reductions are needed to achieve sustainability in the 180-Foot and 400-Foot Aquifers. Even with a 45% reduction, the Deep Aquifers remain well below sustainability goals.
2. Eastside: 17%-25% pumping reductions are needed to reach sustainability goals.
3. Forebay: Up to 9% pumping reductions are needed to reach sustainability goals on average; however, undesirable results may occur during droughts.
4. Upper Valley: Conditions are projected to remain sustainable under current pumping levels.

The results presented here will support estimation of the economic cost of demand management and will inform evaluation of potential demand management implementation measures, either as standalone actions or in combination with other PMAs.

MODELING APPROACH AND SETUP

All demand management scenarios were conducted using the SVOM_v1 (M&A, 2026b), which uses the Farm Process to estimate irrigation demand and groundwater extraction. Each scenario is compared to the Baseline Scenario, which uses a repeating historical climate cycle and does not incorporate future climate change. Demand reductions begin in October 2030, which is assumed to be the earliest any demand management measure would be developed and activated.

To isolate the effects of demand management, only agricultural groundwater extraction was modified between scenarios. Agriculture makes up about 90% of total pumping in the 4 main agricultural subbasins of the Salinas Valley. Municipal and rural domestic pumping—together roughly 10% of total pumping in the agricultural subbasins—remained unchanged from the Baseline Scenario. This does not constitute a policy decision regarding which demand management measures should be pursued and by which users.

The goal of the demand management scenarios is to estimate the approximate magnitude of pumping reductions that would be required if demand management were the only tool used to avoid undesirable results. Although SGMA identifies measurable objectives (MO) as the long-term groundwater conditions that Groundwater Sustainability Plans (GSPs) intend to achieve, this modeling focused on the minimum SGMA requirement: avoiding undesirable results. Undesirable results for groundwater levels occur when more than 15% of Representative Monitoring Site (RMS) wells fall below their minimum thresholds (MT) in any aquifer. As a result, subbasins with fewer wells falling below minimum thresholds generally needed smaller pumping reductions.

The projected model setup and Baseline Scenario are described in detail in the SVOM Update and Projected Baseline Simulation (M&A, 2026b). The Baseline Scenario uses a repeating climate cycle based on the climate in historical years and does not include the future effects of climate change. Beginning in October 2030, each demand management scenario cuts pumping in a specific subbasin. Since the SVOM uses the Farm Process (Boyce 2020 and 2023) to estimate irrigation extraction, agricultural groundwater pumping cannot be directly adjusted. As such, pumping is reduced indirectly by applying a scaling factor to the reference evapotranspiration (ET) in model cells that contain more than 50% irrigated land use, as shown on Figure 1.

Adjusting the reference ET reduces the irrigation demand in the model from which the Farm Process then calculates groundwater extraction at individual wells. The baseline SVOM contains 2 seasonal periods for land use. If a cell contains more than 50% of irrigated land use in either period, then the entire reference ET was scaled for that model cell. Cells with less than 50% irrigated land use were not scaled.

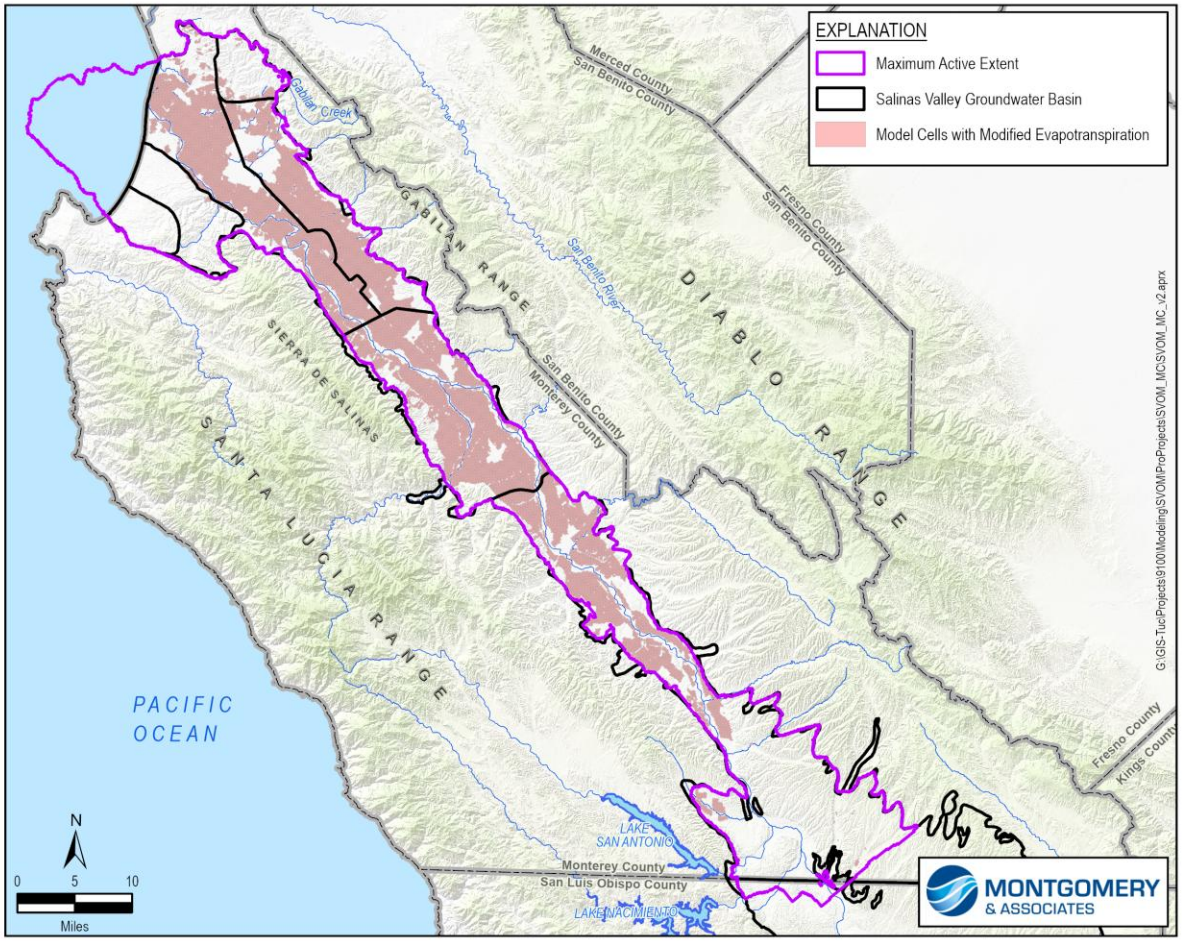

Figure 1. Model Cells with Modified Evapotranspiration for Demand Management Model Scenarios

Agricultural pumping reductions were applied in increments of approximately 10%. However, because municipal pumping was unchanged from the baseline and reductions were implemented indirectly through adjustments to irrigation demand, the resulting total pumping decreases were not exact multiples of 10%. Model scenarios are named based on the percent of total groundwater extraction in the Baseline Scenario, including urban, domestic, and agricultural extraction. The scenarios completed include the following:

- 180/400 Subbasin:
    - 91% of pumping - 90% of reference ET in irrigated cells
    - 82% of pumping - 80% of reference ET in irrigated cells
    - 73% of pumping - 70% of reference ET in irrigated cells
    - 64% of pumping - 60% of reference ET in irrigated cells
    - 55% of pumping - 50% of reference ET in irrigated cells

- Eastside Subbasin:
    - 92% of pumping - 90% of reference ET in irrigated cells
    - 83% of pumping - 80% of reference ET in irrigated cells
    - 75% of pumping - 70% of reference ET in irrigated cells
    - 67% of pumping - 60% of reference ET in irrigated cells
    - 59% of pumping - 50% of reference ET in irrigated cells
- Forebay Subbasin: 91% of pumping - 90% of reference ET in irrigated cells
- Upper Valley Subbasin: “No agricultural pumping” scenario

In the Upper Valley Subbasin, only a scenario with agricultural pumping turned off was run. For this scenario, rather than reducing demand, all agricultural pumping was turned off from the beginning of the model to provide an extreme example of best possible case scenario when solely considering groundwater levels.

In each scenario, reservoir releases and diversions to the Castroville Seawater Intrusion Project (CSIP) via the Salinas River Diversion Facility (SRDF) are kept consistent with the Baseline Scenario, regardless of the amount of demand reductions. This was done to assess the effects of demand management alone without changes in reservoir operations.

RESULTS

The following section contains results for demand management modeling in the 180/400, Eastside, Forebay, and Upper Valley Subbasins. Results were analyzed in 3 main ways:

1. **Groundwater Level Difference from Baseline:** Groundwater level difference maps show which areas in each subbasin respond most to demand management. Difference maps are calculated for the average of November 2040 and 2041 water levels as demand management minus the baseline so that positive values correspond to groundwater level rise. The average of these 2 years is used because across the model area, it is fairly representative of average conditions and close to the SGMA sustainability deadline. Groundwater level change is not shown for model layer(s) where the aquifer is less than 1 foot thick, because they are defined as pass through cells (M&A, 2025).
2. **Comparison to Groundwater Level SMC:** To assess the impacts of pumping reductions on sustainability, simulated heads at RMS wells are compared to the minimum threshold and measurable objective for that well. For the SMC assessment, simulated time series in RMS wells are bias adjusted based on the calibration of the historical model. Details on the bias adjustment can be found in the SVOM Update and Projected Baseline Simulation Technical Memoranda (M&A, 2026b).

3. **Change in Groundwater Pumping, Flow, and Storage:** All water budgets are presented for the average of Water Years (WY) 2040-2064. This period represents a 25-year period with climate conditions representative of average historical climate after demand management has been implemented.

180/400 Subbasin Demand Management

This section presents model results with pumping reductions in the 180/400 Subbasin with demand kept constant in the other subbasins. Since wells are screened across multiple layers, pumping reductions are distributed similarly to the distribution of pumping in each aquifer in the Baseline Scenario, according to the well screen intervals and hydraulic properties of each model layer. Adjusting pumping by aquifer is outside the scope of this investigation.

For all demand management modeling scenarios, agricultural irrigation demand in the CSIP area is reduced similarly to any other area in the model. The same amount of recycled water is delivered as the baseline, and any remaining irrigation demand is met with a combination of groundwater and surface water from the Salinas River Diversion Facility (SRDF).

180/400 Subbasin Groundwater Level Change from Baseline

Figure 2 shows the 2040/2041 difference from the baseline for the 180/400 Subbasin: 64% of Pumping Scenario for each of the primary aquifers in the 180/400 Subbasin. This is shown as an example, as it is the scenario with the lowest reduction in pumping for the 180 and 400-Foot Aquifers to reach sustainability; groundwater level change maps for all scenarios are included in Attachment 1.

For this scenario, in each aquifer, groundwater level difference is up to 20 feet higher than the Baseline Scenario, with the largest rise in groundwater level occurring in the center of the subbasin. Water levels are higher in the 64% of Pumping Scenario in all aquifers; however, the area of 10-to-20-foot water level increase is smallest in the Deep Aquifers.

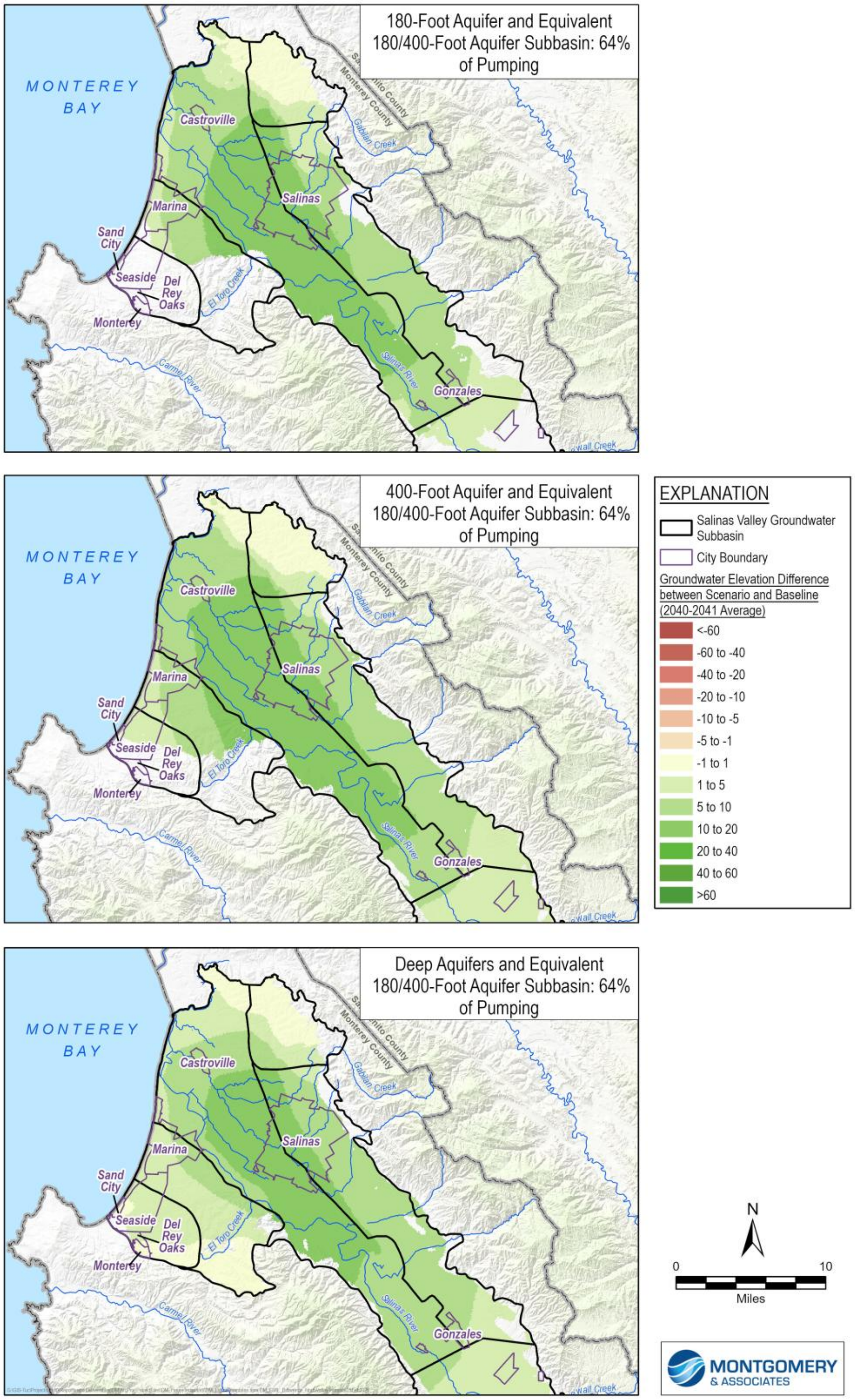

Figure 2. November 2040 and 2041 Average Difference from Baseline for 180/400 Subbasin: 64% of Pumping Scenario

Attachment 1 shows the groundwater level difference from baseline maps for the other 180/400 Subbasin demand management scenarios. Regardless of the scenario, as pumping is reduced, groundwater levels increase, with the largest increases in groundwater level occurring just south of the City of Salinas.

180/400 Subbasin Representative Hydrographs

Figure 3 shows an example hydrograph of well 16S/04E-05M02 for the 180/400 demand management scenarios in the 180-Foot Aquifer. Only November groundwater levels are shown for all series, as November levels are used for evaluating conditions against the SMC. Groundwater levels in the predictive model between the baseline and the demand management scenarios are identical until October 2030 when the pumping reductions begin. Each increasing level of pumping reduction results in additional groundwater level rise.

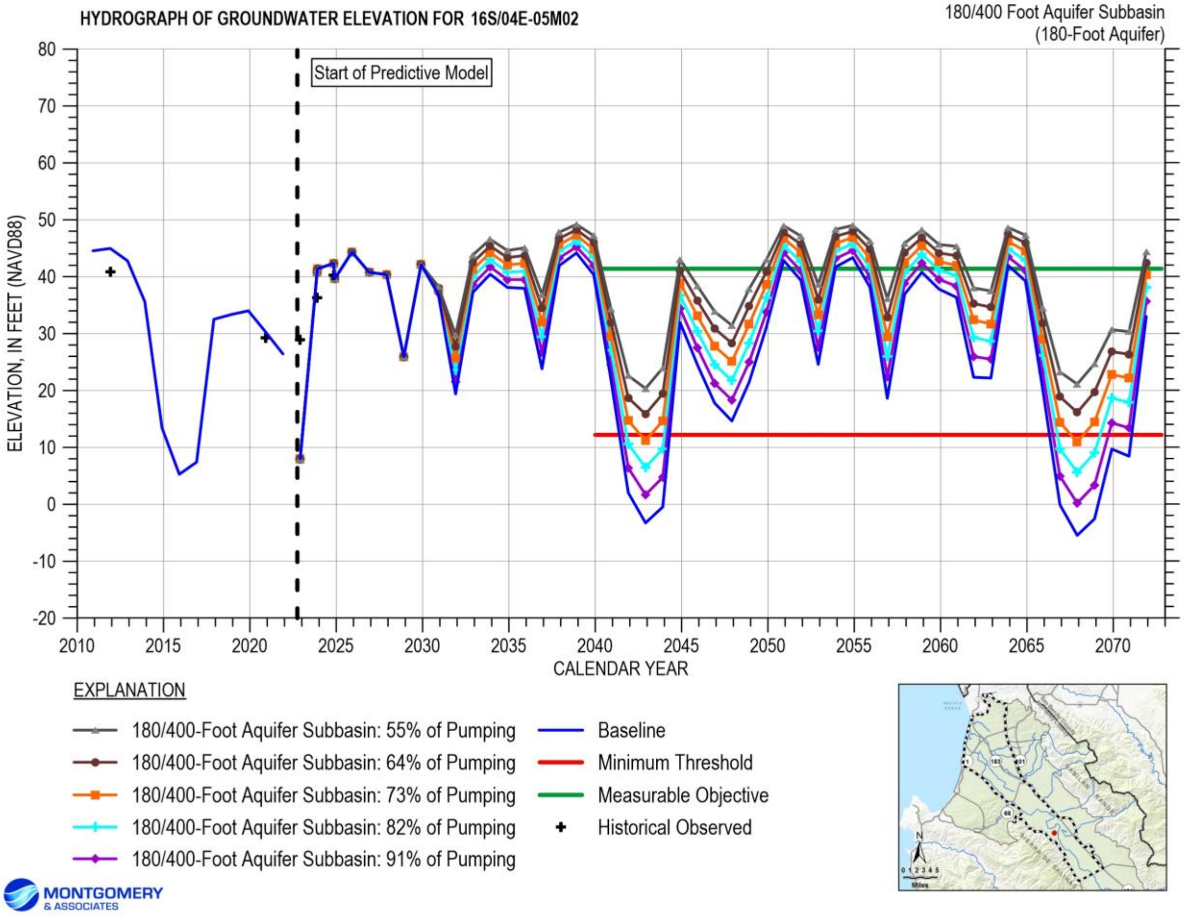

Figure 3. Representative November Hydrograph for Well in 180-Foot Aquifer in 180/400 Subbasin Demand Management Scenarios

Different locations and aquifers show varying degrees of response to demand management based on hydraulic properties of the aquifers in the model and proximity to pumping wells. Figure 4 shows an example hydrograph in the 400-Foot Aquifer. With a 9% reduction in pumping in the subbasin, groundwater levels are above the minimum threshold in all but 4 years. The more years of demand management that occur, the larger the difference in groundwater levels between scenarios is observed.

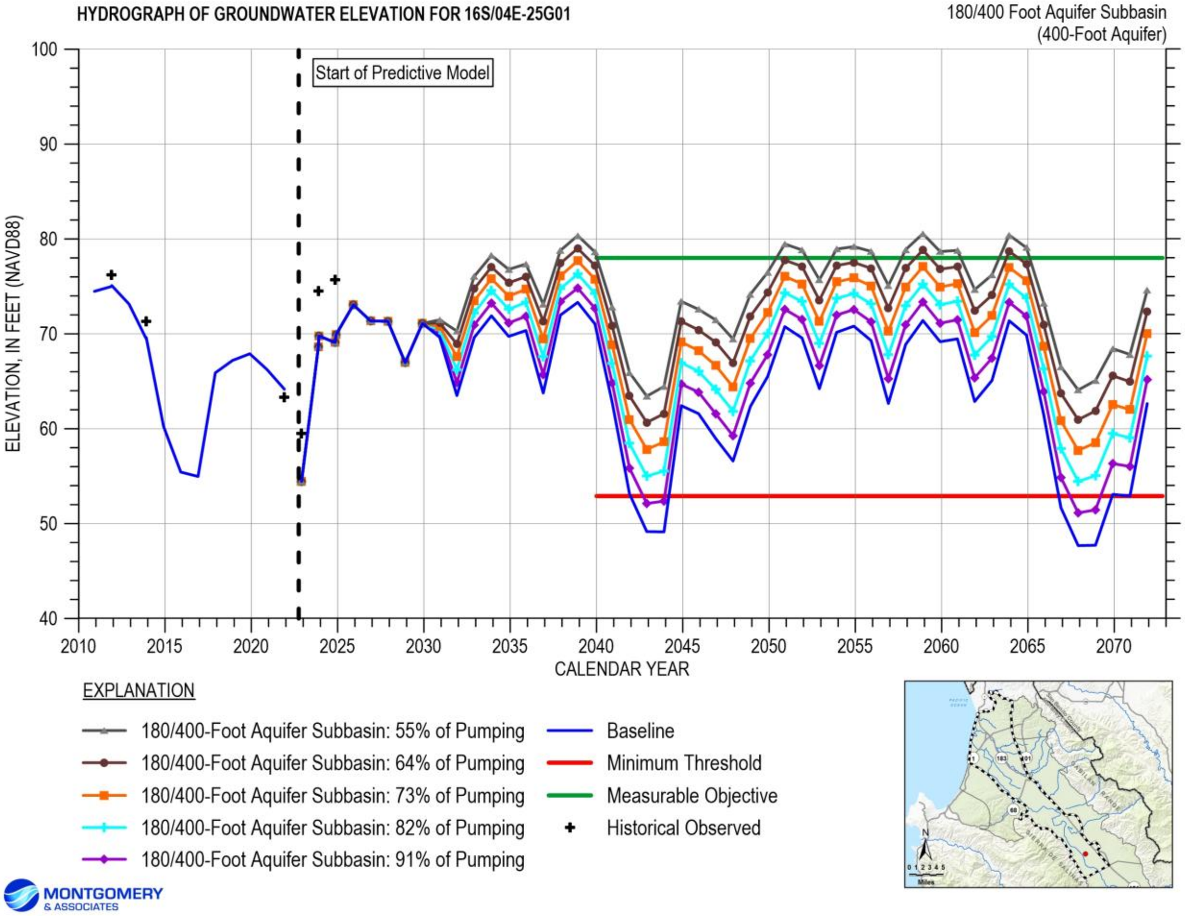

Figure 4. Representative November Hydrograph for Well in 400-Foot Aquifer in the 180/400 Subbasin Demand Management Scenarios

In both hydrographs, the effects of the 25-year climate sequence are visible. The 2012-2016 drought is repeated in 2039-2043 and 2064-2068 and all 3 periods are visible in the hydrographs, though the drought periods are less noticeable on Figure 4.

180/400 Subbasin Comparison to Groundwater Level SMC

Minimum threshold exceedances are assessed by aquifer, with an undesirable result in a single aquifer resulting in an undesirable result for the subbasin. Figure 5 shows the SMC exceedance category by well for the 180/400 Subbasin: 64% of Pumping Scenario. With a 36% reduction in pumping, many wells in the northern 180/400 Subbasin transition to be above their respective minimum thresholds.

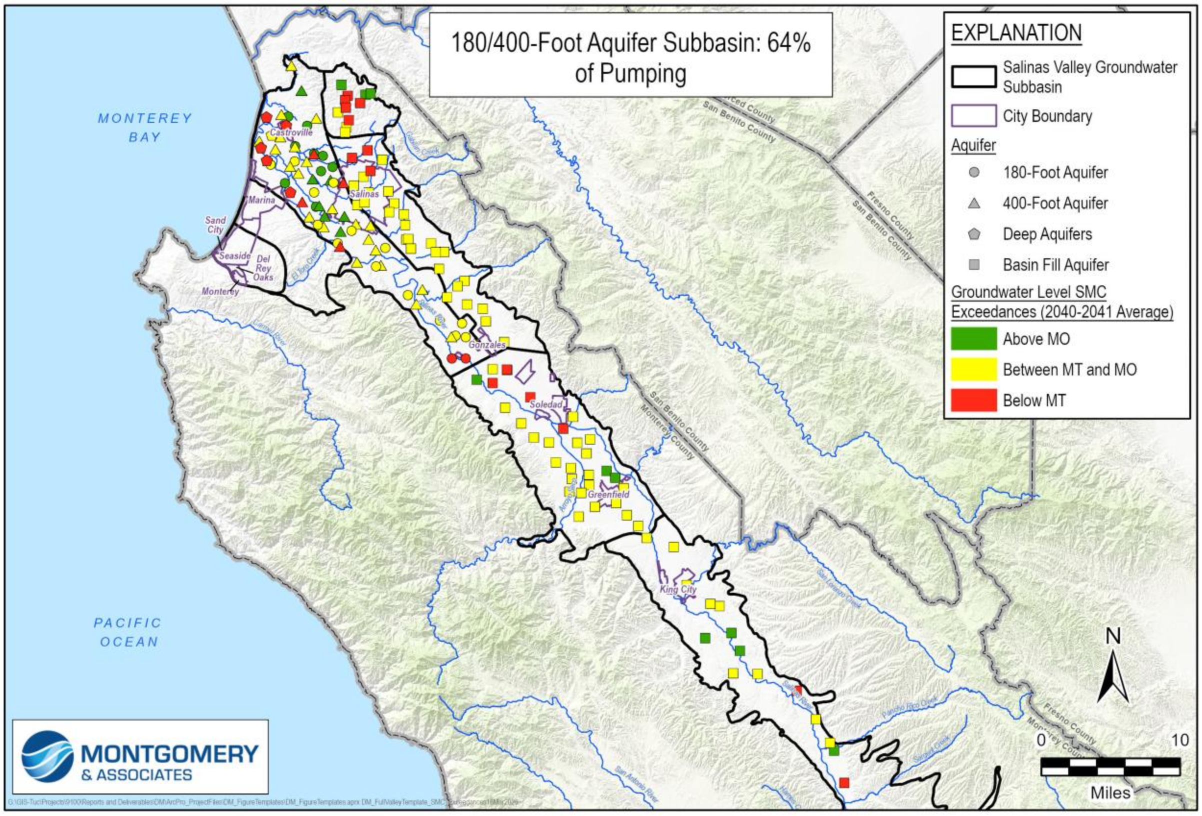

Figure 5. SMC Assessment for the 180/400 Subbasin 64% of Pumping Scenario

Attachment 2 shows groundwater levels compared to SMC by well and by aquifer, for both the Baseline Scenario and the 180/400 demand management scenarios. As pumping reduces, an increasing number of wells transition from below the minimum threshold, to between the measurable objective and minimum threshold, to above the measurable objective. Demand management in the 180/400 Subbasin has the largest impact on RMS well exceedances throughout the 180/400 Subbasin, the very northern end of Forebay Subbasin, and in the northern portion of the Eastside Subbasin, mostly north of the City of Salinas.

Table 1 shows the SMC comparison for the average of November 2040 and 2041 for all 3 aquifers in the 180/400 Subbasin. In the baseline model run, the majority of RMS wells are below the minimum threshold. For the 180-Foot Aquifer, in order for fewer than 15% of RMS wells to drop below the minimum threshold, pumping reductions of 18 to 27% may be required if demand management is used alone. For the 400-Foot Aquifer, 27 to 36% may be required if demand management is used alone. For the Deep Aquifers, basin-wide reductions in pumping of 45% do not bring the aquifer close to sustainability. Future work could consider cutting only pumping in the Deep Aquifers.

Table 1. Average November 2040 and 2041 RMS SMC Assessment in 180-Foot Aquifer in the 180/400 Subbasin

Scenario	RMS Wells Above MO	RMS Wells Between MO & MT	RMS Wells Below MT
180-Foot Aquifer[1]			
Baseline	0%	24%	76%
180/400-Foot Aquifer Subbasin: 91% of Pumping	0%	44%	56%
180/400-Foot Aquifer Subbasin: 82% of Pumping	4%	72%	24%
180/400-Foot Aquifer Subbasin: 73% of Pumping	12%	76%	12%
180/400-Foot Aquifer Subbasin: 64% of Pumping	36%	56%	8%
180/400-Foot Aquifer Subbasin: 55% of Pumping	56%	40%	4%
400-Foot Aquifer[2]			
Baseline	3%	31%	66%
180/400-Foot Aquifer Subbasin: 91% of Pumping	3%	43%	54%
180/400-Foot Aquifer Subbasin: 82% of Pumping	6%	60%	34%
180/400-Foot Aquifer Subbasin: 73% of Pumping	11%	66%	23%
180/400-Foot Aquifer Subbasin: 64% of Pumping	20%	69%	11%
180/400-Foot Aquifer Subbasin: 55% of Pumping	37%	57%	6%
Deep Aquifers[3]			
Baseline	0%	0%	100%
180/400-Foot Aquifer Subbasin: 91% of Pumping	0%	0%	100%
180/400-Foot Aquifer Subbasin: 82% of Pumping	0%	0%	100%
180/400-Foot Aquifer Subbasin: 73% of Pumping	0%	0%	100%
180/400-Foot Aquifer Subbasin: 64% of Pumping	0%	17%	83%
180/400-Foot Aquifer Subbasin: 55% of Pumping	0%	33%	67%

[1] Wells Used In Analysis:25; Effect of single well: 4%
[2] Wells Used In Analysis:35; Effect of single well: 3%
[3] Wells Used In Analysis: 6; Effect of single well:17%

Figure 6 shows the percentage wells below the minimum threshold by year for the 180-Foot Aquifer. In drier years, the percentage of wells below the minimum threshold increases due to lowered groundwater levels resulting from increased groundwater pumping. In the 64% of pumping run, all years have fewer than 15% of the wells below the minimum threshold. In the 73% of pumping run, more than 15% of wells are below the minimum threshold in drought years, but average groundwater levels in 2040/2041 result in fewer than 15% of wells below the minimum threshold.

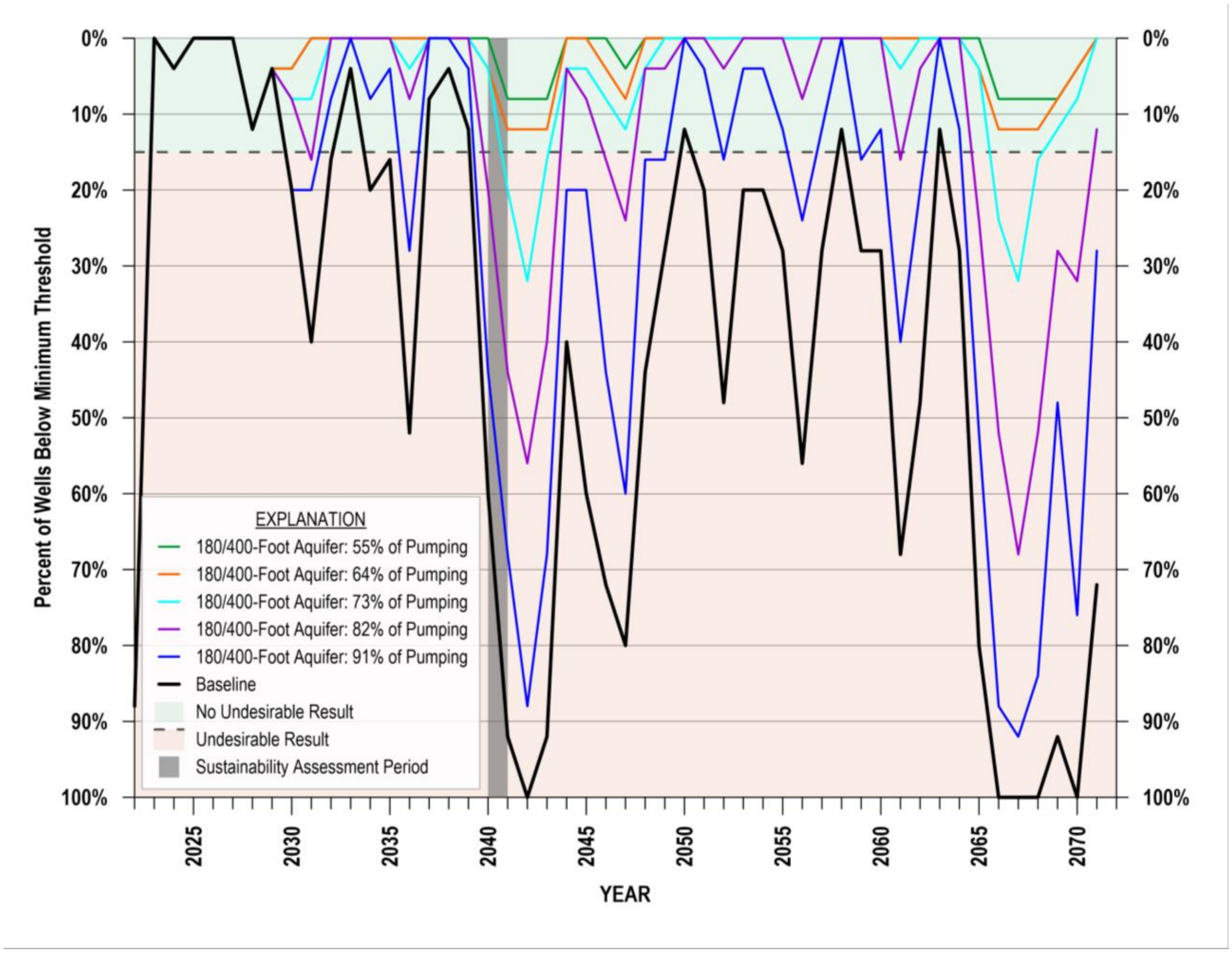

Figure 6. 180/400 Subbasin–180-Foot Aquifer - Projected Groundwater Level Minimum Threshold Exceedances by Year

For the 400-Foot Aquifer, in the Baseline Scenario the majority of RMS wells are below the minimum threshold. In order for fewer than 15% of RMS wells to be below the minimum threshold, pumping reductions of 27 to 36% may be required if demand management is used alone. Figure 7 shows SMC exceedance by year for the 400-Foot Aquifer. In the 64% pumping run, less than 15% of wells are projected to be below the minimum threshold in all but the peak drought years.

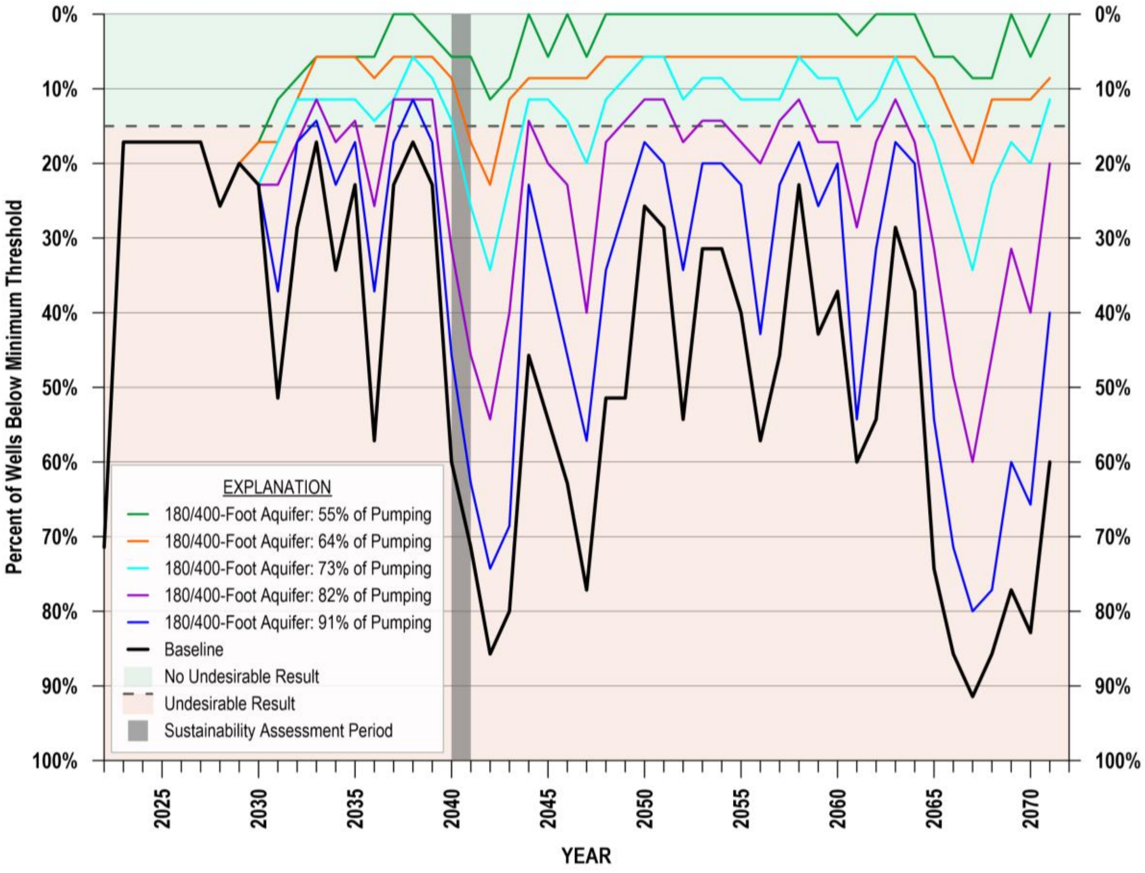

Figure 7. 180/400 Subbasin – 400-Foot Aquifer - Projected Groundwater Level Minimum Threshold Exceedances by Year

In both the 180- and 400-Foot Aquifers, the baseline model shows significant annual variation in percentage of minimum threshold exceedances. This is partly due to a large number of wells with water levels close to their minimum thresholds, as well as water levels showing a significant response to year-to-year climate variability.

Figure 8 shows SMC exceedances by year for the Deep Aquifers within the 180/400 Subbasin. In the Baseline Scenario, the majority of RMS wells are below the minimum threshold. Even with a pumping reduction of 45%, more than 66% of the RMS wells are still below the minimum threshold. Note that only 6 wells are included in this analysis. While groundwater elevation conditions for the aquifer as a whole are reflective of observed data, only 6 RMS wells reproduced historical trends well enough to be included in this analysis. Scaled root mean square error (SRMSE) for the Deep Aquifers in the historical model was 7%. More details on the calibration in the Deep Aquifers is available in the Update to the Salinas Valley Integrated Hydrologic and Operational Models (M&A, 2025).

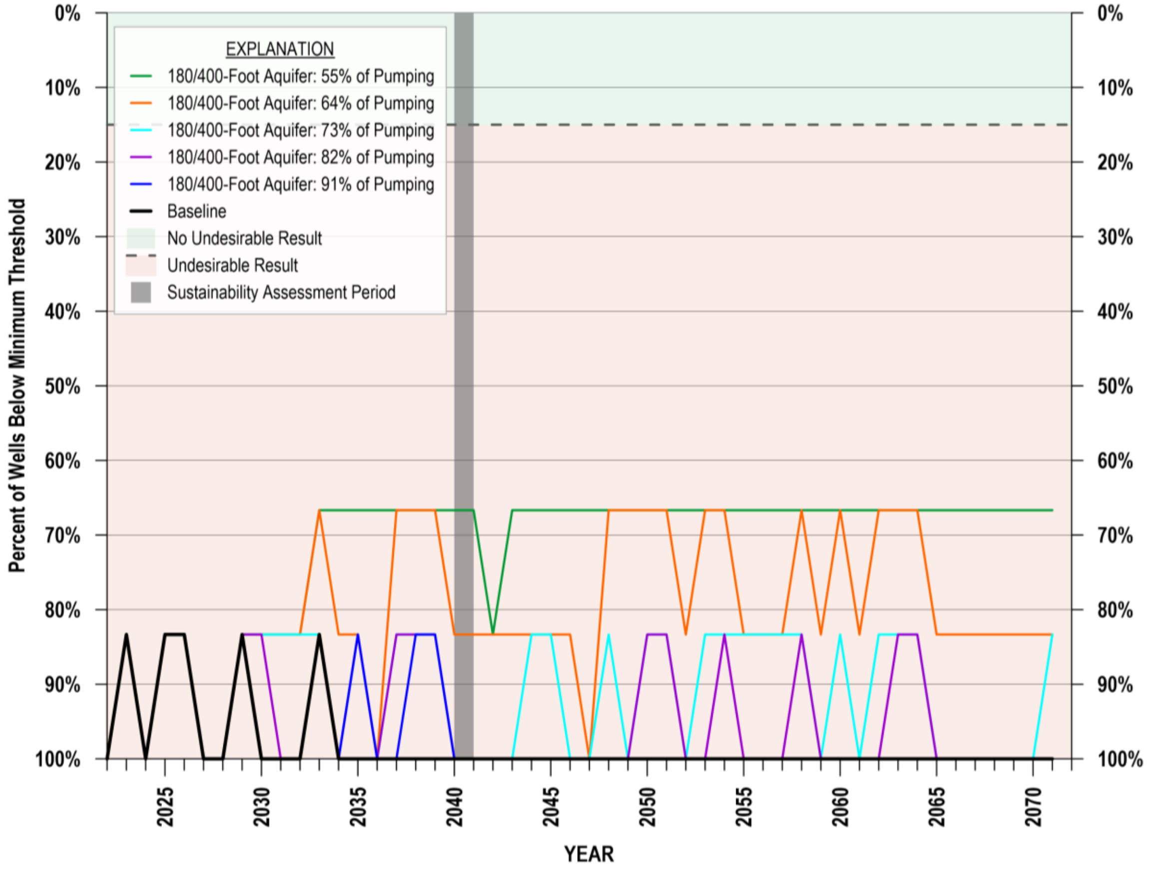

Figure 8. 180/400 Subbasin – Deep Aquifers –Projected Groundwater Level Minimum Threshold Exceedances by Year

180/400 Subbasin Changes in Pumping, Flow, and Storage

Table 2 shows simulated total groundwater extraction in each subbasin for the 5 demand management scenarios for the 180/400 Subbasin. Reducing pumping in the 180/400 Subbasin has minimal effect on groundwater extraction in other subbasins. Raising groundwater levels in the 180/400 Subbasin slightly raises groundwater levels in the adjacent subbasins, allowing crops to access more water from the root zone and decreasing the pumping demand.

Table 2. Average Annual Groundwater Extraction in the 180/400 Subbasin for WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	-108,400	-82,600	-138,600	-94,500	-9,800	-900	-2,300
180/400 Subbasin: 91% of Pumping	-98,400	-82,600	-138,500	-94,500	-9,800	-900	-2,300
180/400 Subbasin: 82% of Pumping	-88,500	-82,600	-138,500	-94,500	-9,800	-900	-2,300
180/400 Subbasin: 73% of Pumping	-78,700	-82,500	-138,500	-94,500	-9,800	-900	-2,300
180/400 Subbasin: 64% of Pumping	-69,200	-82,500	-138,400	-94,500	-9,800	-900	-2,300
180/400 Subbasin: 55% of Pumping	-60,000	-82,500	-138,400	-94,500	-9,800	-900	-2,300

All values in acre-feet per year (AFY)

Table 3 shows net stream exchange in each subbasin for the 180/400 Subbasin demand management scenarios. The positive sign shown for each subbasin indicates a net inflow, where more water is entering the aquifer from the streams and rivers. As pumping declines between model scenarios, the net inflow from the Salinas River and other streams decreases. The pumping reductions cause groundwater levels to increase, which decreases the downward gradient from the stream into the aquifer. The effects are solely due to changes in groundwater levels since reservoir releases are kept constant for all demand management scenarios.

Larger pumping reductions in the 180/400 Subbasin result in less stream recharge into the aquifer. The scenario with the greatest reduction–55% of total pumping–had approximately 62% of the stream recharge as the Baseline Scenario, or 21,000 acre-feet per year (AFY) on average less recharge. A similar but less severe trend is shown in the other subbasins with the largest impact by percentage occurring in Monterey Subbasin. The pumping reductions in the 180/400 Subbasin cause groundwater levels to rise in the eastern portion of the Monterey Subbasin. This groundwater level increase reduces the hydraulic gradient between the stream and the aquifer and reduces the amount of stream recharge. 180/400 Subbasin pumping reductions have a limited impact on stream recharge in the remaining subbasins.

Table 3. Average Annual Net Stream Exchange in the 180/400 Subbasin for WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	55,400	7,100	118,600	95,300	4,500	1,000	1,900
180/400 Subbasin: 91% of Pumping	51,400	7,000	117,500	95,300	4,400	1,000	1,900
180/400 Subbasin: 82% of Pumping	47,300	7,000	116,500	95,200	4,300	1,000	1,800
180/400 Subbasin: 73% of Pumping	43,100	6,900	115,400	95,200	4,100	900	1,800
180/400 Subbasin: 64% of Pumping	38,900	6,900	114,400	95,200	4,000	900	1,800
180/400 Subbasin: 55% of Pumping	34,400	6,800	113,400	95,100	3,800	900	1,800

All values in AFY

Table 4 shows the changes in inter-subbasin groundwater flow for the 180/400 Subbasin scenarios. With the exception of flows between the 180/400 and Eastside Subbasins, reduced pumping demand in the 180/400 Subbasin results in less inter-subbasin flow. This is because increased groundwater levels in the 180/400 Subbasin generally reduces the movement of water between subbasins when the 180/400 Subbasin is down-gradient, e.g., from Forebay, Langley, and Monterey Subbasins. The Eastside Subbasin, however, has lower groundwater levels than the 180/400 Subbasin in the Baseline Scenario, so as groundwater levels rise in the 180/400 Subbasin from pumping reductions, more groundwater flows out to the Eastside Subbasin.

Table 4. Average Inter-subbasin Groundwater Flow for 180/400 Subbasin Demand Management Subbasin for WY 2040-2064

Scenario	Upper Valley to Forebay	Forebay to Eastside	Forebay to 180/400	180/400 to Eastside	Monterey to 180/400	Langley to Eastside	Langley to 180/400
Baseline	25,600	6,400	29,900	41,400	21,100	4,200	500
180/400 Subbasin: 91% of Pumping	25,600	6,200	28,800	42,200	19,600	4,000	500
180/400 Subbasin: 82% of Pumping	25,600	6,000	27,800	43,000	18,100	3,800	500
180/400 Subbasin: 73% of Pumping	25,600	5,800	26,700	43,800	16,600	3,700	500
180/400 Subbasin: 64% of Pumping	25,500	5,600	25,700	44,500	15,000	3,500	500
180/400 Subbasin: 55% of Pumping	25,500	5,400	24,700	45,200	13,600	3,400	500

All values in AFY

Table 5 shows the average annual change in groundwater storage for the 180/400 demand management scenarios. The convention used for this table, and all other tables showing change in storage in this document, is that positive values correspond to a gain in storage associated with rising groundwater levels on average, while negative values correspond to a loss of storage associated with declining groundwater levels on average.

Overall, average annual change in storage is somewhat insensitive to reductions in pumping. Even a 45% reduction in pumping in the 180/400 Subbasin only results in only about 1,000 AFY increase in storage in that subbasin and about a 1,900 AFY increase in the Eastside Subbasin. This limited response is partly due to the shallow unconfined sediments that overlie much of the 180/400 Subbasin. Most of the storage change occurs in model layer 1, which represents these shallow sediments. While the pumping reductions occur primarily in deeper layers, irrigation return flows recharge the shallow zone. As a result, reductions in deeper pumping do influence groundwater levels, but they have a smaller effect on total storage change, in part because of the differing storage coefficients among the aquifers.

Table 5. Average Annual Change in Groundwater Storage for 180/400 Subbasin Demand Management Subbasin for WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	-500	-900	-400	-200	-7,600	-2,600	600
180/400 Subbasin: 91% of Pumping	-300	-500	-300	-200	-7,100	-2,400	800
180/400 Subbasin: 82% of Pumping	-100	-100	-300	-200	-6,700	-2,200	900
180/400 Subbasin: 73% of Pumping	100	200	-200	-200	-6,200	-2,100	1,000
180/400 Subbasin: 64% of Pumping	300	600	-200	-200	-5,800	-1,900	1,200
180/400 Subbasin: 55% of Pumping	500	1,000	-100	-200	-5,400	-1,700	1,300

All values in AFY

Eastside Subbasin Demand Management

Similar to the 180/400 Subbasin demand management scenarios, 5 scenarios were run for the Eastside Subbasin, where agricultural pumping was reduced in the Eastside Subbasin and demand was kept constant in all other subbasins.

Eastside Subbasin Groundwater Level Change from Baseline

Figure 9 shows the groundwater level difference from the baseline for the Eastside Subbasin at 2040/2041 for the 75% of Pumping Scenario. This is the smallest pumping reduction estimated in order for the Eastside Subbasin to meet sustainability. Groundwater level change maps for the remaining scenarios are included in Attachment A. While the Eastside Subbasin consists of a single Basin Fill Aquifer, maps are included for each of the primary aquifers in the 180/400 Subbasin and their stratigraphic equivalent in the Eastside Subbasin. For this scenario, groundwater level difference is up to 20 feet higher than the Baseline Scenario, with the largest rise in groundwater levels occurring southeast of the City of Salinas. A similar pattern of groundwater level rise is observed in all model layers in the Eastside.

While these maps illustrate how pumping reductions affect groundwater levels, they do not show absolute groundwater elevations. Consistent with groundwater elevation maps developed from observed measurements over the past several decades, the Baseline Scenario shows a pronounced groundwater level depression east of the City of Salinas, with projected groundwater levels to be lower than 60 feet below sea level in November 2040. These pumping reductions bring groundwater elevations closer, but still below sea level.

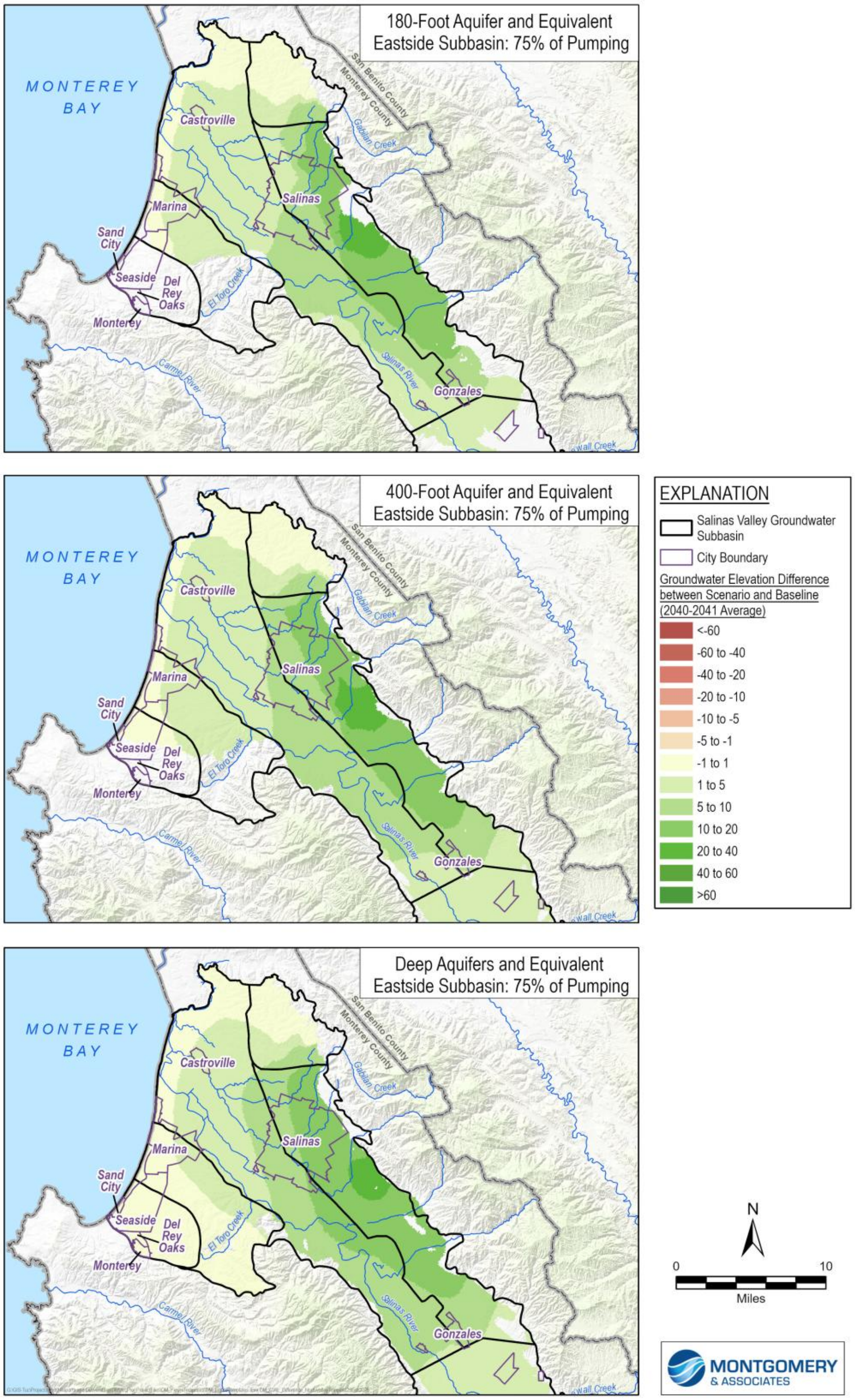

Figure 9. November 2040 and 2041 Average Difference from Baseline for Eastside Subbasin: 75% of Pumping Scenario

Attachment 1 shows the groundwater level difference maps for each Eastside Subbasin demand management scenario compared to the Baseline Scenario for the average of November 2040 and November 2041 groundwater levels. Regardless of scenario, as pumping reduces, groundwater levels increase, with the largest increases in groundwater level occurring southeast of the City of Salinas in the Eastside Subbasin.

Eastside Subbasin Representative Hydrograph

Figure 10 shows a representative hydrograph for the Eastside Subbasin. This well shows a similar pattern between the Baseline Scenario and the demand management scenarios, similar to the hydrographs in the 180/400 Subbasin. Reducing pumping raises groundwater levels and can prevent wells from exceeding their minimum thresholds. With a 25% reduction in pumping in the Eastside Subbasin, this well does not drop below its minimum threshold in any year, whereas the baseline is below the minimum threshold during many years.

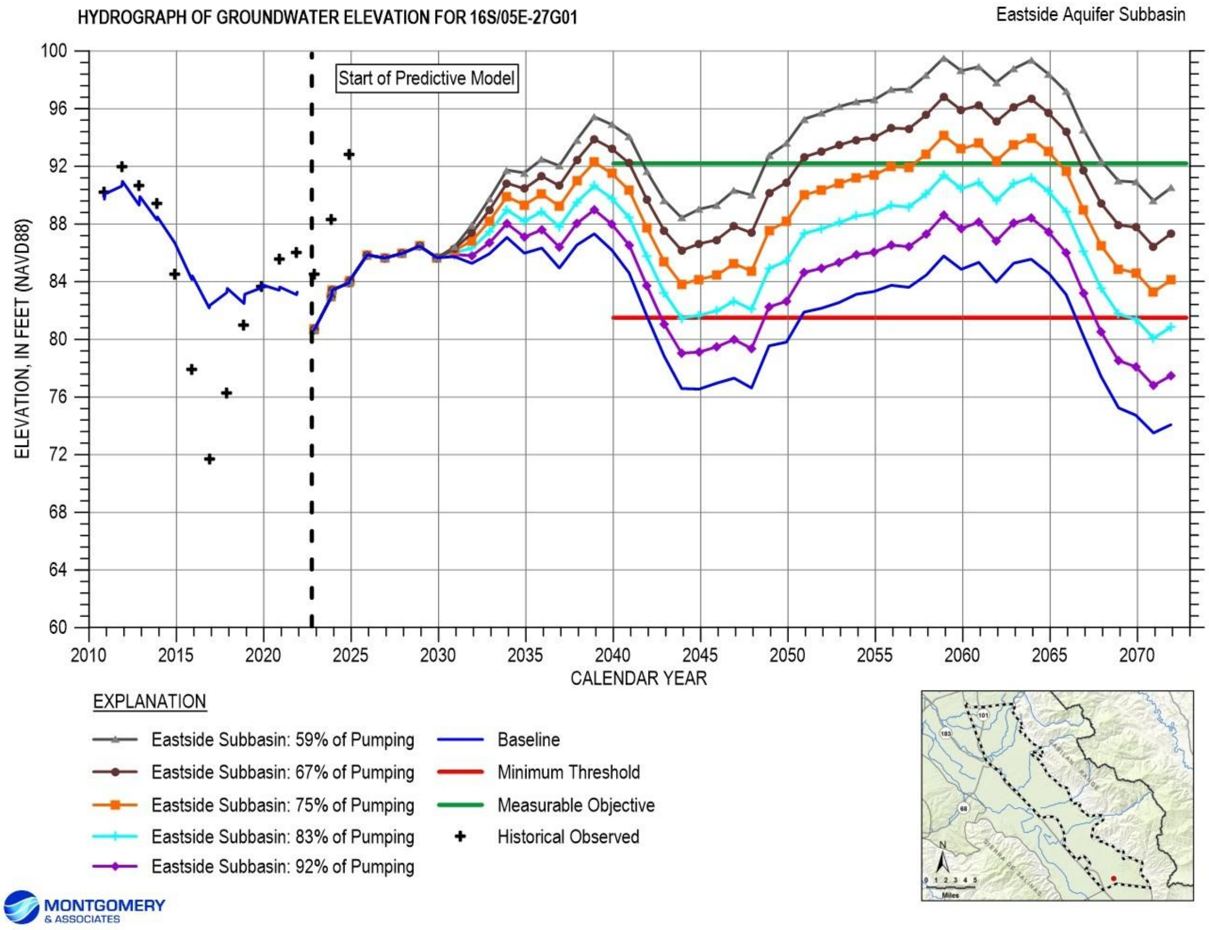

Figure 10. Representative Hydrograph for the Eastside Subbasin

Eastside Subbasin Comparison to Groundwater Level SMC

Groundwater levels in RMS wells are compared to SMC to assess sustainability. Figure 11Figure 5 shows groundwater levels compared to the measurable objective and minimum threshold for each RMS well for the Eastside Subbasin 75% of Pumping Scenario. With a 25% reduction in pumping, many wells in the northern Eastside Subbasin transition to be above their respective minimum thresholds. Similar figures for the other Eastside Subbasin demand management scenarios are included in Attachment 2. Note that these model runs only adjust agricultural pumping in the Eastside Subbasin and that wells for the City of Salinas continue to pump the same rates as in the Baseline Scenario.

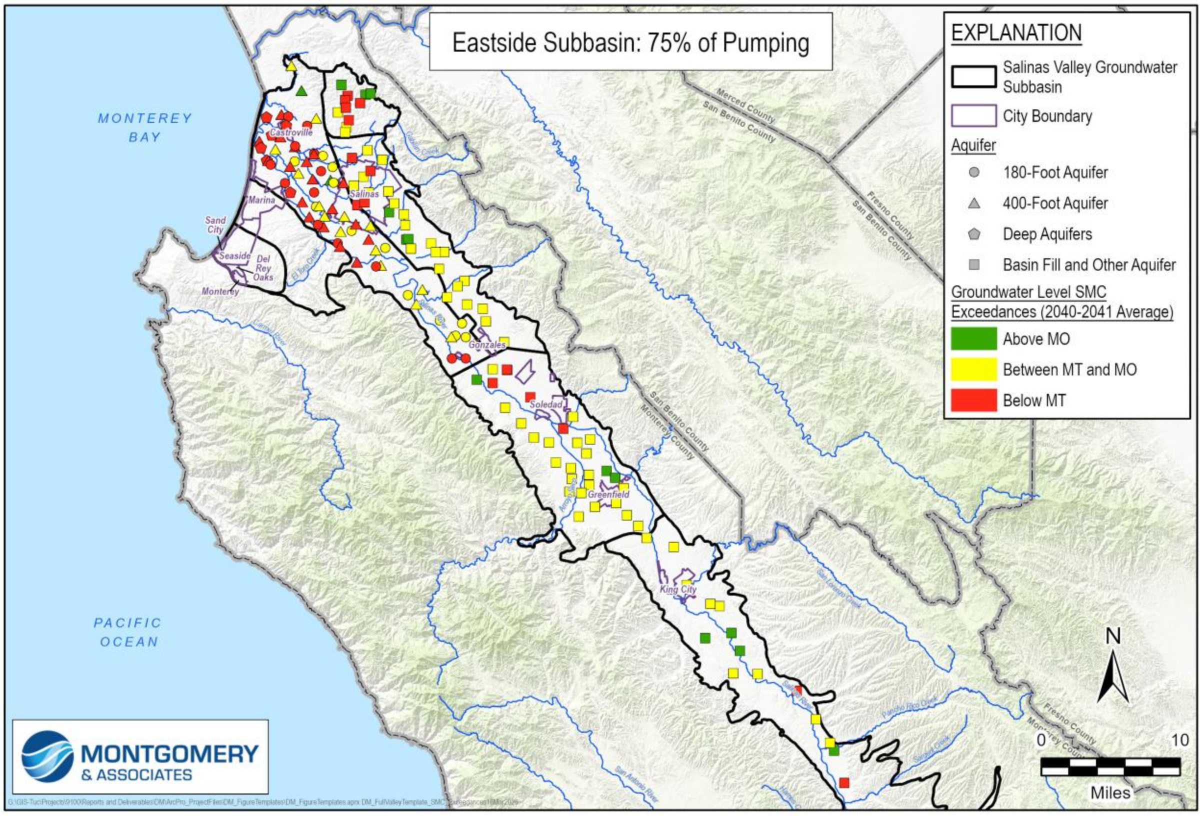

Figure 11.SMC Assessment for the Eastside Subbasin 75% of Pumping Scenario

Demand management in the Eastside Subbasin primarily impacts RMS well exceedances throughout the Eastside Subbasin, but also affects wells in the northern end of Forebay and in the eastern portion of the 180/400 Subbasin.

Table 6 shows the percentage of RMS wells with average November groundwater levels for 2040 and 2041 below the minimum threshold for each well. In the Baseline Scenario, more than 60% of wells are below the minimum threshold. However, an 8% reduction in pumping results in about half as many wells being below the minimum threshold, indicating that many of these wells are near their minimum threshold in the Baseline Scenario. Sustainability is achieved in the Eastside Subbasin with pumping reductions between 17% and 25%.

Table 6. Average November 2040 and 2041 RMS SMC Assessment in the Eastside Subbasin

Scenario	RMS Wells Above MO	RMS Wells Between MO & MT	RMS Wells Below MT
Baseline	0%	38%	62%
Eastside Subbasin: 92% of Pumping	0%	66%	34%
Eastside Subbasin: 83% of Pumping	0%	79%	21%
Eastside Subbasin: 75% of Pumping	10%	76%	14%
Eastside Subbasin: 67% of Pumping	21%	72%	7%
Eastside Subbasin: 59% of Pumping	45%	52%	3%

Note:

Wells Used In Analysis:	29
Effect of single well:	3%

Figure 12 shows the annual percentage of wells with their November groundwater level below the minimum threshold. In general, the percentage of RMS wells below the minimum threshold in the Eastside Subbasin is sensitive to changes in pumping in the Eastside Subbasin, indicating that the demand management could be an appropriate measure for the Eastside Subbasin.

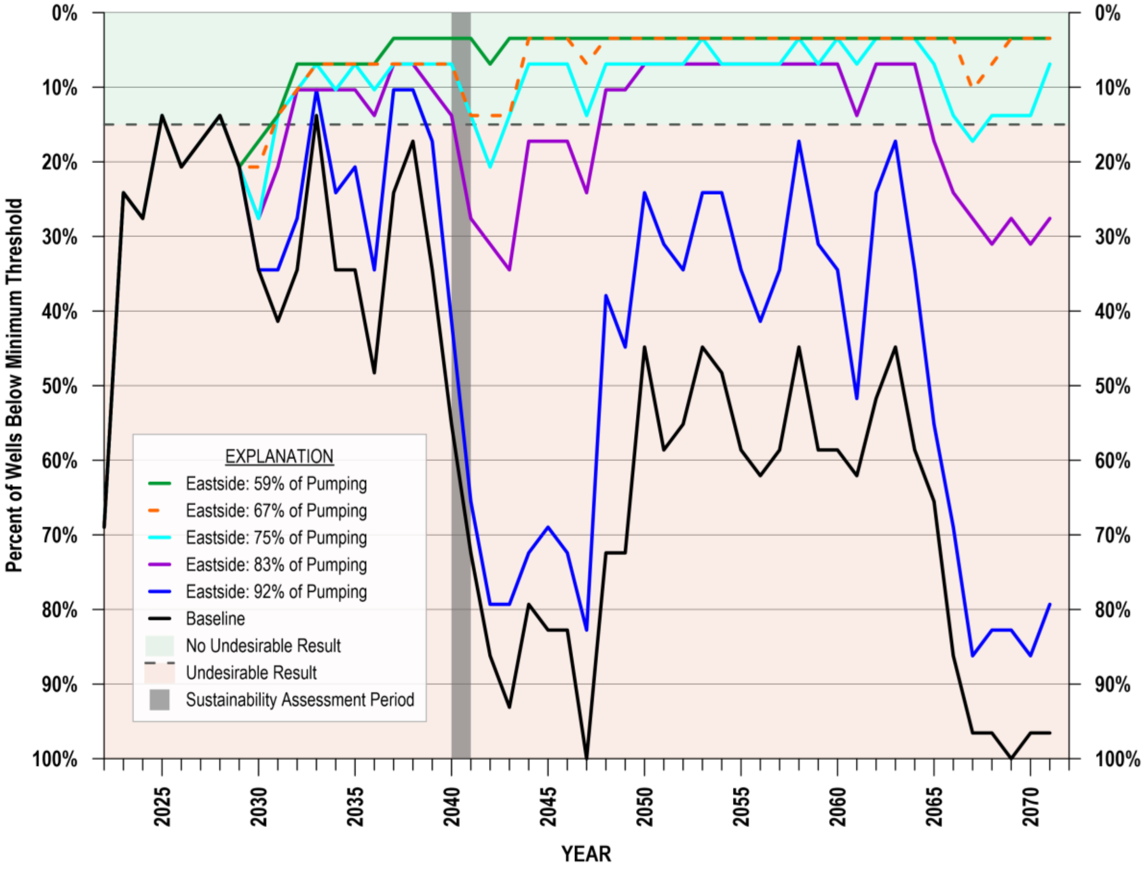

Figure 12. Eastside Subbasin Projected Groundwater Level Minimum Threshold Exceedances by Year

Eastside Subbasin Changes in Pumping, Flow, and Storage

Table 7 shows average annual groundwater extraction in each subbasin for the Eastside Demand Management model scenarios. Reducing pumping in the Eastside Subbasin has a minimal effect on groundwater extraction in other scenarios.

Table 7. Average Annual Groundwater Extraction in the Eastside Demand Management Scenarios for WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	-108,400	-82,600	-138,600	-94,500	-9,800	-900	-2,300
Eastside Subbasin: 92% of Pumping	-108,200	-75,700	-138,500	-94,500	-9,800	-900	-2,300
Eastside Subbasin: 83% of Pumping	-108,000	-68,900	-138,500	-94,500	-9,800	-900	-2,300
Eastside Subbasin: 75% of Pumping	-107,900	-62,200	-138,500	-94,500	-9,800	-900	-2,200
Eastside Subbasin: 67% of Pumping	-107,700	-55,500	-138,400	-94,500	-9,800	-900	-2,200
Eastside Subbasin: 59% of Pumping	-107,500	-48,900	-138,400	-94,500	-9,800	-900	-2,200

All values in AFY

Table 8 shows changes in net stream exchange in response to changes in pumping in the Eastside Subbasin. Positive values indicate stream recharge to the aquifer. The largest source of stream recharge in the Salinas Valley is the Salinas River which does not run through the Eastside Subbasin. In general, stream exchange only changes in the 180/400 and Forebay Subbasins in response to changes in pumping in the Eastside Subbasin. Decreasing pumping in the Eastside Subbasin raises groundwater levels in the 180/400 and Forebay Subbasins, which slightly decreases the amount of stream recharge that enters the aquifer in those subbasins.

Table 8. Average Annual Net Stream Exchange in the Eastside Demand Management Scenarios for WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	55,400	7,100	118,600	95,300	4,500	1,000	1,900
Eastside Subbasin: 92% of Pumping	52,700	7,000	117,300	95,200	4,400	1,000	1,900
Eastside Subbasin: 83% of Pumping	49,900	7,000	116,000	95,200	4,400	1,000	1,800
Eastside Subbasin: 75% of Pumping	47,100	6,900	114,800	95,200	4,300	1,000	1,800
Eastside Subbasin: 67% of Pumping	44,300	6,900	113,500	95,200	4,300	1,000	1,800
Eastside Subbasin: 59% of Pumping	41,400	6,900	112,300	95,100	4,200	1,000	1,800

All values in AFY

Table 9 shows changes in inter-subbasin groundwater flows in response to changes in pumping in the Eastside Subbasin. Reducing pumping in Eastside Subbasin causes reductions in inflows to the Eastside Subbasin from Forebay and Langley Subbasins and substantial reductions in inflows from the 180/400 Subbasin. However, even more significant reductions would be required to change the net groundwater flow direction between any subbasins.

Table 9. Average Annual Inter-subbasin Groundwater Flow for Eastside Demand Management Scenarios for WY 2040-2064

Scenario	Upper Valley to Forebay	Forebay to Eastside	Forebay to 180/400	180/400 to Eastside	Monterey to 180/400	Langley to Eastside	Langley to 180/400
Baseline	25,600	6,400	29,900	41,400	21,100	4,200	500
Eastside Subbasin: 92% of Pumping	25,600	5,900	28,900	36,200	20,400	3,900	500
Eastside Subbasin: 83% of Pumping	25,600	5,300	27,900	31,000	19,700	3,600	600
Eastside Subbasin: 75% of Pumping	25,500	4,800	26,900	25,700	19,000	3,300	600
Eastside Subbasin: 67% of Pumping	25,500	4,300	25,900	20,400	18,300	3,000	700
Eastside Subbasin: 59% of Pumping	25,500	3,800	24,900	15,000	17,700	2,700	700

All values in AFY

Table 10 shows average annual change in groundwater storage for the Eastside Subbasin demand management scenarios. For the Eastside Subbasin in the SVOM, the storage property zone representing the unconfined sediments extends into layer 7. As a result, change in storage in the Eastside Subbasin is sensitive to changes in pumping. As pumping decreases, net storage change becomes increasingly more positive, reflecting a rise in groundwater levels and switches from a loss of 900 AFY in the Baseline Scenario to a gain of 3,000 AFY for the Eastside 59% of Pumping Scenario.

Table 10. Average Annual Net Groundwater Storage Change in the Eastside Demand Management Scenarios for WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	-500	-900	-400	-200	-7,600	-2,600	600
Eastside Subbasin: 92% of Pumping	-300	-200	-300	-200	-7,300	-2,500	900
Eastside Subbasin: 83% of Pumping	-100	600	-200	-200	-7,000	-2,400	1,100
Eastside Subbasin: 75% of Pumping	200	1,400	-100	-200	-6,700	-2,400	1,300
Eastside Subbasin: 67% of Pumping	400	2,200	0	-100	-6,500	-2,300	1,600
Eastside Subbasin: 59% of Pumping	600	3,000	0	-100	-6,200	-2,200	1,800

All values in AFY

Forebay Subbasin Demand Management

The Forebay Subbasin is nearly at sustainability in the Baseline Scenario. Minimal amounts of demand management are required to achieve sustainability. As a result, only a scenario with 9% reduction in pumping is presented in this memo.

Forebay Subbasin Groundwater Level Change from Baseline

Figure 13 shows the groundwater level difference from the baseline for the Forebay Subbasin demand management scenario at 2040/2041 for the Basin Fill Aquifer. Layer 9 from the model is shown, since it has the largest extent of non-nominal thickness, but similar levels of groundwater level rise are observed in other layers. As pumping reduces, groundwater levels increase, approximately 1 to 5 feet. The effects from reduced pumping extend into the adjacent subbasins.

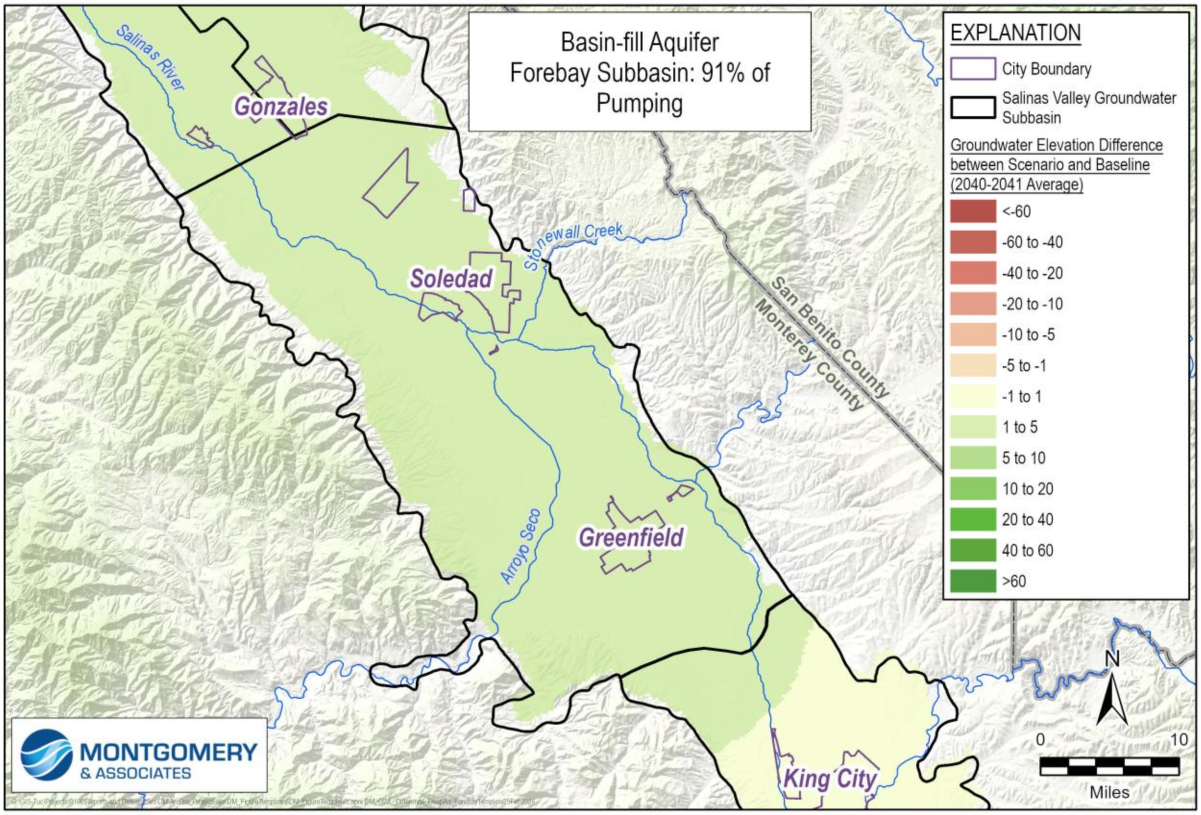

Figure 13. November 2040 and 2041 Average Difference from Baseline for Forebay Subbasin: 91% of Pumping Scenario

Forebay Subbasin Representative Hydrograph

Figure 14 shows a representative hydrograph for the Forebay Subbasin. The 9% pumping reduction does not raise groundwater levels above the minimum threshold in drought years. Since pumping is reduced by only a 9%, groundwater levels between the Baseline Scenario and 91% of Pumping Scenario are similar, with the largest difference occurring in drought years. As mentioned above, reservoir releases and diversions at both Clark Colony and SRDF were kept consistent with the baseline to isolate the effect of pumping reductions in the scenarios described here. However, pumping reductions in the subbasin could result in less river loss, smaller releases, and therefore greater carry-over storage in the reservoirs that could help maintain releases in drought years.

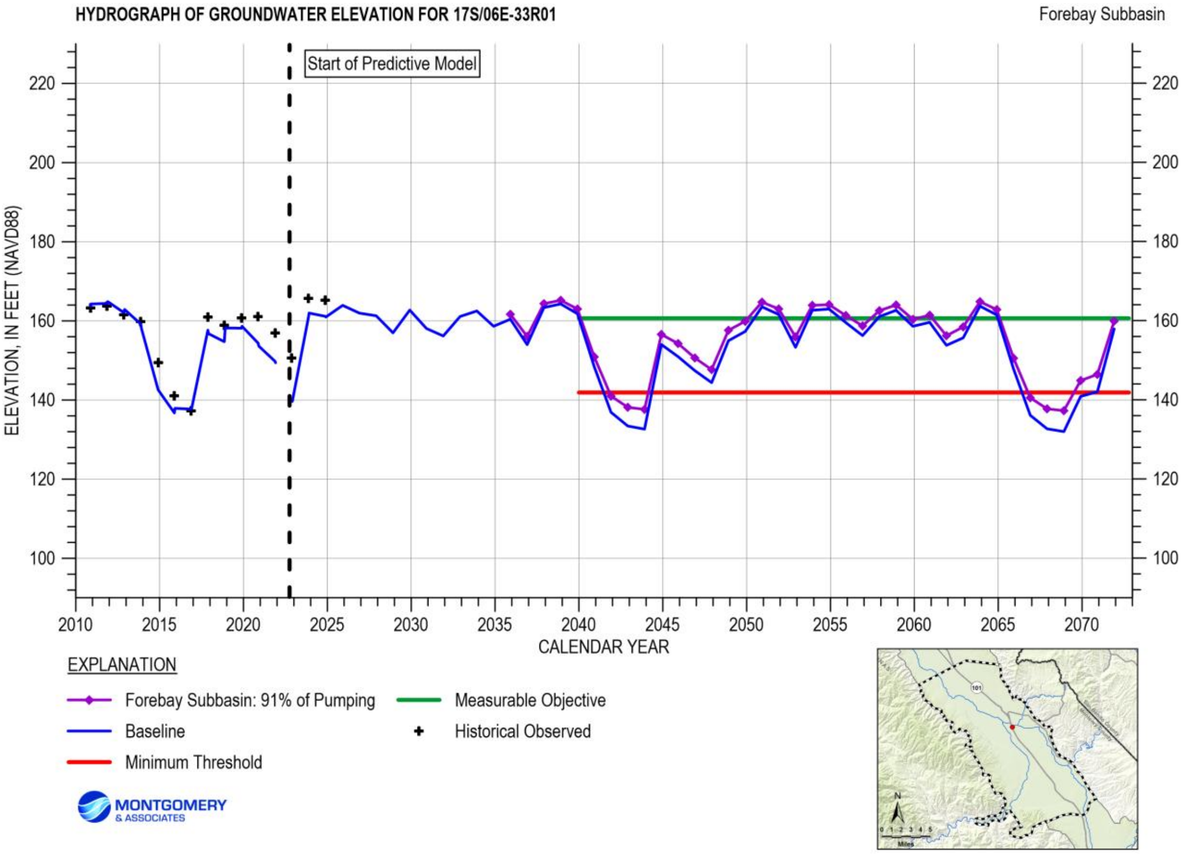

Figure 14. Representative Hydrograph for Forebay Subbasin 91% of Pumping Scenario

Forebay Subbasin Comparison to Groundwater Level SMC

Figure 15 shows groundwater levels compared to the measurable objective and minimum threshold for each RMS well in the Forebay Subbasin 91% of Pumping Scenario. Although some sediments are equivalent to the 180-Foot, 400-Foot, or Deep Aquifers, the Forebay Subbasin has 1 principal aquifer due to lack of a continuous aquitard across a majority of the subbasin. With a 9% reduction in pumping, only a few wells transition from below to above the minimum threshold between this run and the Baseline Scenario, and pumping has limited effects on groundwater level SMC outside of the Forebay Subbasin.

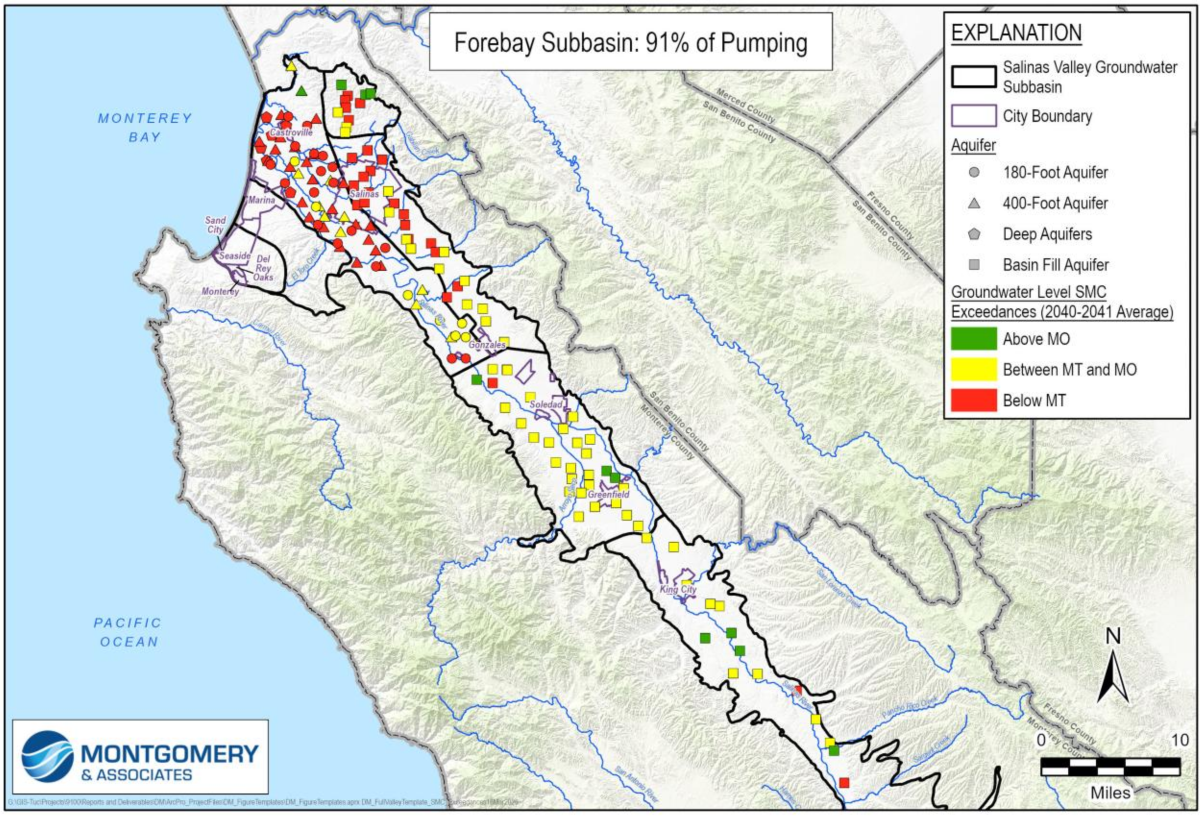

Figure 15. SMC Assessment for the Forebay Subbasin 91% of Pumping Scenario

Table 11 shows the percentage of RMS wells with average November 2040 and 2041 water levels below the minimum threshold in the Forebay Subbasin. A 9% reduction in pumping results in the Forebay Subbasin achieving sustainability.

Table 11. Average November 2040 and 2041 RMS SMC Assessment in Forebay Subbasin

Scenario	RMS Wells Above MO	RMS Wells Between MO & MT	RMS Wells Below MT
Baseline	6%	76%	18%
Forebay Subbasin: 91% of Pumping	9%	82%	9%

Note:
Wells Used In Analysis: 34
Effect of single well: 3%

Figure 16 shows the percentage of RMS wells in the Forebay Subbasin below the minimum threshold on an annual basis. With the exception of drought years, in both the Baseline Scenario and the 91% of Pumping Scenario, fewer than 15% of RMS wells are below the minimum threshold. In drought years, more than 15% of wells drop below the minimum threshold in both model scenarios.

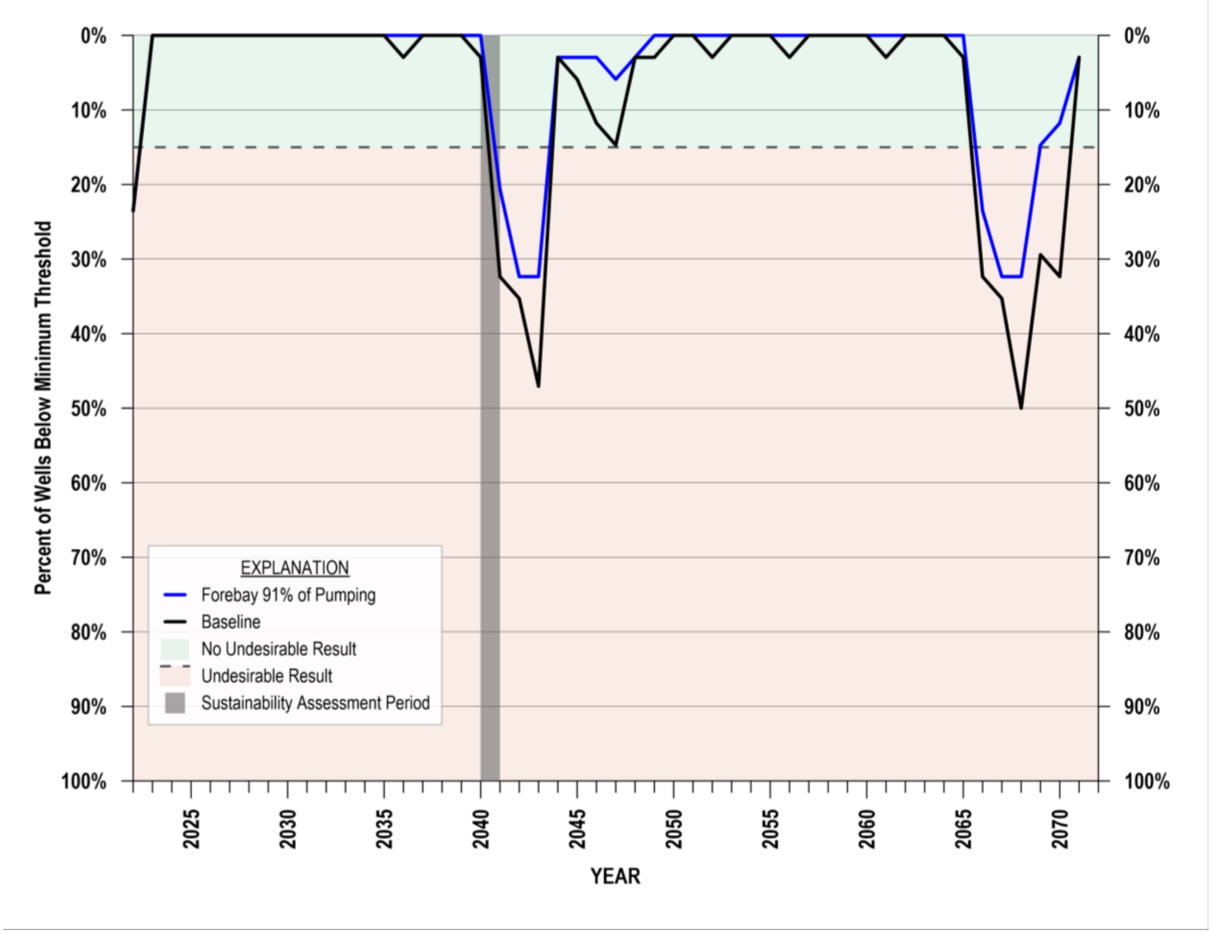

Figure 16. Forebay Subbasin Projected Groundwater Level Minimum Threshold Exceedances by Year

Forebay Subbasin Changes in Pumping, Flow, and Storage

Table 12 shows average annual groundwater extraction for the Baseline Scenario and 91% of pumping scenario. Pumping outside the Forebay Subbasin is minimally different from the Baseline Scenario.

Table 12. Average Annual Groundwater Extraction for Forebay Demand Management Scenarios in WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	-108,400	-82,600	-138,600	-94,500	-9,800	-900	-2,300
Forebay Subbasin: 91% of Pumping	-108,300	-82,600	-125,900	-94,500	-9,800	-900	-2,300

All values in AFY

Table 13 shows average net stream exchange for the Forebay demand management model scenarios. The increased groundwater levels from the reduction in agricultural pumping result in less stream recharge into the aquifer.

Table 13. Average Net Stream Exchange for Forebay Demand Management Scenarios in WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	55,400	7,100	118,600	95,300	4,500	1,000	1,900
Forebay Subbasin: 91% of Pumping	55,100	7,100	110,900	93,800	4,600	1,000	1,900

All values in AFY

Table 14. shows average annual inter-subbasin groundwater flows for the Forebay demand management model scenarios. The reduced pumping in Forebay Subbasin causes groundwater levels to rise, resulting in a small reduction in inflow from Upper Valley Subbasin and a small increase in outflow to the 180/400 Subbasin.

Table 14. Average Annual Inter-subbasin Groundwater Flows for Forebay Demand Management Scenarios in WY 2040-2064

Scenario	Upper Valley to Forebay	Forebay to Eastside	Forebay to 180/400	180/400 to Eastside	Monterey to 180/400	Langley to Eastside	Langley to 180/400
Baseline	25,600	6,400	29,900	41,400	21,100	4,200	500
Forebay Subbasin: 91% of Pumping	24,000	6,700	30,600	41,300	21,000	4,200	500

All values in AFY

Table 15 shows changes in net groundwater storage as a result of a 9% reduction in pumping. Annual change in storage only changes by up to 200 AFY in response to a 9% reduction in pumping.

Table 15. Average Annual Net Groundwater Storage Change for Forebay Demand Management Scenarios in WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	-500	-900	-400	-200	-7,600	-2,600	600
Forebay Subbasin: 91% of Pumping	-500	-700	-200	-100	-7,500	-2,600	600

All values in AFY

Upper Valley Subbasin Demand Management

The Baseline Scenario suggests that the Upper Valley Subbasin will be managed sustainably by 2040/2041. To provide a highpoint of where groundwater elevations could reach in this time, this section compares a “No Ag Pumping” Scenario to the Baseline Scenario. The No Ag Pumping Scenario has all agricultural pumping in the Upper Valley Subbasin turned off with urban pumping and pumping in other subbasins kept unchanged from the Baseline Scenario. As noted above, reservoir releases are specified the same as in the Baseline Scenario to isolate the effect of pumping reductions. Additional modeling would be necessary to evaluate the effect on reservoir releases, streamflow, diversions, and reservoir carry-over storage.

Upper Valley Subbasin Groundwater Level Change from Baseline

Figure 17 shows the groundwater level difference from the baseline for the Upper Valley Subbasin demand management scenario at 2040/2041 for the Basin Fill Aquifer.

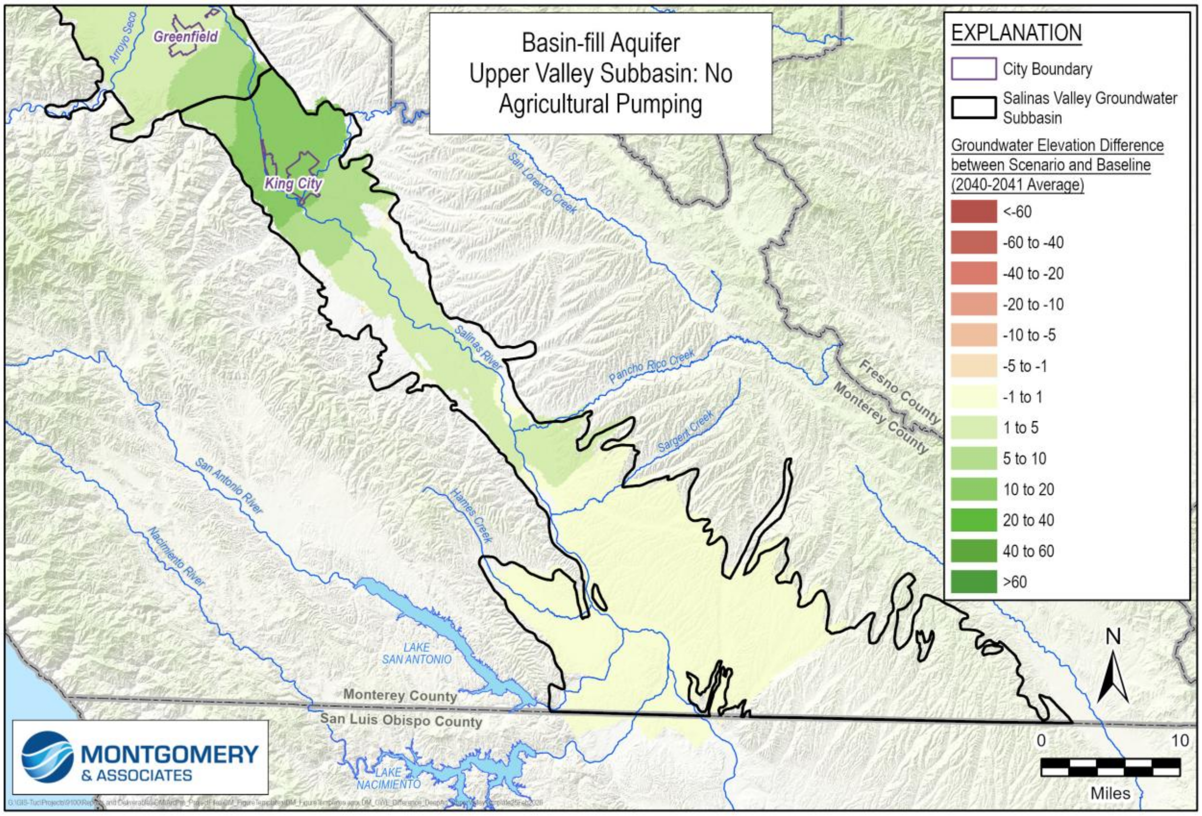

Figure 17. November 2040 and 2041 Average Difference from Baseline for Upper Valley No Agricultural Pumping Scenario

In narrow portions of the basin, groundwater levels can only rise to the point they intercept the bottom of the Salinas River, which then conveys the water downstream. In the No Ag Pumping Scenario, groundwater levels rise up to 10 to 20 feet near King City with minimal groundwater level changes observed in the southern portion of Upper Valley Subbasin.

Upper Valley Representative Hydrograph

Figure 20 shows a representative hydrograph for the Upper Valley Subbasin. Similar to the other hydrographs, the effect of drought is clearly visible in 2012-2016, 2039-2043, and 2064-2068. Even with all agricultural pumping turned off, this well does not quite reach its measurable objective during drought periods.

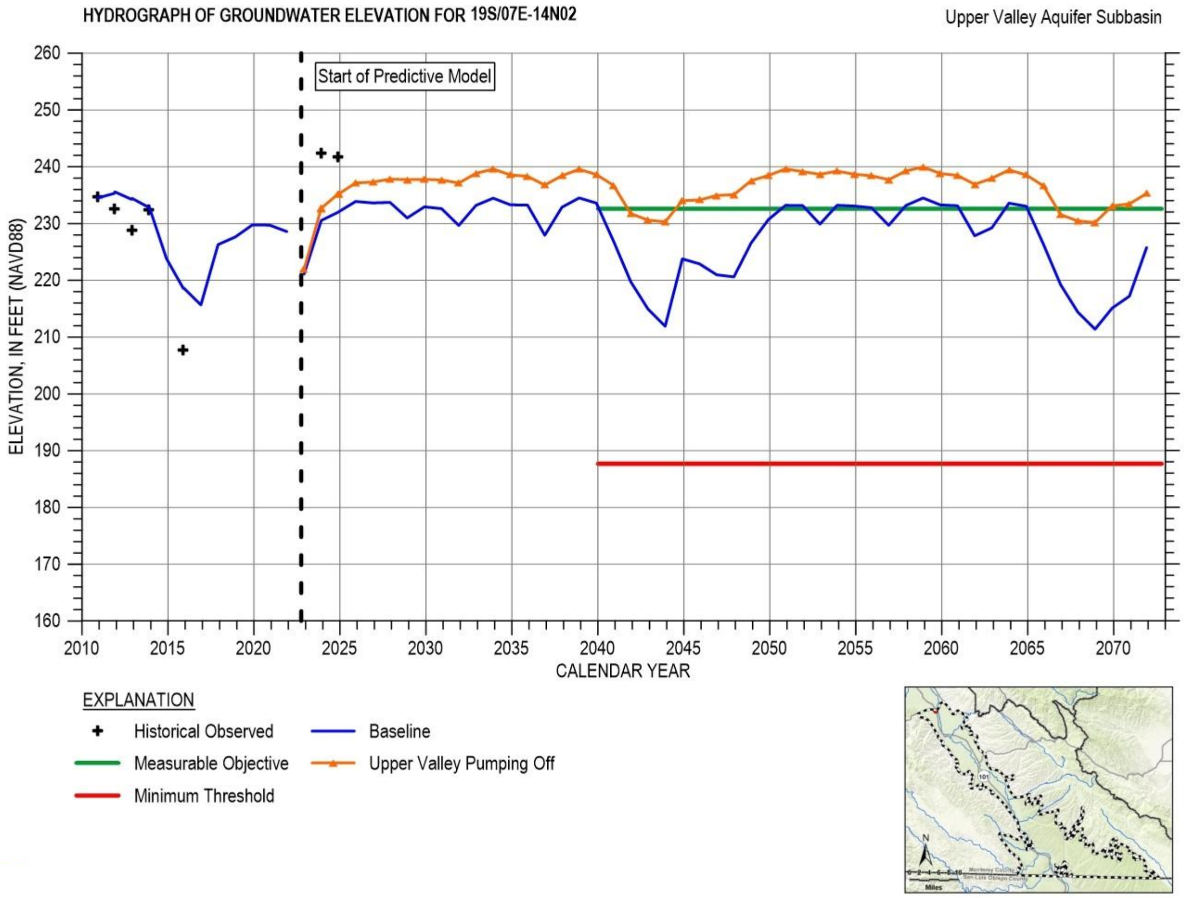

Figure 18. Representative Hydrograph for the Upper Valley No Agricultural Pumping Scenario

Upper Valley Subbasin Comparison to Groundwater Level SMC

Figure 19 shows groundwater levels compared to the measurable objective and minimum threshold for each RMS well in the Upper Valley demand management scenario.

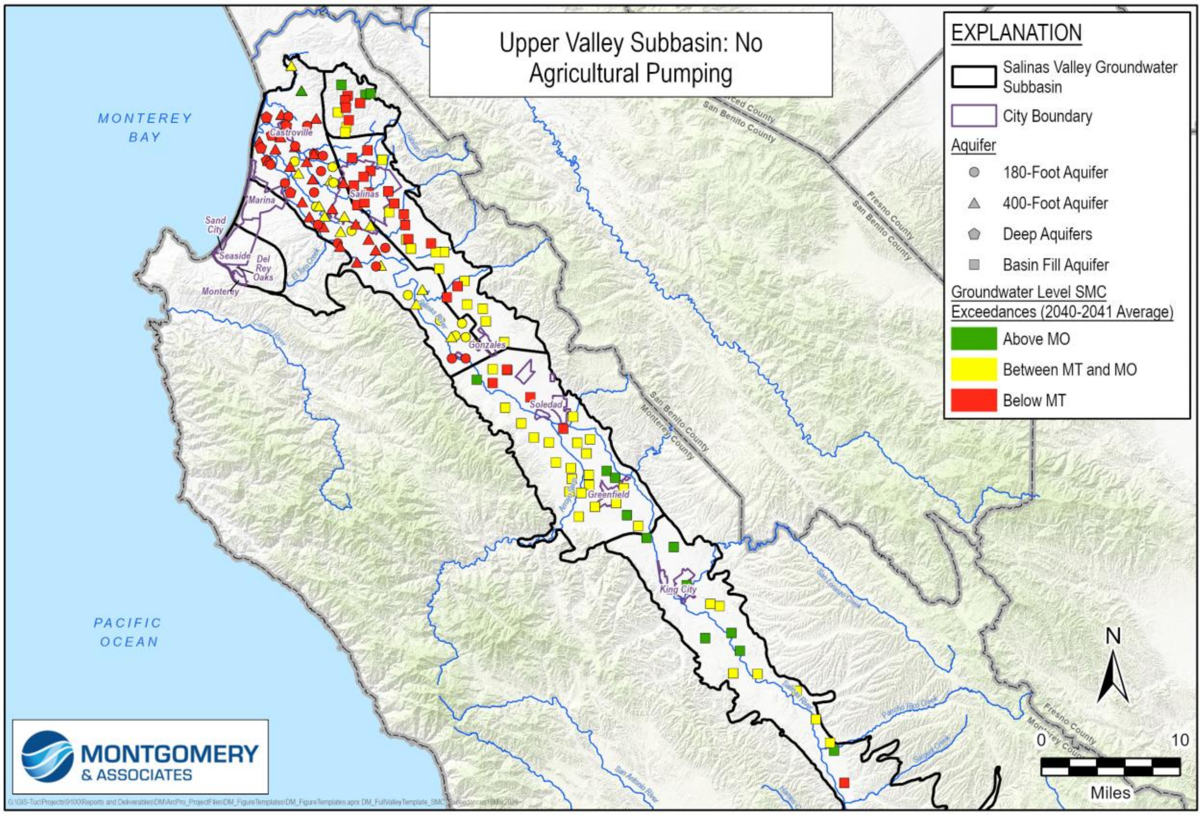

Figure 19. SMC Assessment for the Upper Valley Subbasin No Agricultural Pumping Scenario

A 100% reduction in agricultural pumping has limited effects on percentage of wells below the minimum threshold in the Upper Valley Subbasin. The elevated groundwater levels resulting from eliminating agricultural pumping allow more water to flow down valley, resulting in RMS wells rising above their SMC in the subbasins to the north.

In the Upper Valley Subbasin, the Baseline Scenario shows that groundwater levels in 2040/2041 avoid undesirable results. Table 16 shows the percentage of wells below the minimum threshold for both the Baseline Scenario and the No Ag Pumping Scenario in Upper Valley. Even with all pumping turned off, a single well is still below its minimum threshold. However, this well is farther from areas with large amounts of pumping and groundwater levels are less than 4 feet higher in the No Ag Pumping Scenario, than in the Baseline Scenario.

Table 16. Average November 2040 and 2041 RMS SMC Assessment in Upper Valley Subbasin

Scenario	RMS Wells Above MO	RMS Wells Between MO & MT	RMS Wells Below MT
Baseline	27%	60%	13%
Upper Valley Subbasin: No Ag Pumping	47%	47%	7%

Note:
Wells Used In Analysis: 15
Effect of single well: 7%

Figure 20 shows the minimum threshold exceedances on an annual basis for November water levels at RMS wells in the Upper Valley Subbasin. During all projected years, the percentage of wells below the minimum threshold is less than 15%.

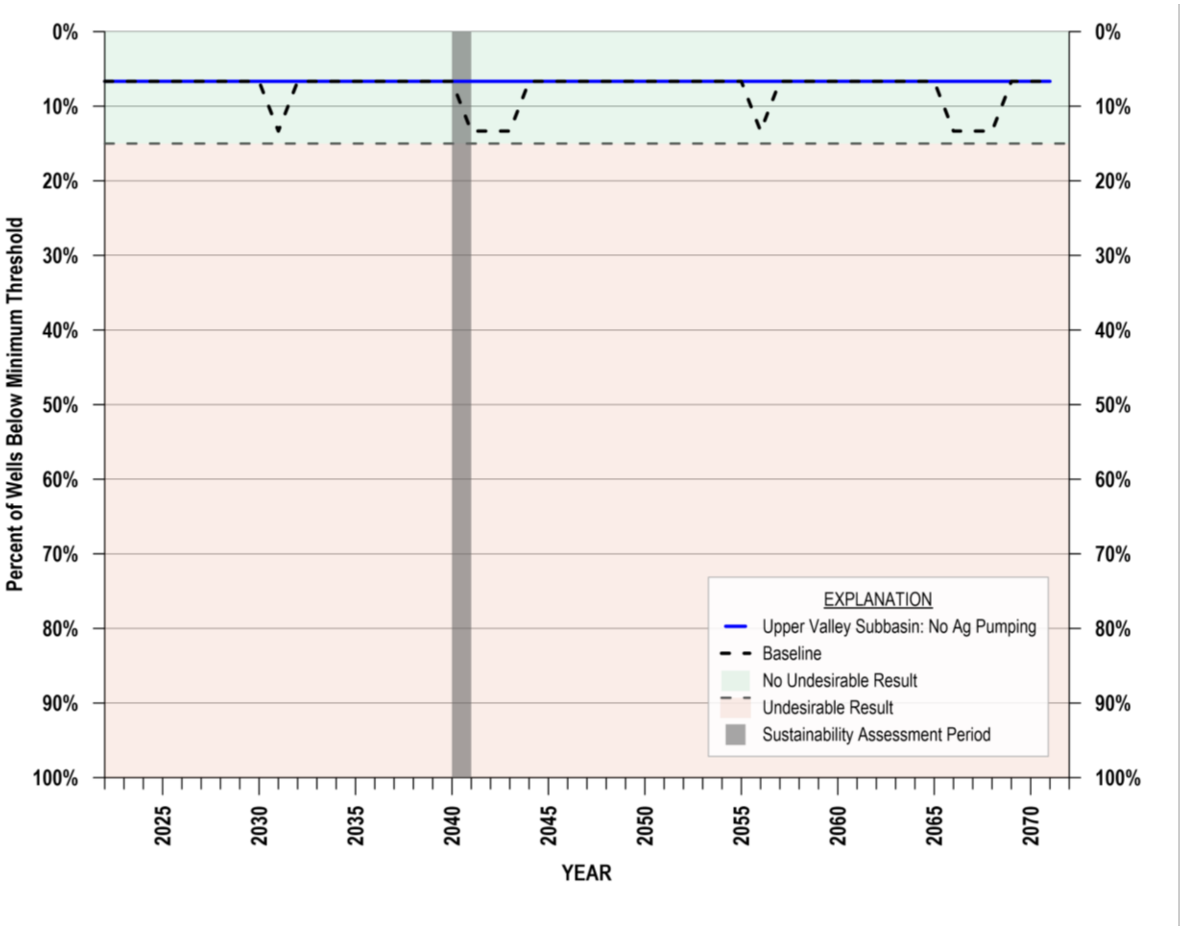

Figure 20. Upper Valley Projected Groundwater Level Minimum Threshold Exceedances by Year
Upper Valley Water Budgets

Upper Valley Subbasin Changes in Pumping, Flow, and Storage

Table 17 shows groundwater extraction for the No Agricultural Pumping Scenario. Only 2,300 AFY of municipal pumping is simulated in the model. Pumping in other subbasins is minimally affected.

Table 17. Average Annual Groundwater Extraction in Upper Valley Subbasin.for WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	-108,400	-82,600	-138,600	-94,500	-9,800	-900	-2,300
Upper Valley Subbasin: No Ag Pumping	-108,100	-82,600	-137,900	-2,300	-9,800	-900	-2,300

All values in AFY

Table 18 shows the net stream exchange in response to eliminating agricultural pumping. The increase in groundwater levels drastically reduces the stream recharge in the Upper Valley Subbasin.

Table 18 Average Annual Net Stream Exchange for Upper Valley Demand Management Scenarios for WY 2040-2064

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	55,400	7,100	118,600	95,300	4,500	1,000	1,900
Upper Valley Subbasin: No Ag Pumping	56,900	7,100	117,700	43,700	5,000	1,000	1,900

All values in AFY

Table 19 shows average annual inter-subbasin groundwater flows for the Upper Valley demand management scenario. Inter-subbasin flows are largely unaffected in the rest of the Salinas Valley except for the flow between Upper Valley and Forebay where the increased groundwater levels in Upper Valley Subbasin allow for more outflow down valley into the Forebay Subbasin.

Table 19. Average Annual Inter-subbasin Groundwater Flows for Upper Valley Demand Management Scenarios for WY 2040-2064

Scenario	Upper Valley to Forebay	Forebay to Eastside	Forebay to 180/400	180/400 to Eastside	Monterey to 180/400	Langley to Eastside	Langley to 180/400
Baseline	25,600	6,400	29,900	41,400	21,100	4,200	500
Upper Valley Subbasin: No Ag Pumping	30,000	6,400	30,000	41,700	21,000	4,100	500

All values in AFY

Table 20 shows average annual net storage change in response to eliminating agricultural pumping in Upper Valley Subbasin. Overall, despite the drastic decrease in pumping, changes in storage are comparatively minimal. However, reduced pumping has effects on surface water and groundwater flows. Eliminating 92,000 AFY of pumping results in approximately 52,000 AFY less stream recharge and 27,000 AFY less deep percolation. Additionally, in response to the higher groundwater levels there is 9,000 AFY more groundwater evapotranspiration and 4,000 AFY more groundwater exiting into Forebay Subbasin.

Table 20. Net Storage Change in the Upper Valley Subbasin

Scenario	180/400	Eastside	Forebay	Upper Valley	Monterey	Seaside	Langley
Baseline	-500	-900	-400	-200	-7,600	-2,600	600
Upper Valley Subbasin: No Ag Pumping	-400	-700	-100	0	-7,400	-2,500	700

KEY FINDINGS

Demand management can be an effective tool for improving groundwater levels in certain areas of the Salinas Valley. However, beginning pumping reductions in 2030 provides only 10 years for groundwater levels to rise above minimum thresholds. As a result, modeling indicates significant reductions would likely be required if demand management were the only strategy used to achieve SGMA groundwater level goals. To achieve sustainability using demand management alone by 2040, the following subbasin-specific reductions are required:

- 180/400 Subbasin: 18%-36% reductions are needed to achieve sustainability in the 180-Foot and 400-Foot Aquifers. Even with a 45% reduction, the Deep Aquifers remain well below sustainability goals.
- Eastside: 17%-25% pumping reductions are needed to reach sustainability goals.
- Forebay: Up to 9% pumping reductions are needed to reach sustainability goals on average; however, undesirable results may occur during droughts.

Under the Baseline Scenario, the Upper Valley Subbasin is projected to avoid undesirable results on average by 2040/2041 with current pumping levels.

These simulations hold reservoir releases, streamflow conditions, and diversions constant at Baseline levels. Additional analysis could evaluate how pumping reductions might influence reservoir operations and surface-water dynamics.

This modeling effort focused on assessing groundwater level responses to pumping reductions and the resulting effect on SMC. Further investigations on individual areas could result in a more refined estimate of what pumping reductions are required or examine the effect of pumping reductions in multiple subbasins simultaneously. This modeling effort helps provide the basis for demand management to be considered alongside other project and management actions to identify most cost-effective approach to reach sustainability.

LIMITATIONS IN MODEL PROJECTIONS

The predictive models developed for this study are mathematical approximations of future processes relying on simplifications and climate assumptions. Furthermore, the models are based on the SVIHM (M&A, 2025) and baseline SVOM (M&A, 2026b), and therefore model projections are affected by the assumptions and data limitations inherent in those models as well. Although uncertainty exists in model results, the projections provide reasonable insight on potential future groundwater conditions.

The demand management modeling scenarios described in this report help compare and contrast relative effects of differing amounts of demand management in each subbasin. These simulations represent approximations of future groundwater conditions. In addition to the limitations described in the SVOM Model Update and Projected Baseline Simulation (M&A, 2026b), several scenario-specific assumptions and limitations apply to this phase of demand management modeling:

- Reservoir operations were kept constant at baseline conditions to isolate the effect of pumping reductions. At higher reduction levels, groundwater levels could rise enough to affect streamflows and potentially change how the reservoirs are operated.
- Reference ET was adjusted within predominately irrigated cells, rather than simulating fallowing of individual fields. This approach was done to have a more direct link between demand adjustments and pumping reductions, thus reducing the number of model iterations. The objective of this study is to evaluate subbasin-scale pumping reductions, not crop-specific water use.
- Demand management projections are based on a single baseline annual climate data series for estimated future conditions. While it provides an initial platform for assessing potential future conditions, projections are highly dependent on the years used for evaluation. Whether groundwater elevations at a particular RMS well are projected to be below the minimum threshold depends on the specified climate inputs to the baseline model. Further investigations could include the simulation of different potential baseline climate scenarios.
- Demand management projections rely on a single baseline climate sequence. While suitable for this initial assessment, simulated results are sensitive to the specific climate years selected. Whether groundwater elevations at a particular RMS well fall below the minimum threshold is affected by the chosen climate inputs. Future work could investigate alternative climate sequences.
- The Farm Process used in this model distributes irrigation demand amongst available pumping wells based on the SVIHM calibration. Pumping is then distributed to individual model layers based on model layering, well construction, and hydraulic properties. As such, the pumping distribution in the model may differ from reported pumping distribution.
- The model does not simulate impacts of climate change. Future studies should evaluate whether climate change could have significant implications.

Several steps could improve this modeling, including refining the estimate of pumping reductions needed, evaluating variations in pumping reductions by aquifer, and/or combining reductions in multiple subbasins simultaneously.

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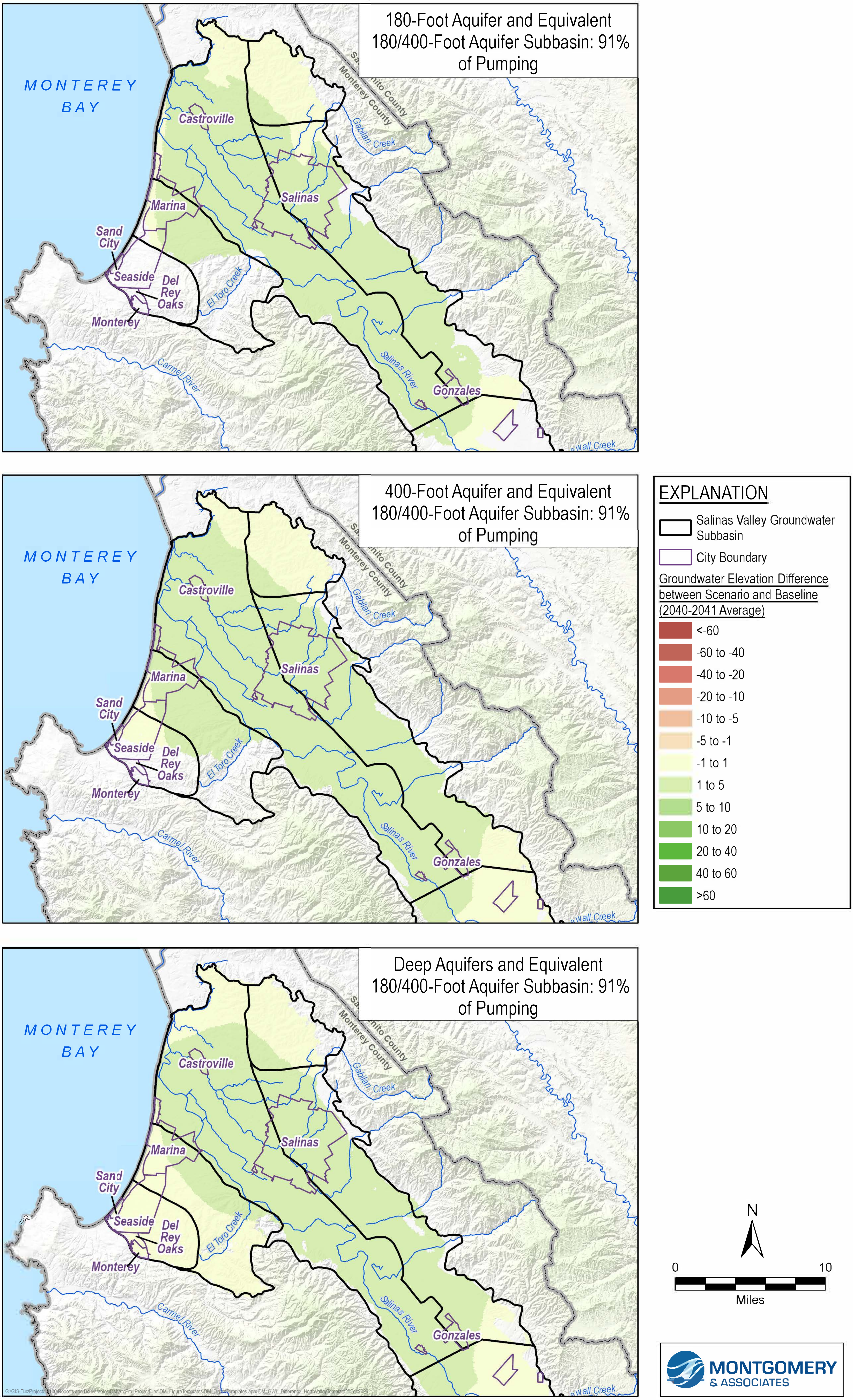
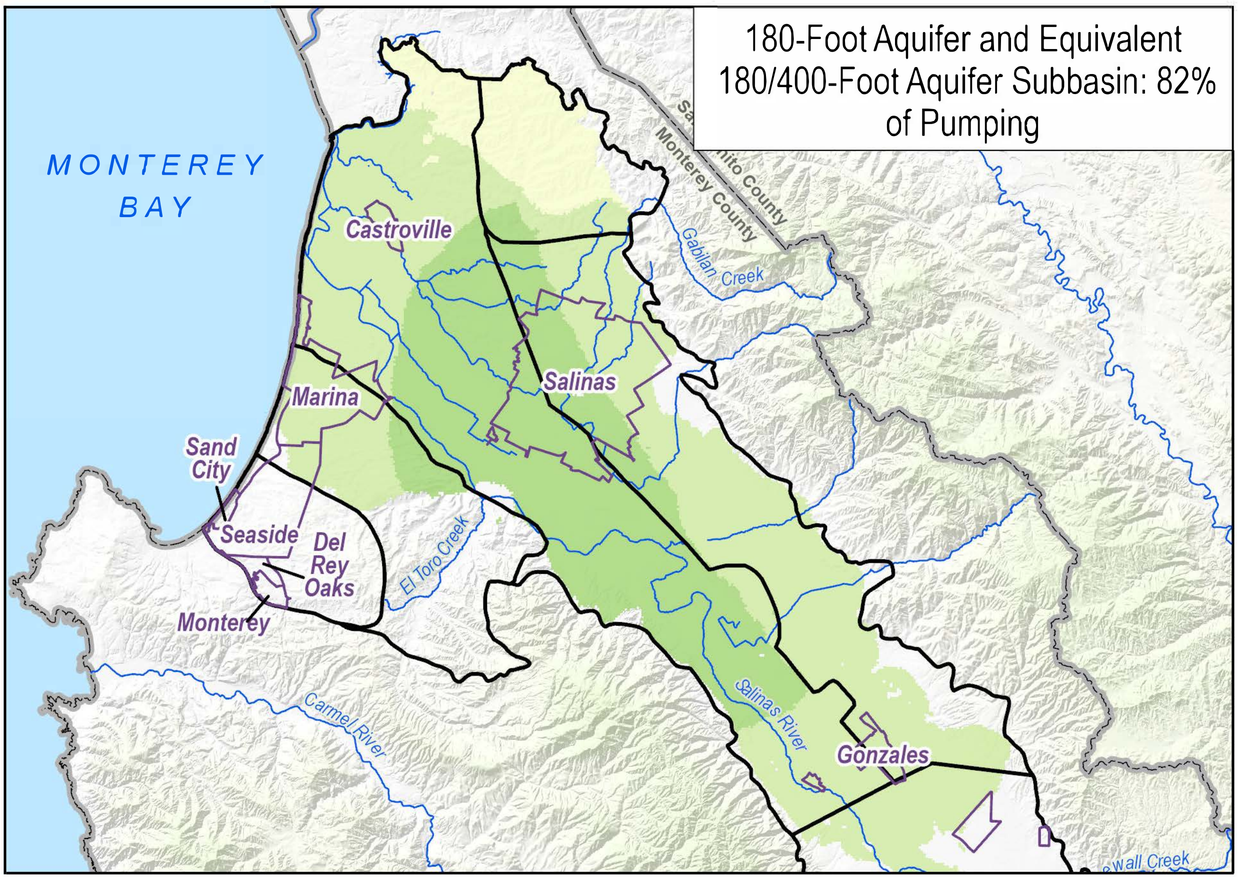
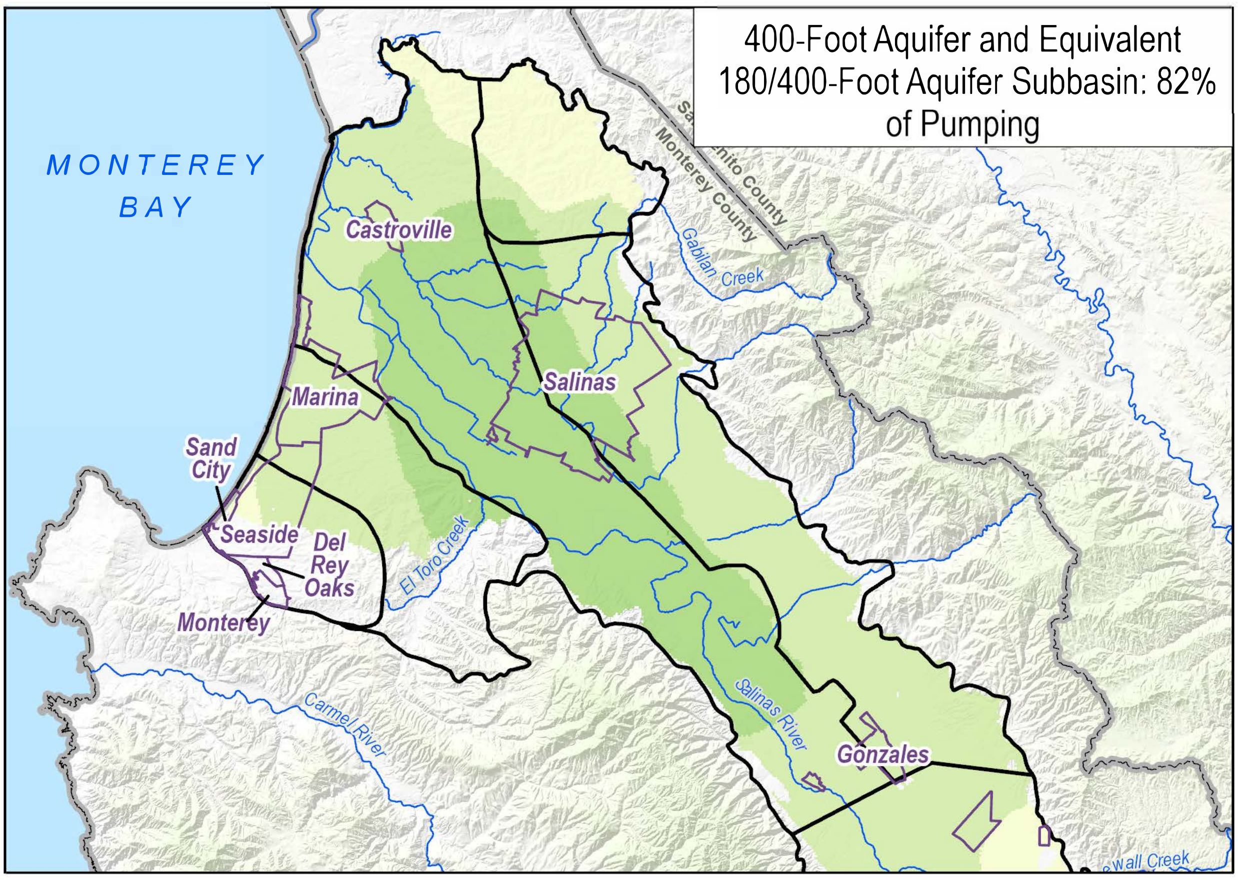
MONTGOMERY
& ASSOCIATES

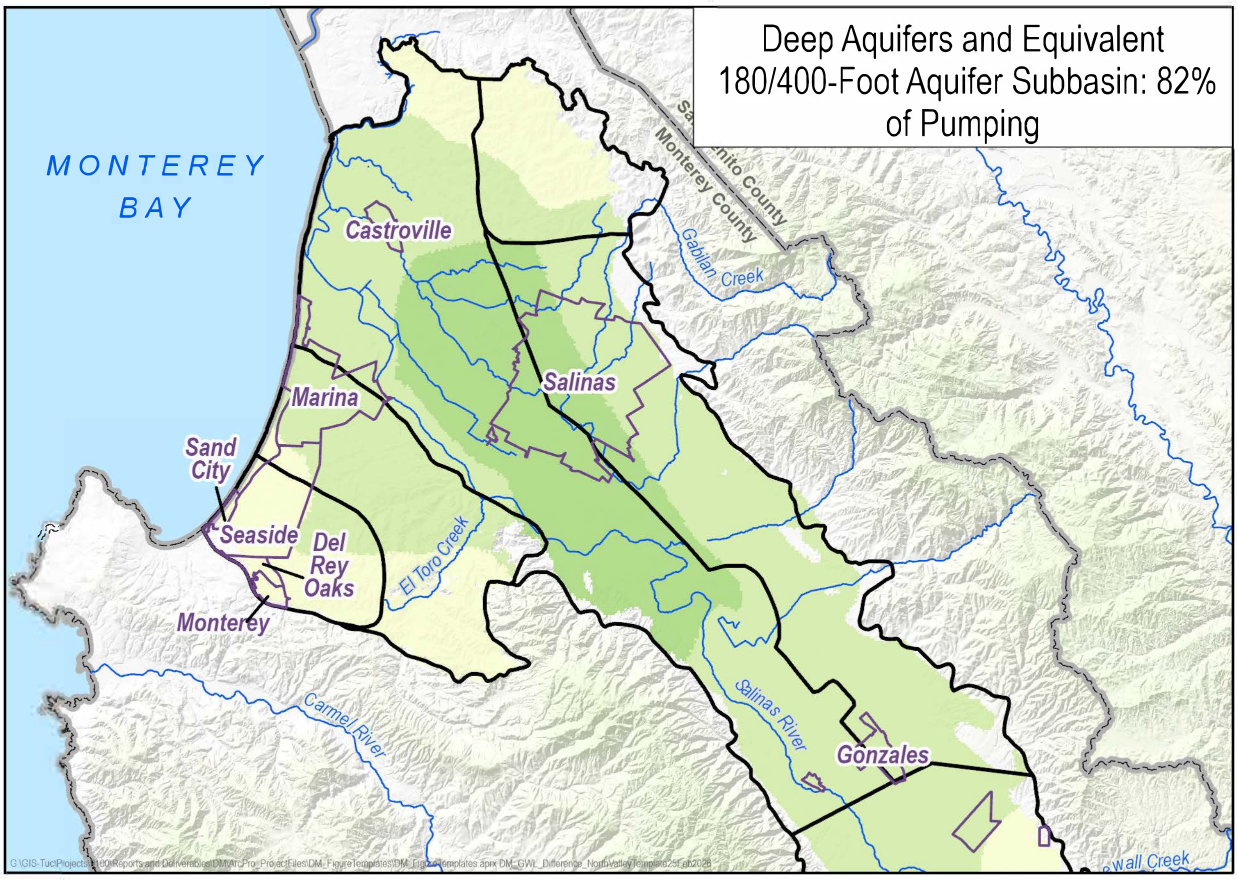
Attachment 1

Water Level Change Maps for the 180/400 and Eastside Subbasin Demand Management Scenarios


180-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 91% of Pumping
400-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 91% of Pumping
Deep Aquifers and Equivalent 180/400-Foot Aquifer Subbasin: 91% of Pumping
MONTEREY BAY
Castroville
Salinas
Marina
Sand City
Seaside
Del Rey Oaks
Monterey
Gonzales
El Toro Creek
Carmel River
Salinas River
Gabilan Creek
Monterey County
San Benito County
Stonewall Creek
EXPLANATION
Salinas Valley Groundwater Subbasin
City Boundary
Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)
<-60
-60 to -40
-40 to -20
-20 to -10
-10 to -5
-5 to -1
-1 to 1
1 to 5
5 to 10
10 to 20
20 to 40
40 to 60
>60
N
0
10
Miles
MONTGOMERY & ASSOCIATES


180-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 82% of Pumping


400-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 82% of Pumping


Deep Aquifers and Equivalent 180/400-Foot Aquifer Subbasin: 82% of Pumping

EXPLANATION

▭ Salinas Valley Groundwater Subbasin
▭ City Boundary

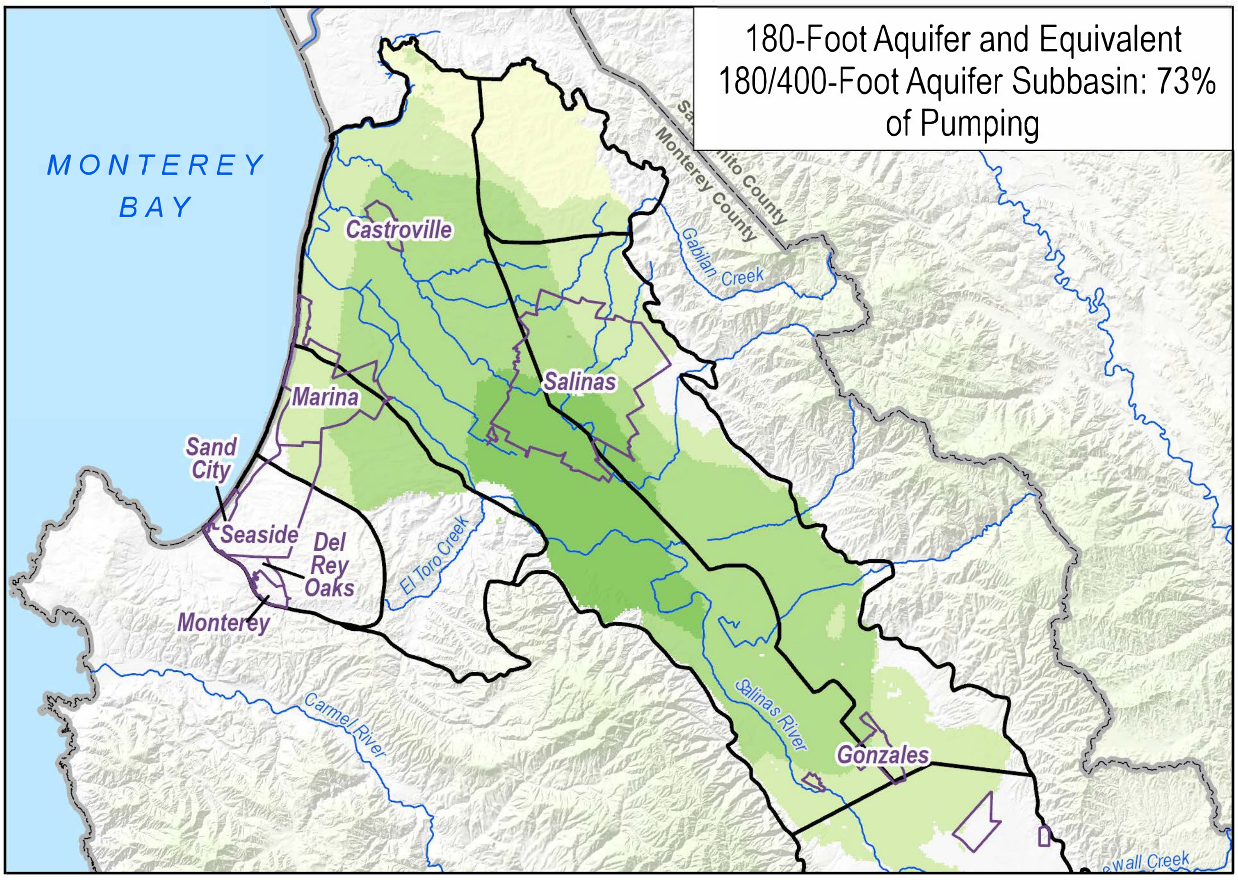
Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)

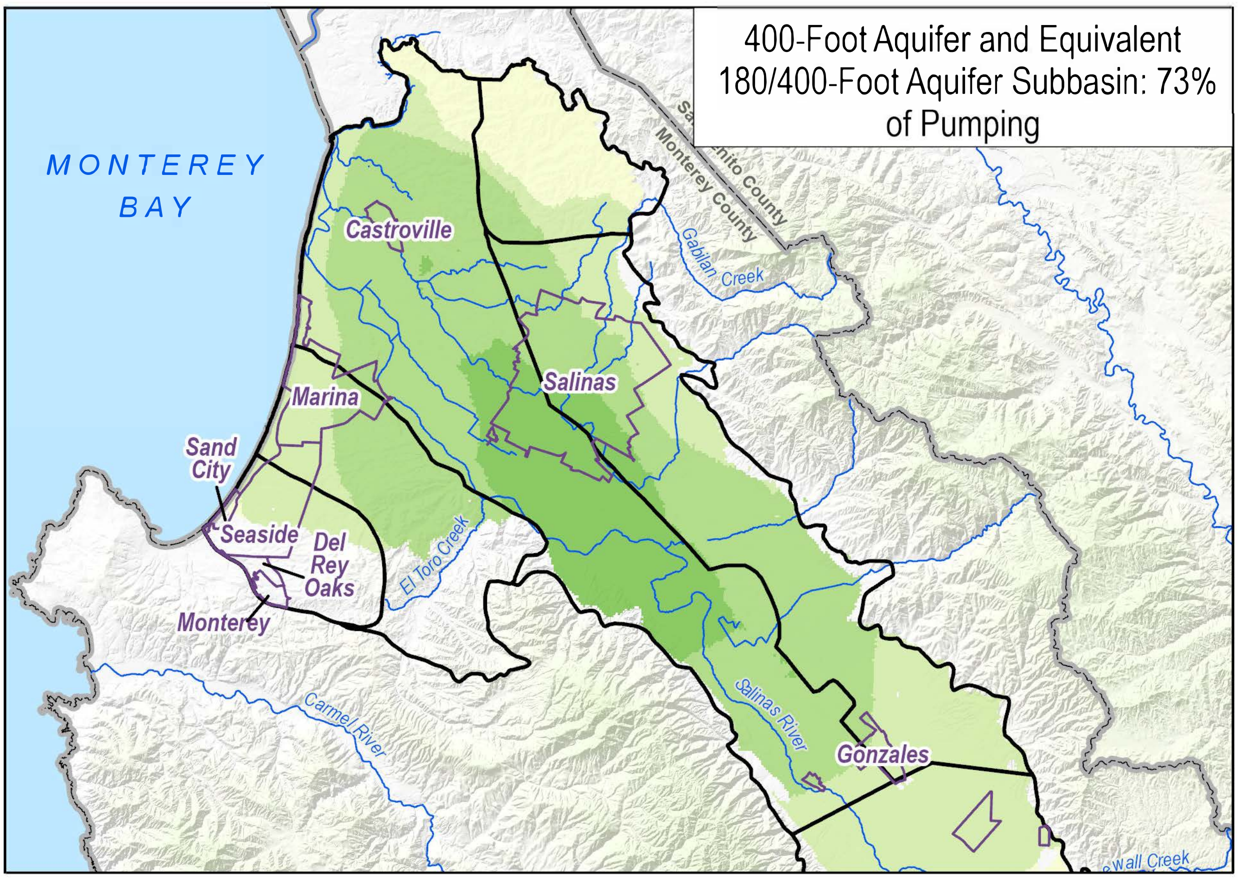
- 🟥 <-60
- 🟥 -60 to -40
- 🟥 -40 to -20
- 🟧 -20 to -10
- 🟧 -10 to -5
- 🟨 -5 to -1
- 🟨 -1 to 1
- 🟩 1 to 5
- 🟩 5 to 10
- 🟩 10 to 20
- 🟩 20 to 40
- 🟩 40 to 60
- 🟩 >60

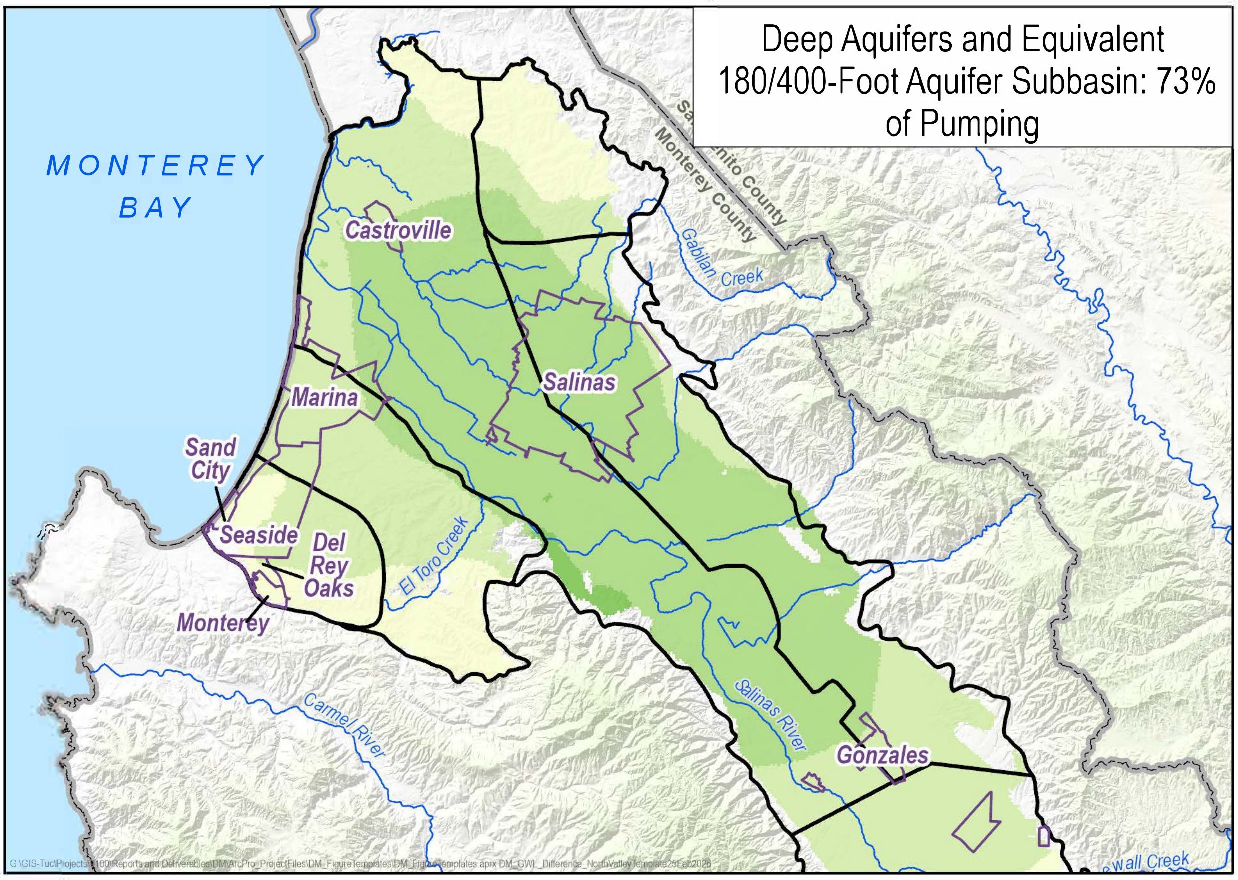
N

0 10
Miles

MONTGOMERY
& ASSOCIATES


180-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 73% of Pumping


400-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 73% of Pumping


Deep Aquifers and Equivalent 180/400-Foot Aquifer Subbasin: 73% of Pumping

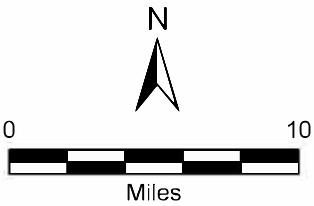
EXPLANATION

▭ Salinas Valley Groundwater Subbasin

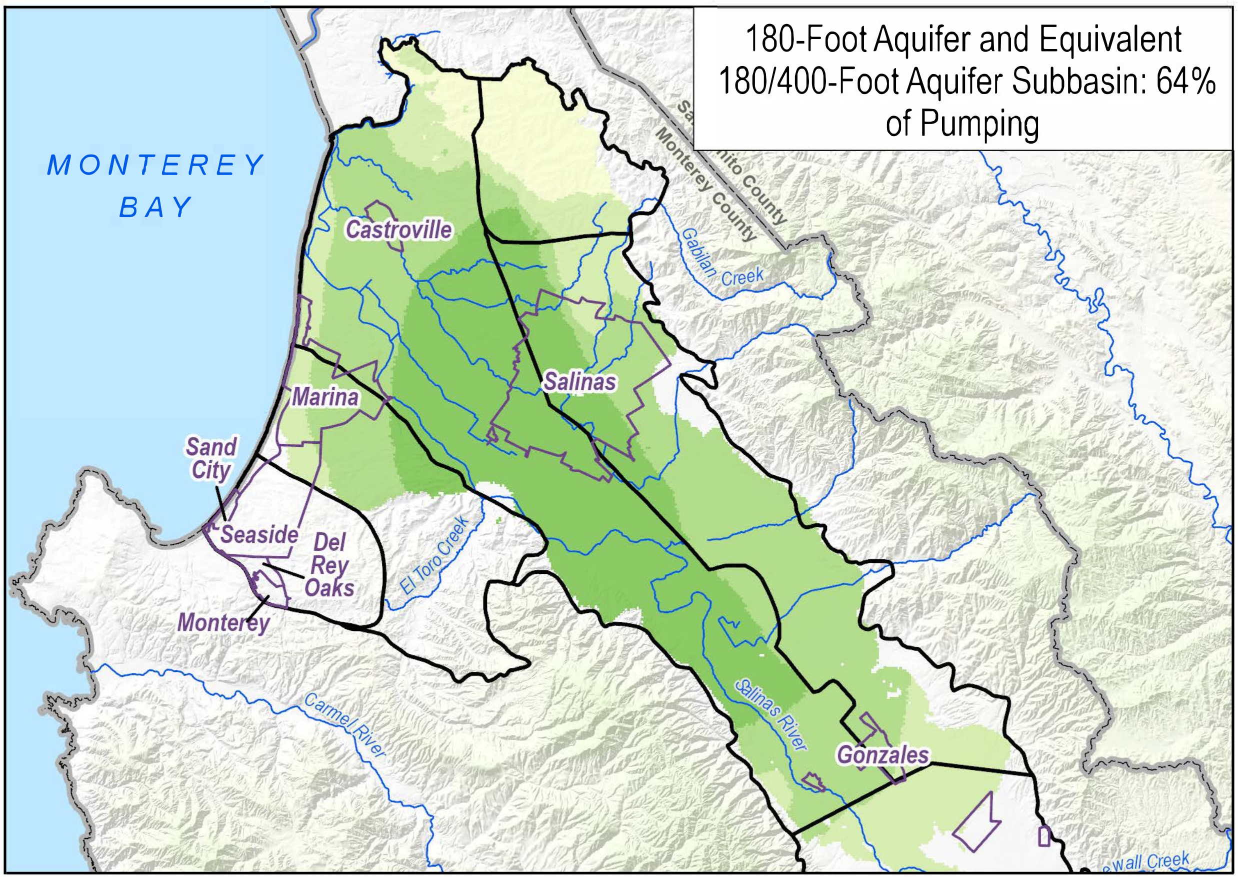
▭ City Boundary

Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)

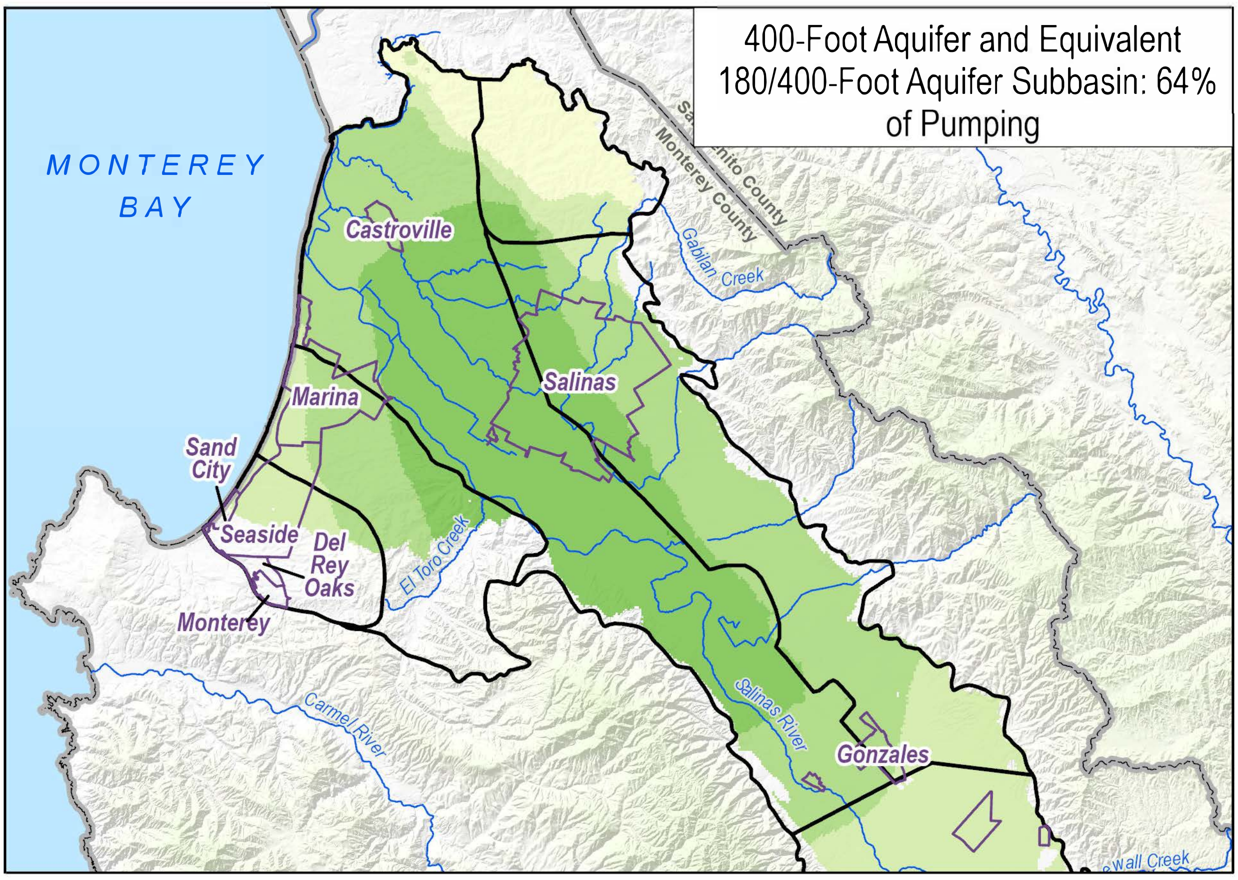
- 🟥 <-60
- 🟥 -60 to -40
- 🟥 -40 to -20
- 🟧 -20 to -10
- 🟧 -10 to -5
- 🟨 -5 to -1
- 🟨 -1 to 1
- 🟩 1 to 5
- 🟩 5 to 10
- 🟩 10 to 20
- 🟩 20 to 40
- 🟩 40 to 60
- 🟩 >60



MONTGOMERY & ASSOCIATES



180-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 64% of Pumping



400-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 64% of Pumping

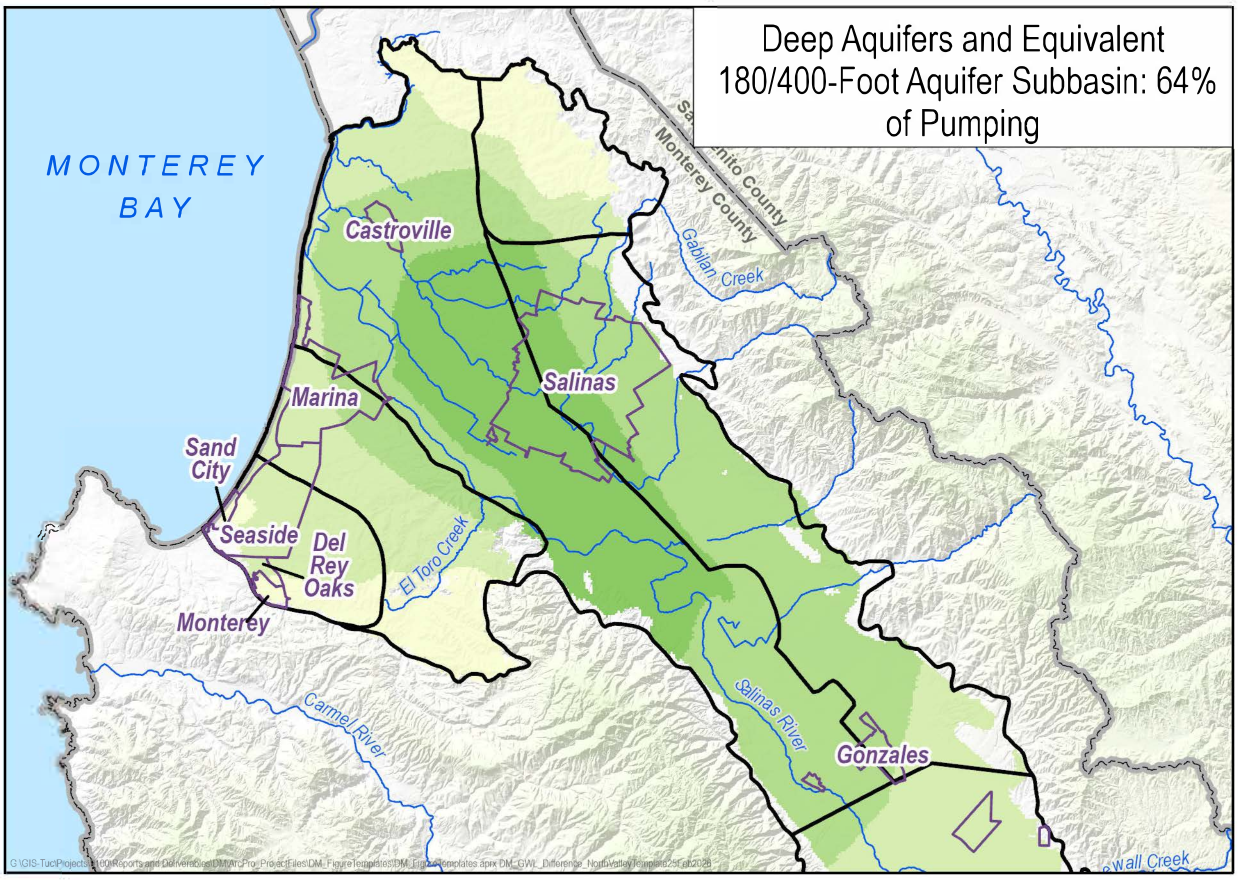
EXPLANATION

▭ Salinas Valley Groundwater Subbasin

▭ City Boundary

Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)

- 🟥 <-60
- 🟥 -60 to -40
- 🟥 -40 to -20
- 🟧 -20 to -10
- 🟧 -10 to -5
- 🟧 -5 to -1
- 🟨 -1 to 1
- 🟩 1 to 5
- 🟩 5 to 10
- 🟩 10 to 20
- 🟩 20 to 40
- 🟩 40 to 60
- 🟩 >60

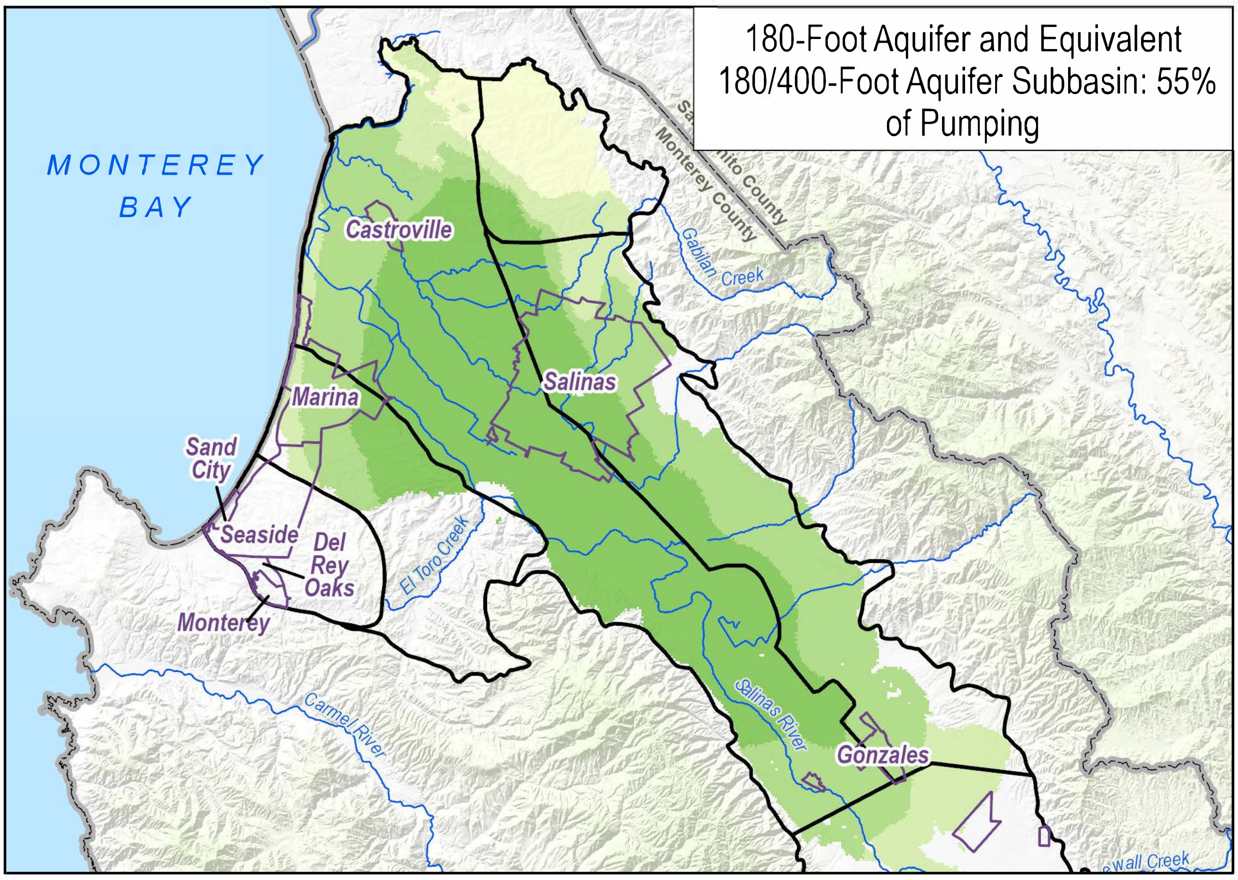


Deep Aquifers and Equivalent 180/400-Foot Aquifer Subbasin: 64% of Pumping

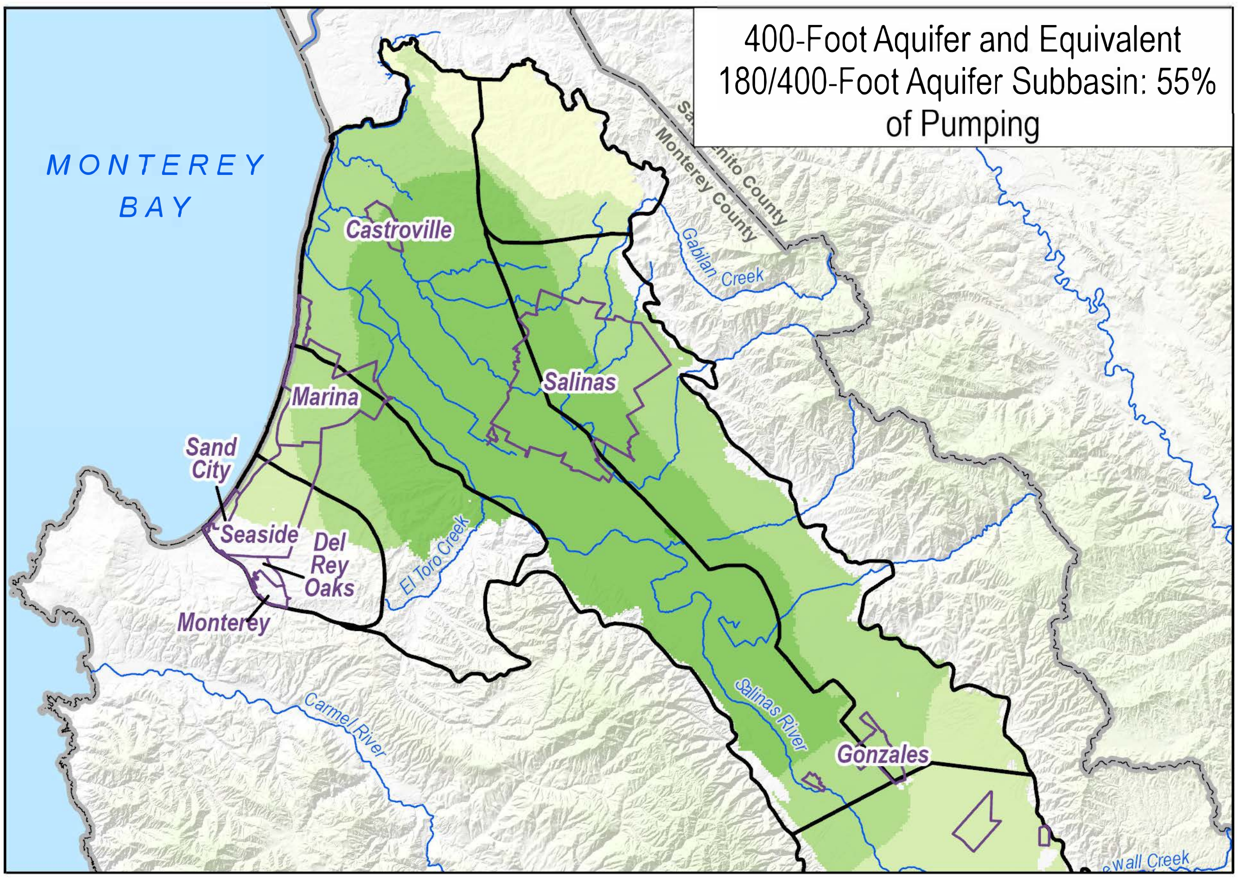
N

0 10
Miles

MONTGOMERY
& ASSOCIATES



180-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 55% of Pumping



400-Foot Aquifer and Equivalent 180/400-Foot Aquifer Subbasin: 55% of Pumping

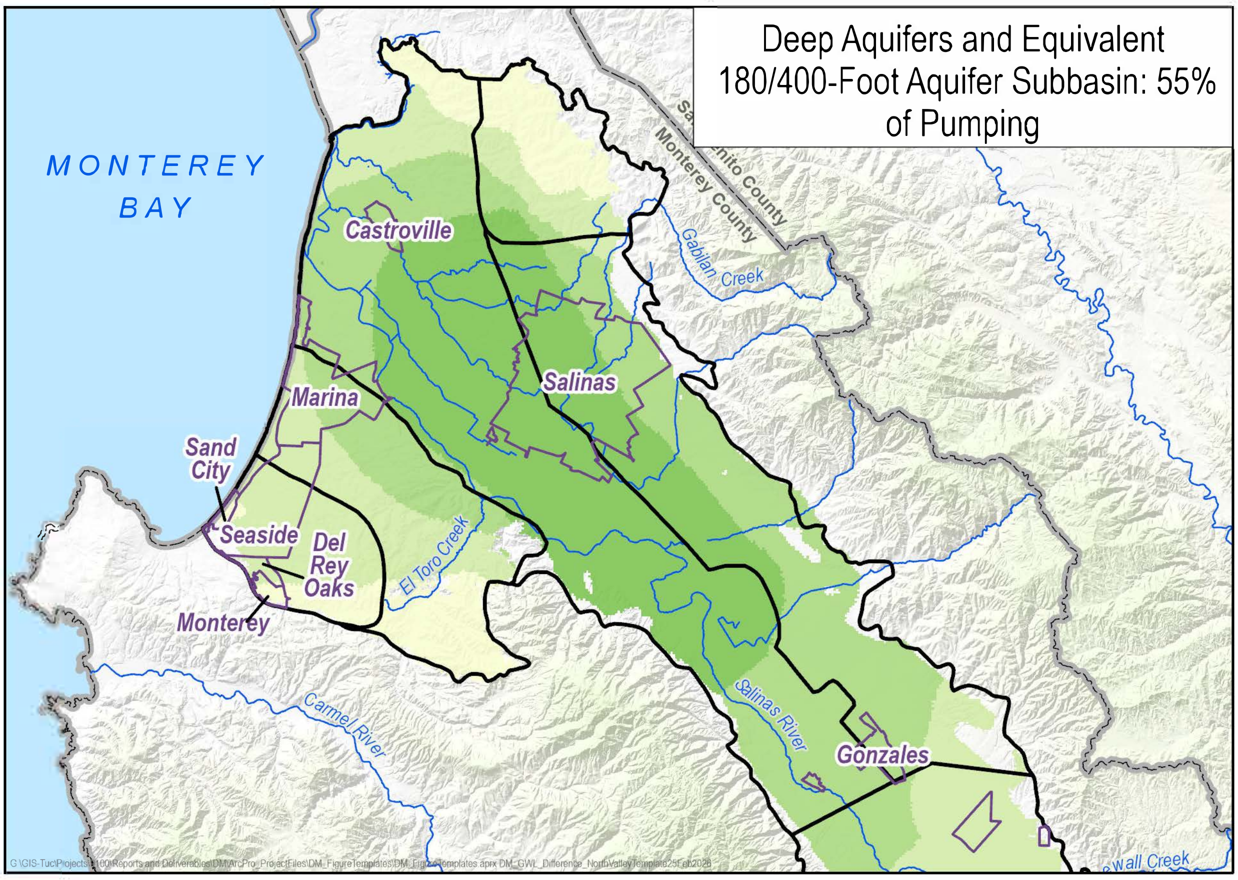
EXPLANATION

▭ Salinas Valley Groundwater Subbasin

▭ City Boundary

Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)

- 🟥 <-60
- 🟥 -60 to -40
- 🟥 -40 to -20
- 🟧 -20 to -10
- 🟧 -10 to -5
- 🟨 -5 to -1
- 🟨 -1 to 1
- 🟩 1 to 5
- 🟩 5 to 10
- 🟩 10 to 20
- 🟩 20 to 40
- 🟩 40 to 60
- 🟩 >60



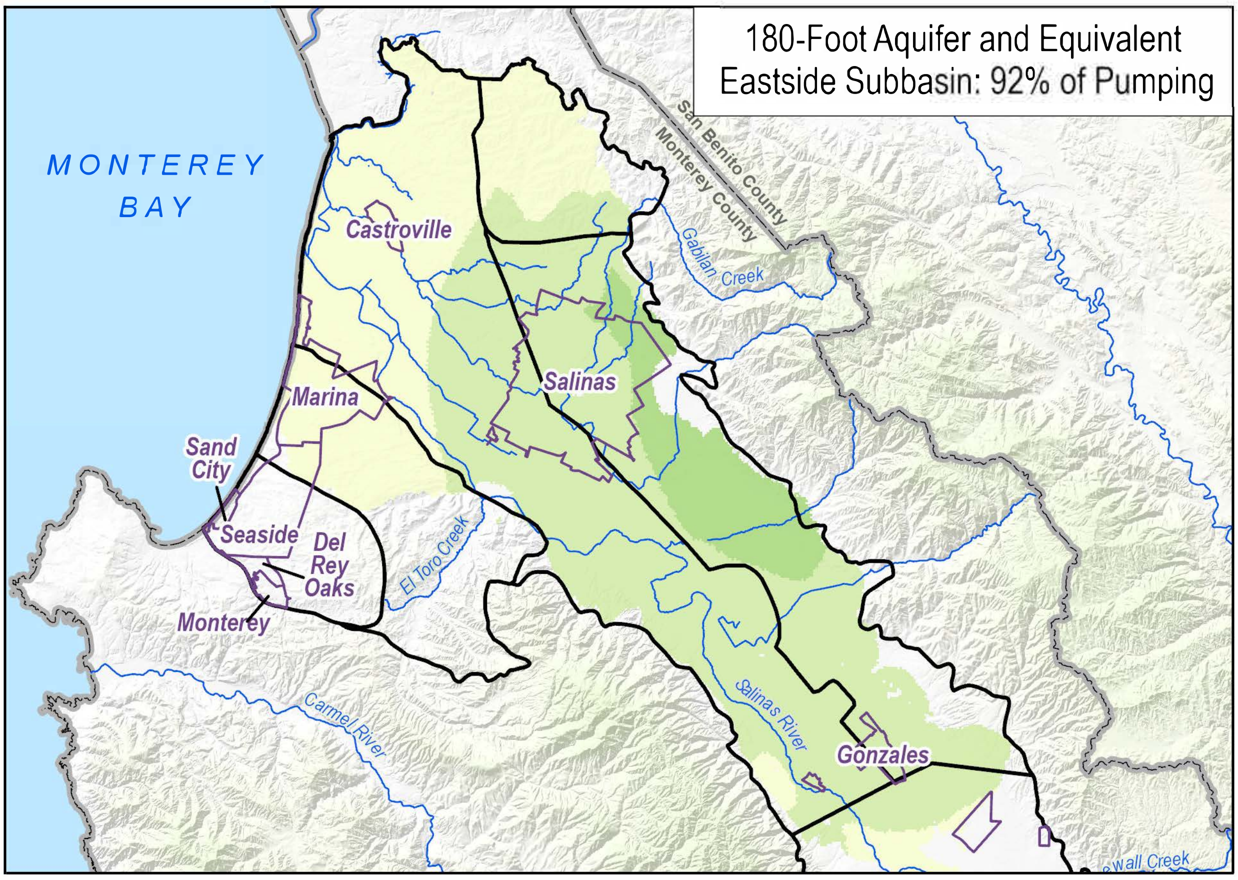
Deep Aquifers and Equivalent 180/400-Foot Aquifer Subbasin: 55% of Pumping

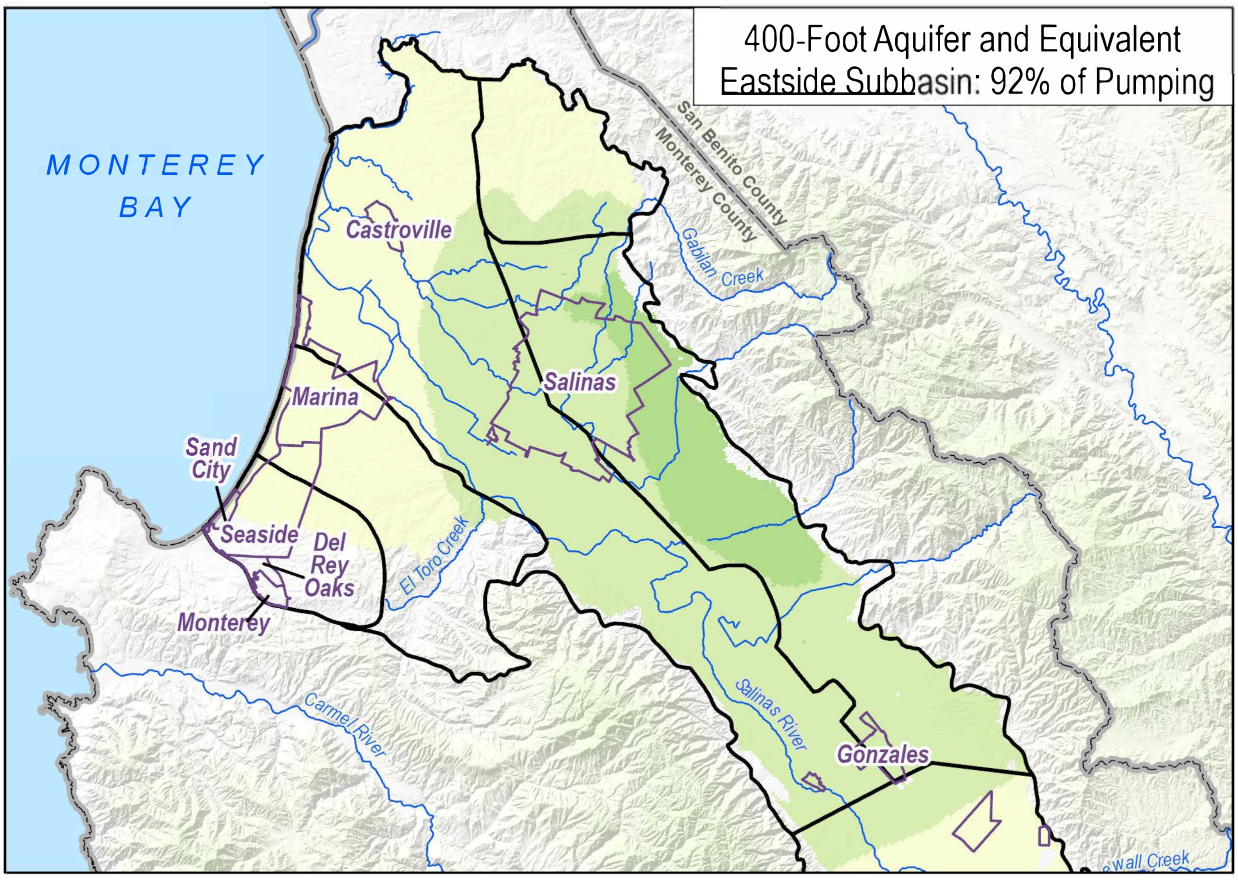
N

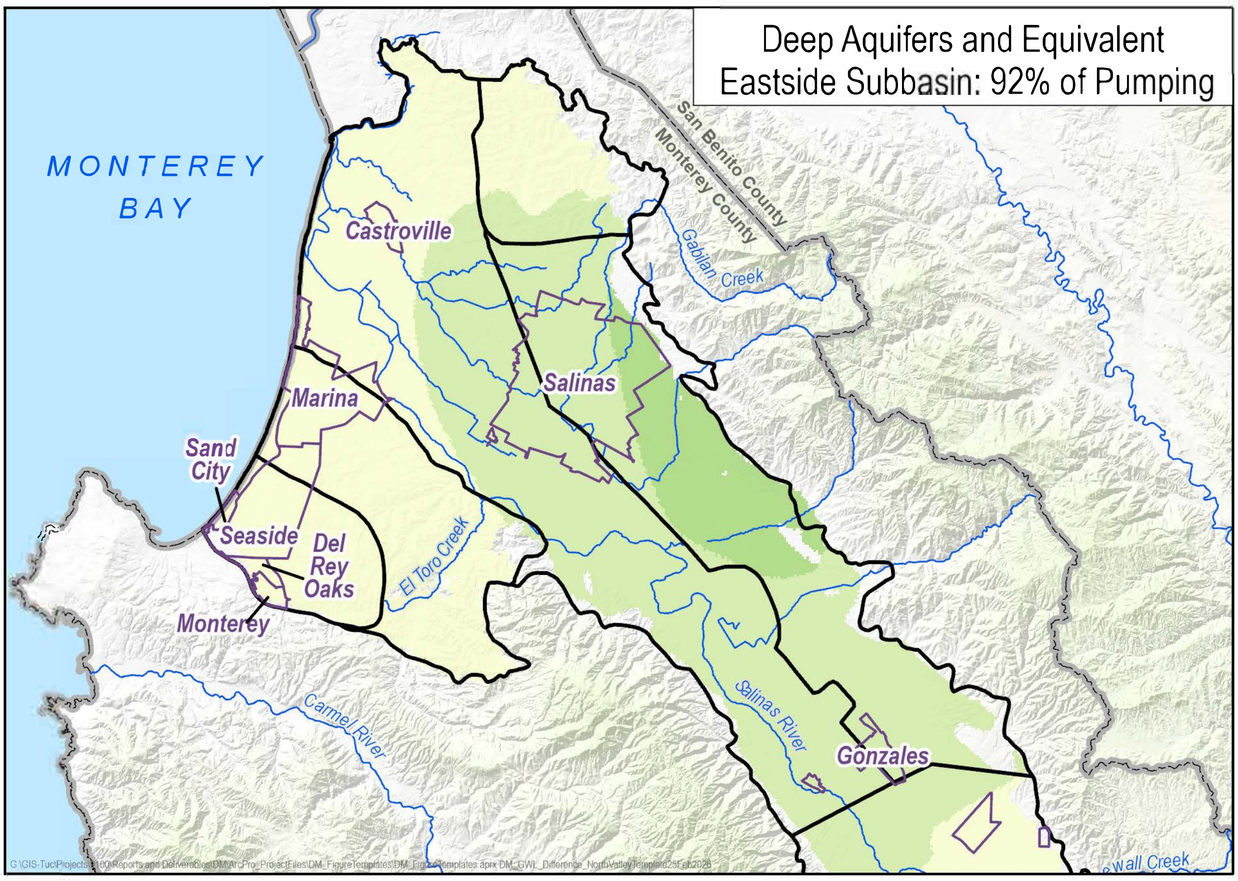
0 10

Miles

MONTGOMERY & ASSOCIATES







EXPLANATION

▭ Salinas Valley Groundwater Subbasin

▭ City Boundary

Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)

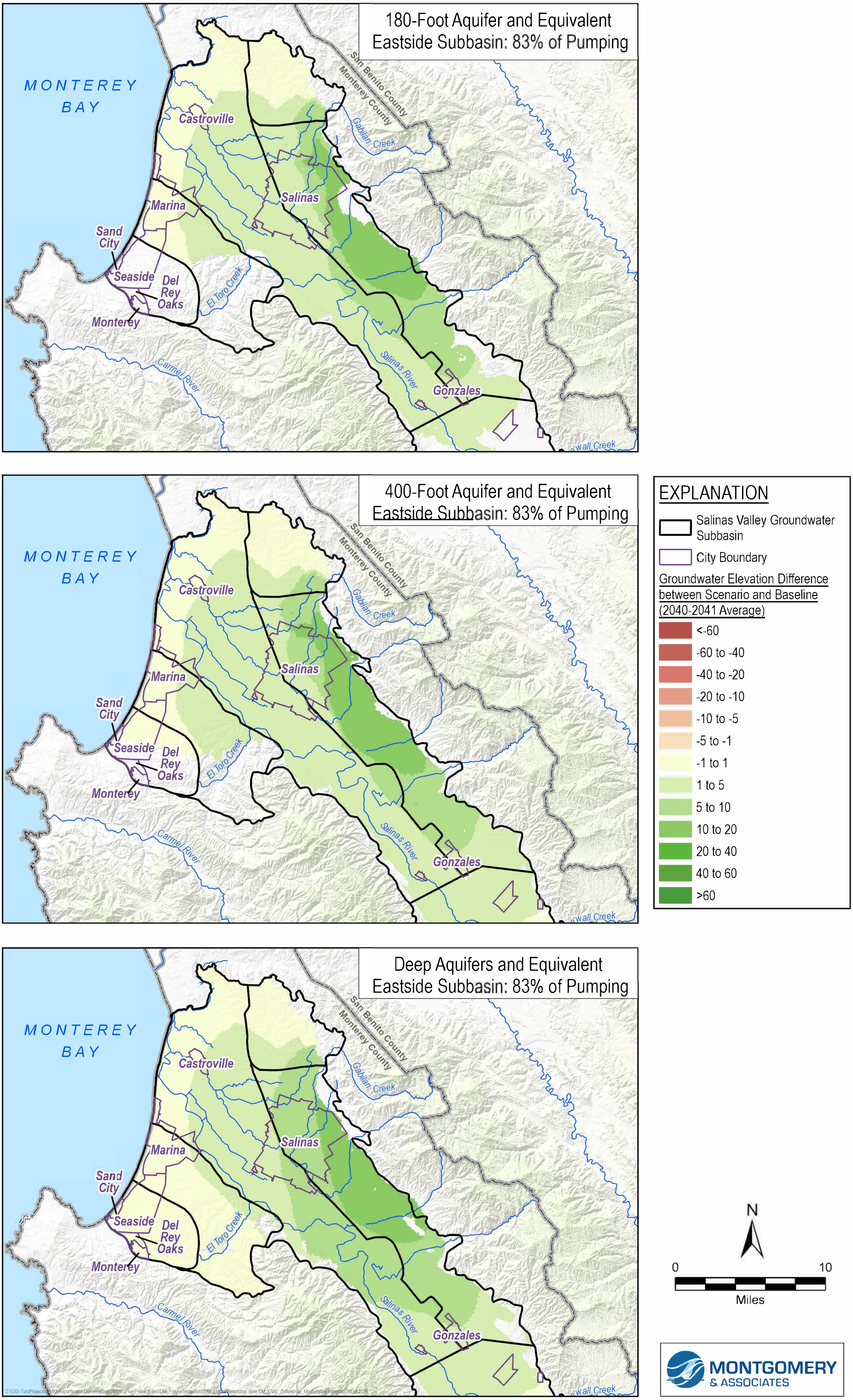
- 🟥 <-60
- 🟥 -60 to -40
- 🟥 -40 to -20
- 🟧 -20 to -10
- 🟧 -10 to -5
- 🟨 -5 to -1
- 🟨 -1 to 1
- 🟩 1 to 5
- 🟩 5 to 10
- 🟩 10 to 20
- 🟩 20 to 40
- 🟩 40 to 60
- 🟩 >60

N

0 10

Miles

MONTGOMERY & ASSOCIATES


180-Foot Aquifer and Equivalent
Eastside Subbasin: 83% of Pumping
400-Foot Aquifer and Equivalent
Eastside Subbasin: 83% of Pumping
Deep Aquifers and Equivalent
Eastside Subbasin: 83% of Pumping
MONTEREY BAY
Castroville
Salinas
Marina
Sand City
Seaside
Del Rey Oaks
Monterey
Gonzales
San Benito County
Monterey County
Gabilan Creek
El Toro Creek
Carmel River
Salinas River
Chualar Creek
EXPLANATION
Salinas Valley Groundwater Subbasin
City Boundary
Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)
<-60
-60 to -40
-40 to -20
-20 to -10
-10 to -5
-5 to -1
-1 to 1
1 to 5
5 to 10
10 to 20
20 to 40
40 to 60
>60
N
0
10
Miles
MONTGOMERY & ASSOCIATES
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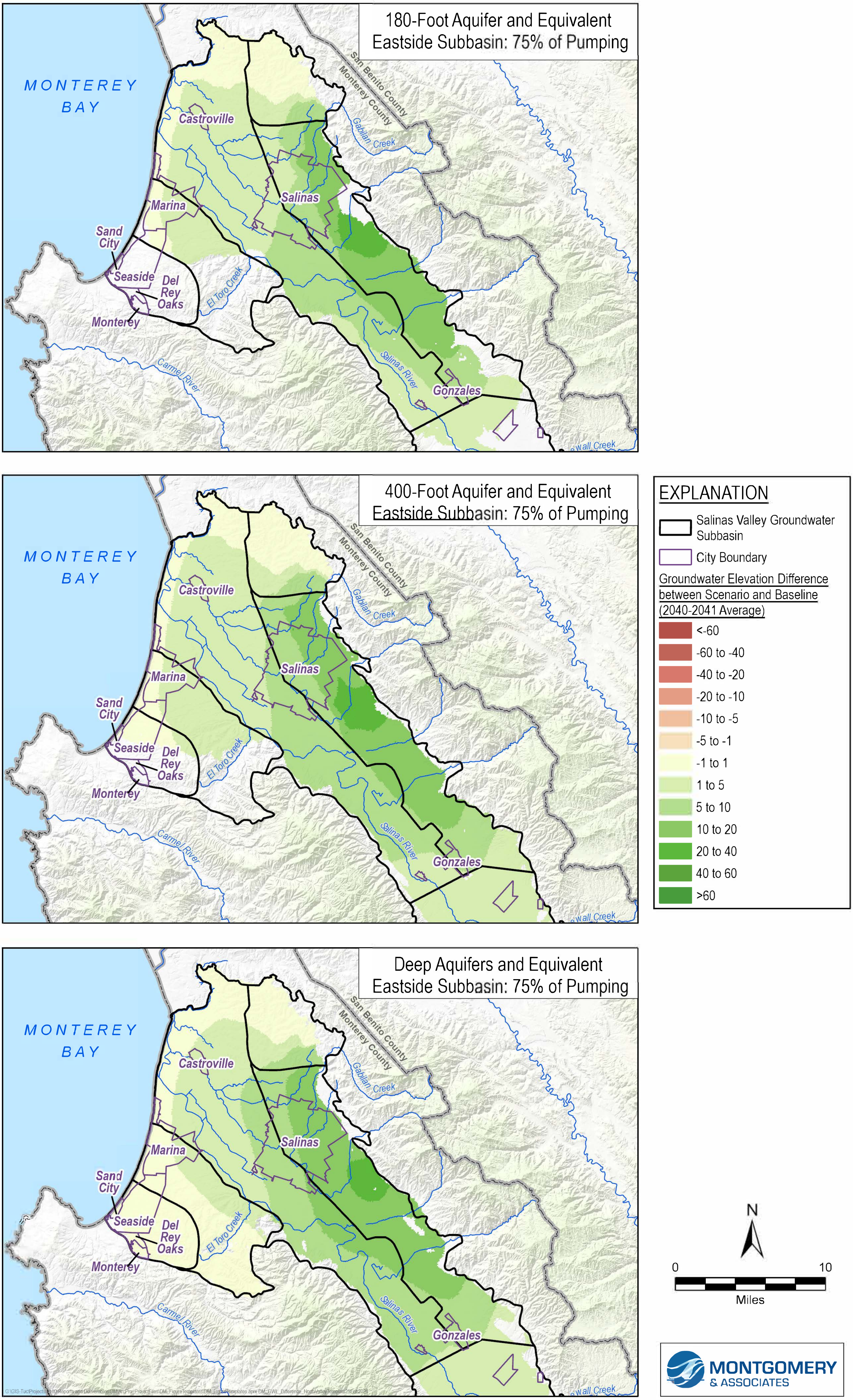
180-Foot Aquifer and Equivalent
Eastside Subbasin: 75% of Pumping
400-Foot Aquifer and Equivalent
Eastside Subbasin: 75% of Pumping
Deep Aquifers and Equivalent
Eastside Subbasin: 75% of Pumping
MONTEREY BAY
Castroville
Salinas
Marina
Sand City
Seaside
Del Rey Oaks
Monterey
Gonzales
El Toro Creek
Carmel River
Salinas River
Gabilan Creek
San Benito County
Monterey County
Chualar
EXPLANATION
Salinas Valley Groundwater Subbasin
City Boundary
Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)
<-60
-60 to -40
-40 to -20
-20 to -10
-10 to -5
-5 to -1
-1 to 1
1 to 5
5 to 10
10 to 20
20 to 40
40 to 60
>60
N
0
10
Miles
MONTGOMERY & ASSOCIATES
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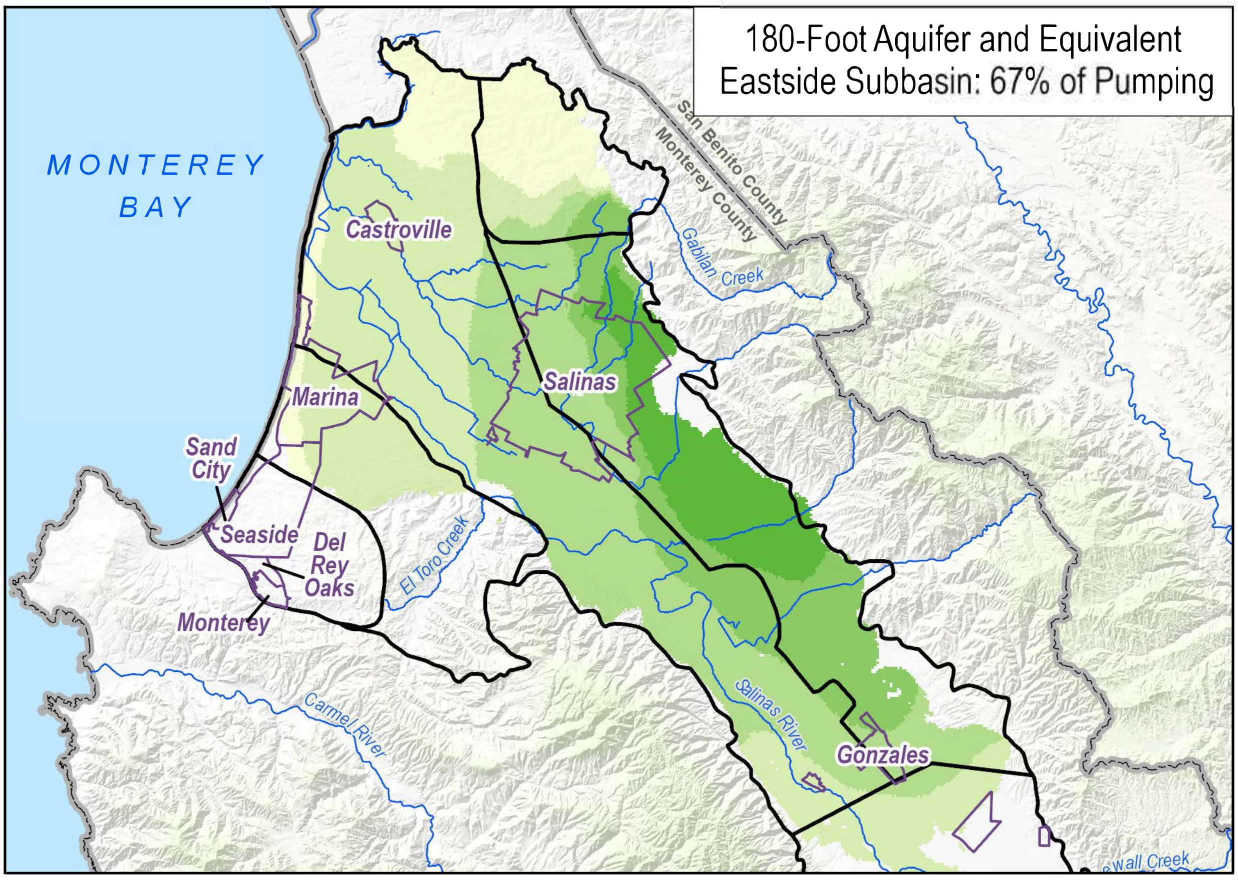
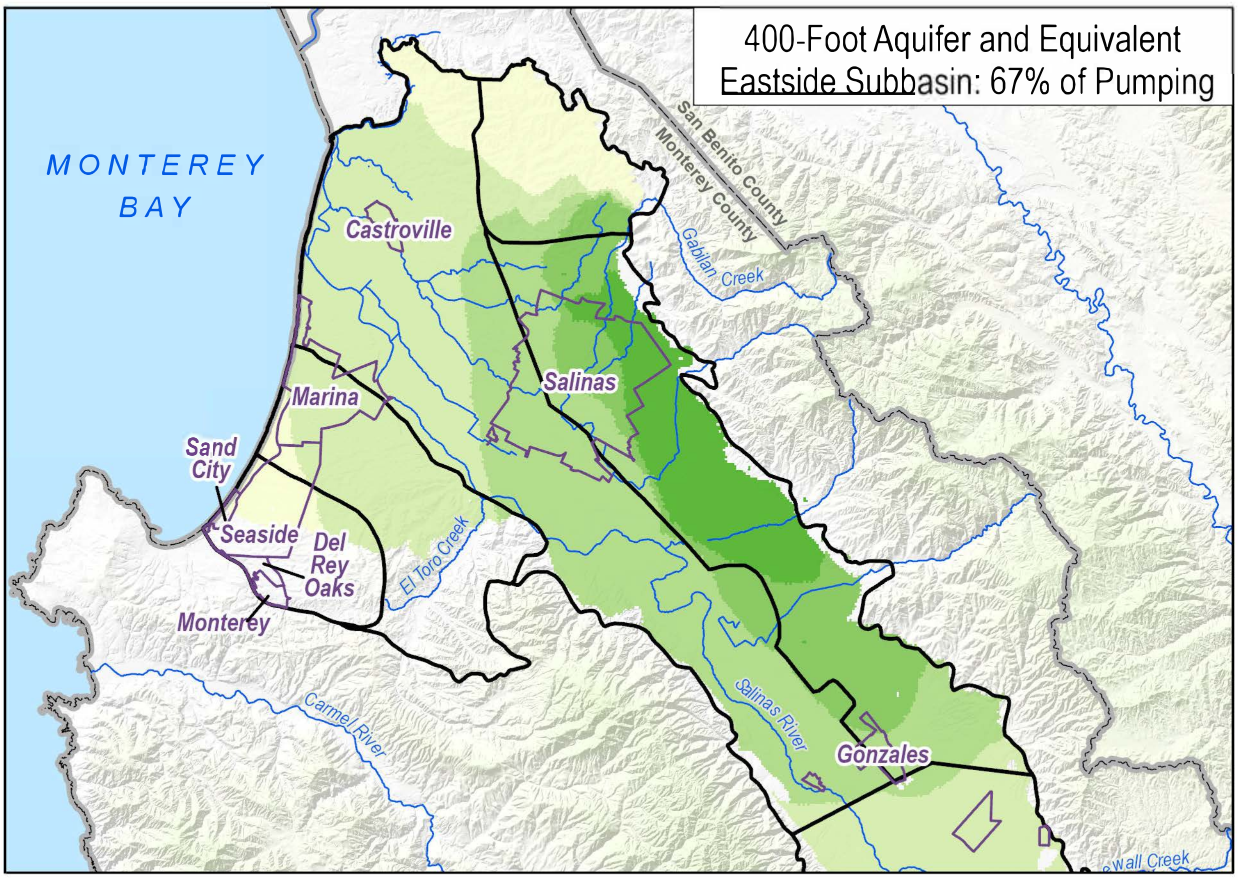
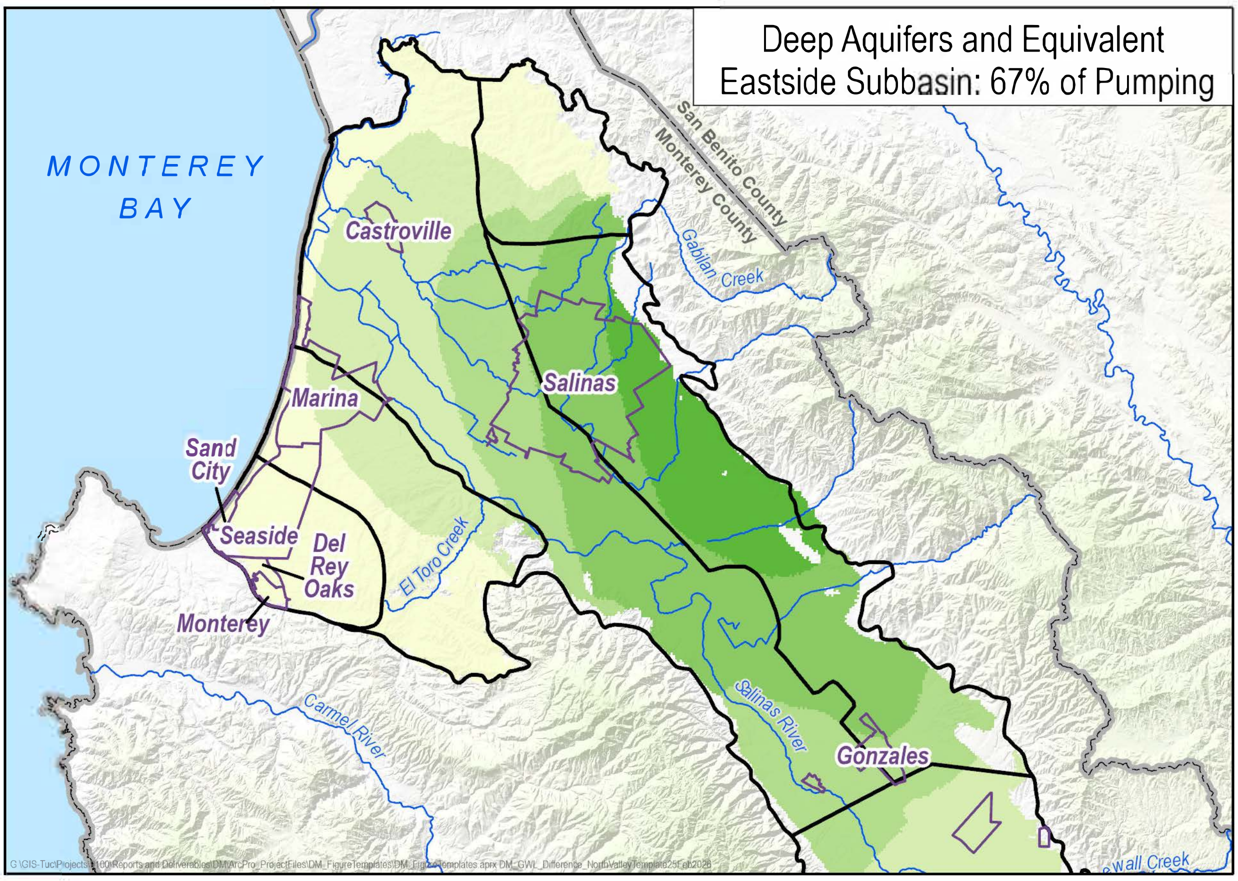


180-Foot Aquifer and Equivalent
Eastside Subbasin: 67% of Pumping



400-Foot Aquifer and Equivalent
Eastside Subbasin: 67% of Pumping



Deep Aquifers and Equivalent
Eastside Subbasin: 67% of Pumping

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EXPLANATION

▭ Salinas Valley Groundwater Subbasin

▭ City Boundary

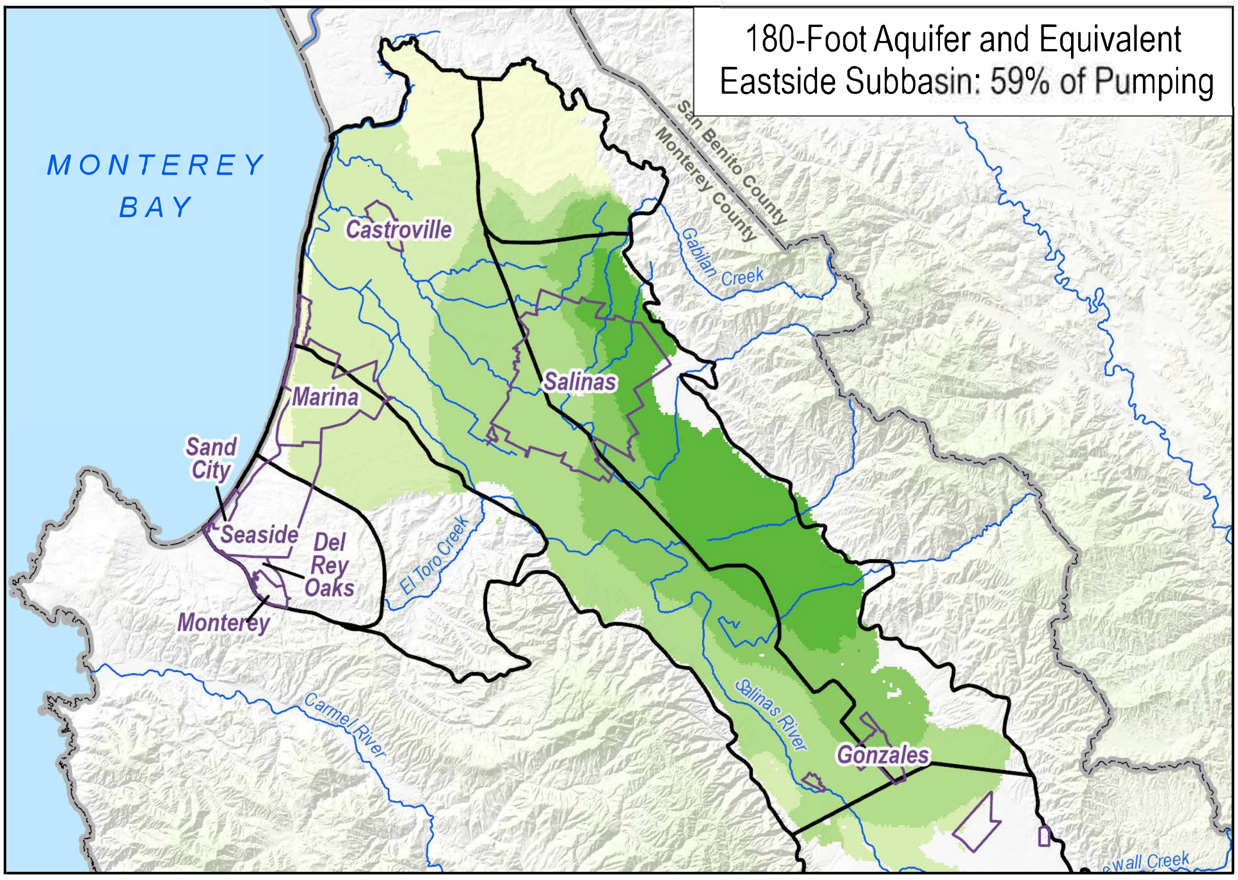
Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)

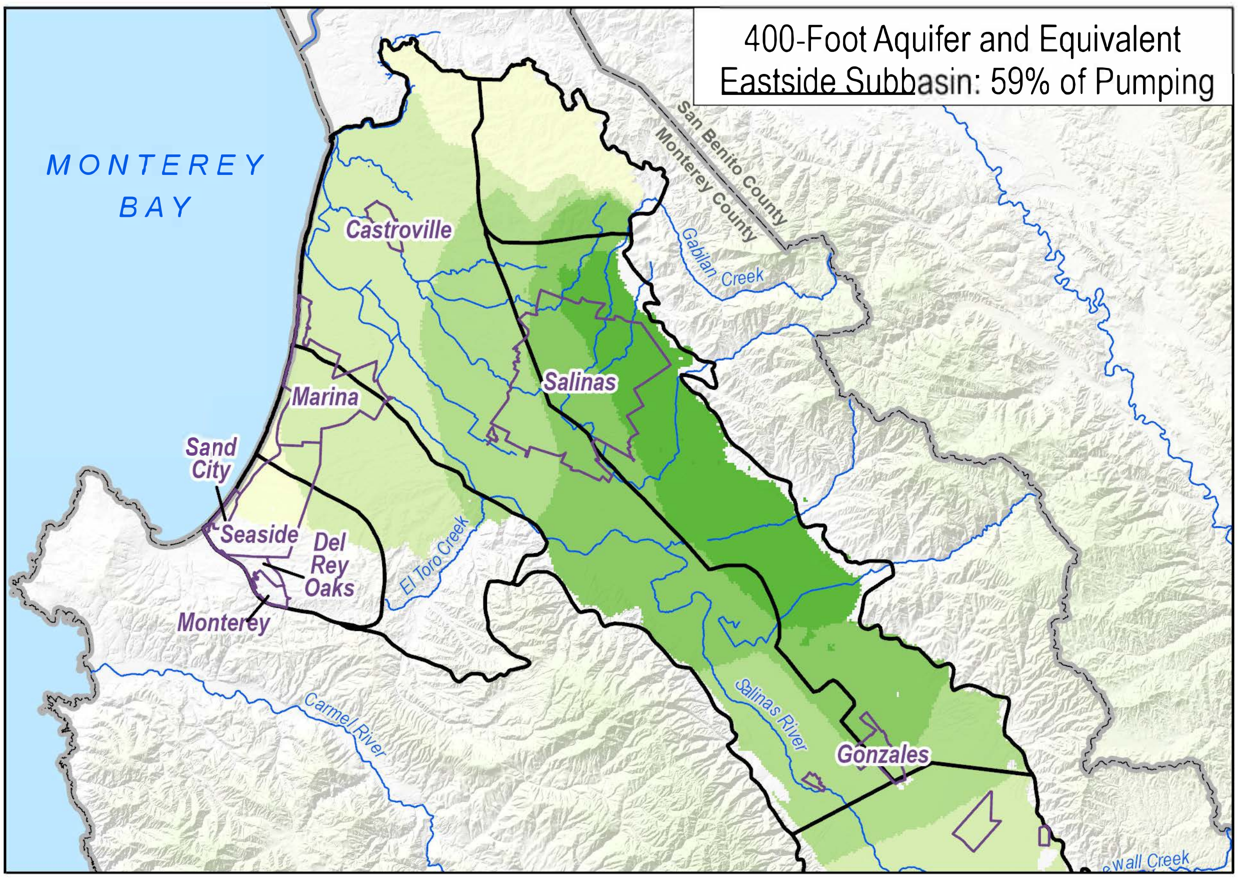
- 🟥 <-60
- 🟥 -60 to -40
- 🟥 -40 to -20
- 🟧 -20 to -10
- 🟧 -10 to -5
- 🟨 -5 to -1
- 🟨 -1 to 1
- 🟩 1 to 5
- 🟩 5 to 10
- 🟩 10 to 20
- 🟩 20 to 40
- 🟩 40 to 60
- 🟩 >60

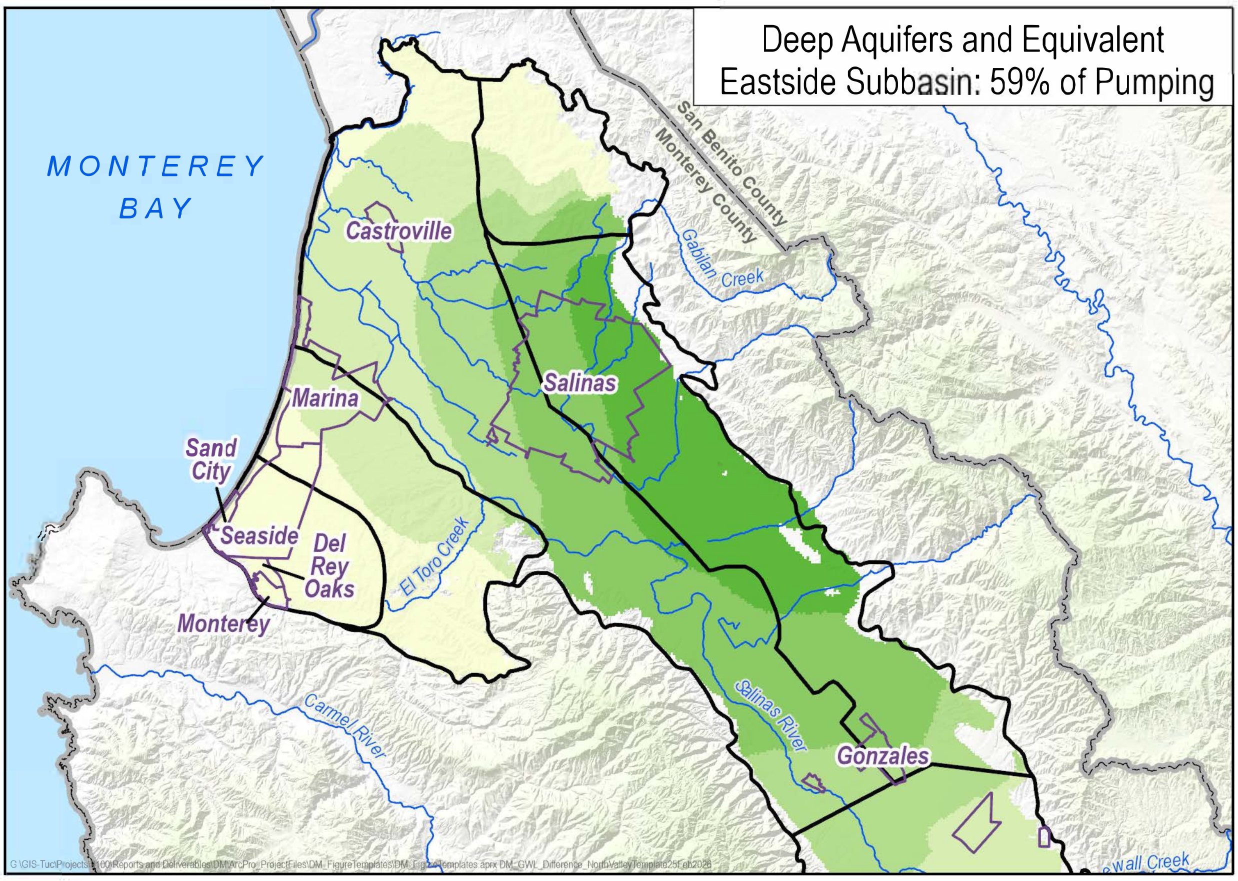
N

0 10
Miles

MONTGOMERY
& ASSOCIATES


180-Foot Aquifer and Equivalent
Eastside Subbasin: 59% of Pumping


400-Foot Aquifer and Equivalent
Eastside Subbasin: 59% of Pumping


Deep Aquifers and Equivalent
Eastside Subbasin: 59% of Pumping

EXPLANATION

▭ Salinas Valley Groundwater Subbasin

▭ City Boundary

Groundwater Elevation Difference between Scenario and Baseline (2040-2041 Average)

- 🟥 <-60
- 🟥 -60 to -40
- 🟥 -40 to -20
- 🟧 -20 to -10
- 🟧 -10 to -5
- 🟨 -5 to -1
- 🟨 -1 to 1
- 🟩 1 to 5
- 🟩 5 to 10
- 🟩 10 to 20
- 🟩 20 to 40
- 🟩 40 to 60
- 🟩 >60

N

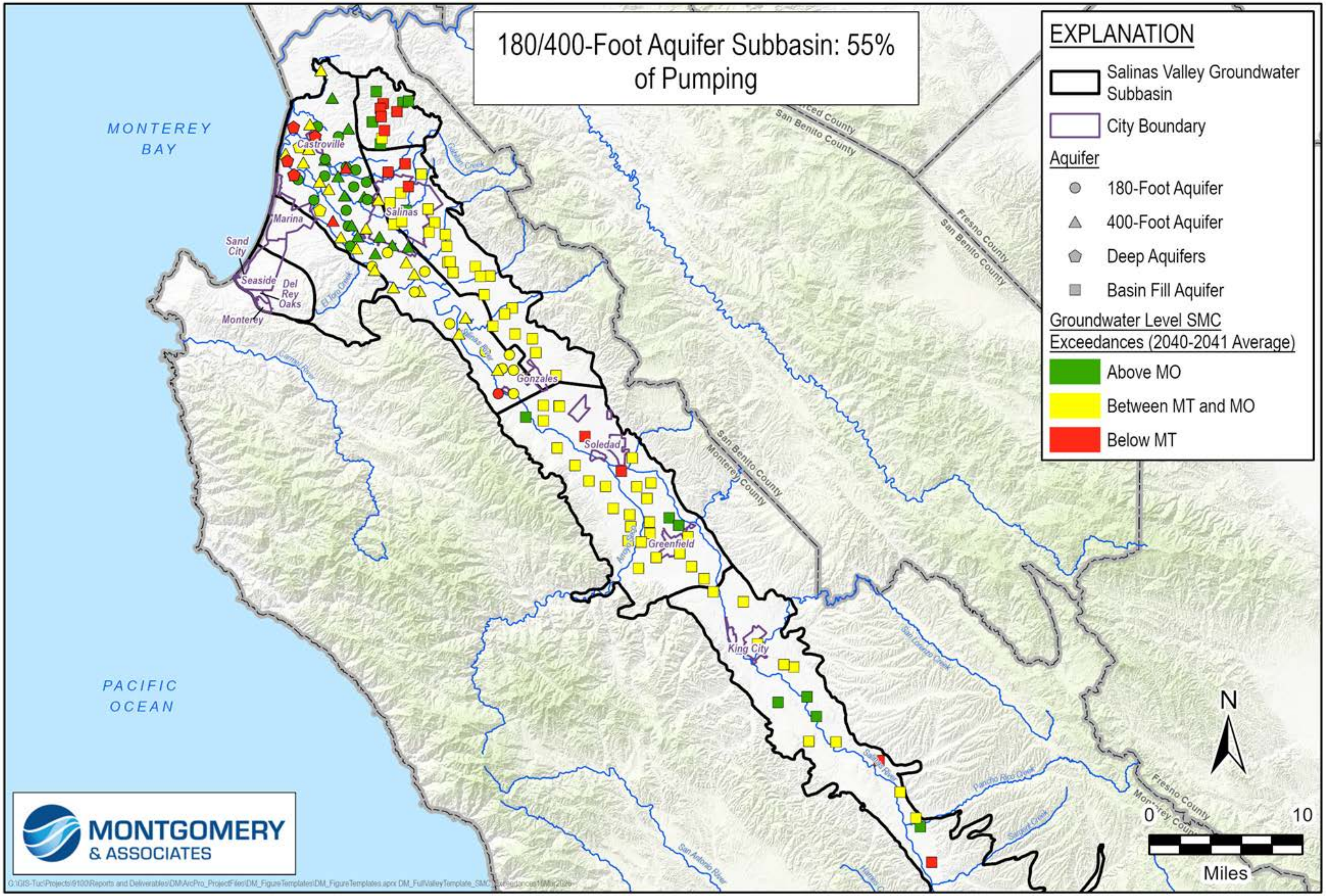
0 10

Miles

MONTGOMERY
& ASSOCIATES

Attachment 2

Sustainable Management Criteria Maps for the 180/400 and Eastside Subbasin Demand Management Scenarios


180/400-Foot Aquifer Subbasin: 55% of Pumping
EXPLANATION
Salinas Valley Groundwater Subbasin
City Boundary
Aquifer
180-Foot Aquifer
400-Foot Aquifer
Deep Aquifers
Basin Fill Aquifer
Groundwater Level SMC Exceedances (2040-2041 Average)
Above MO
Between MT and MO
Below MT
MONTEREY BAY
PACIFIC OCEAN
Castroville
Salinas
Marina
Sand City
Seaside
Del Rey Oaks
Monterey
Gonzales
Soledad
Greenfield
King City
El Toro Creek
Gabilan Creek
Salinas River
Carmel River
Arroyo Seco
San Lorenzo Creek
Pancho Rico Creek
Sargent Creek
San Antonio River
Merced County
San Benito County
Fresno County
Monterey County
N
0
10
Miles
MONTGOMERY & ASSOCIATES
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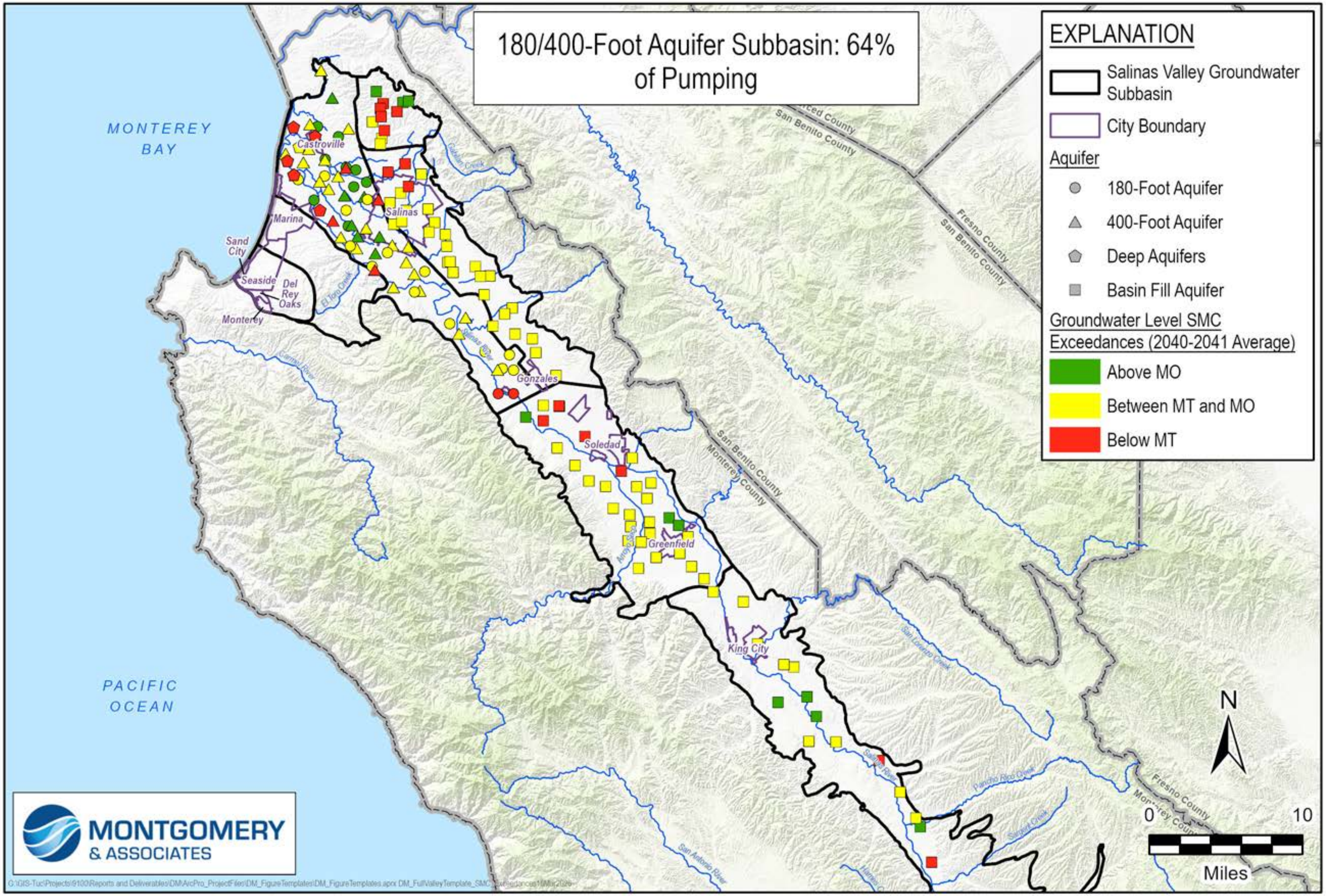


180/400-Foot Aquifer Subbasin: 64% of Pumping

EXPLANATION

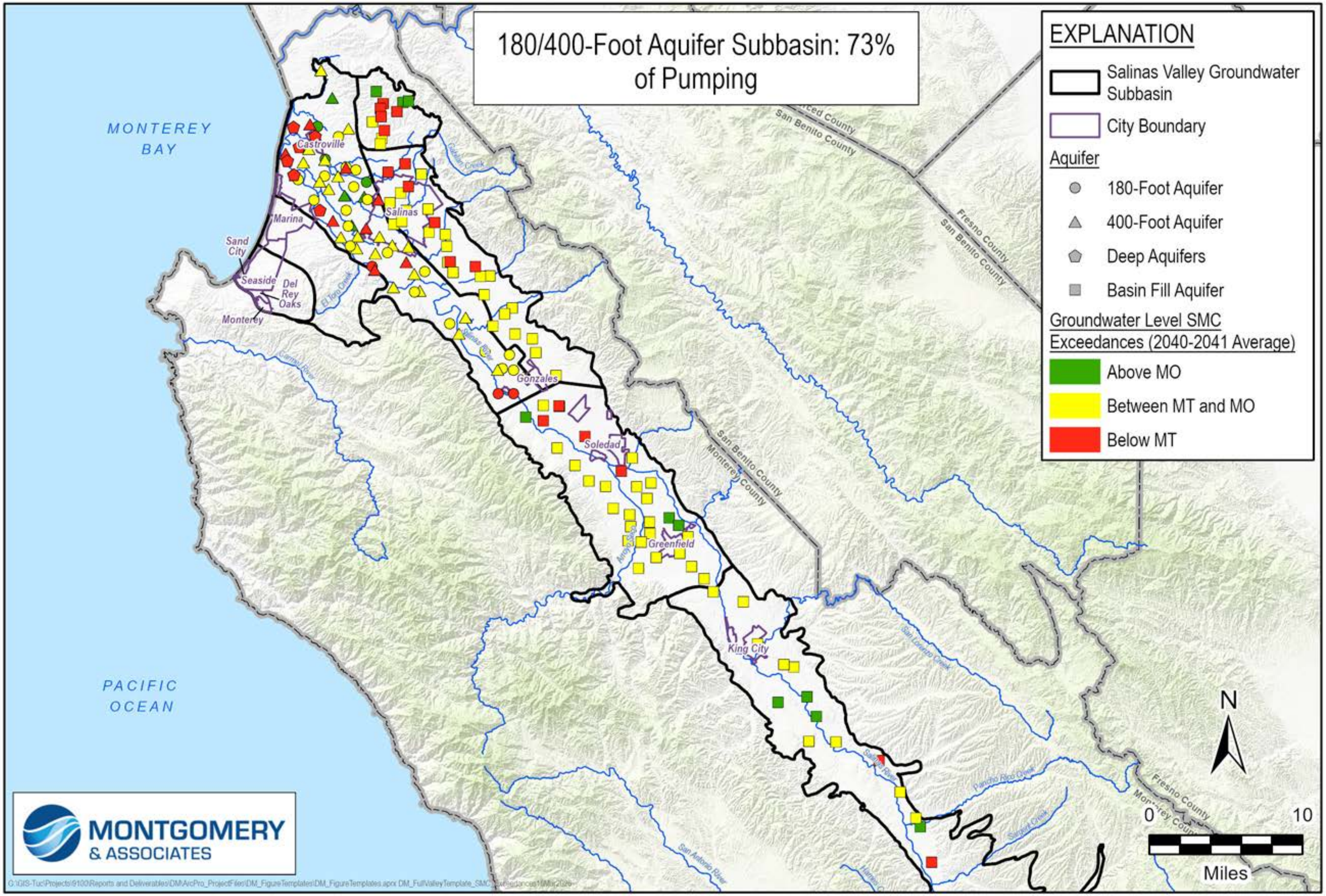
- Salinas Valley Groundwater Subbasin
- City Boundary

Aquifer

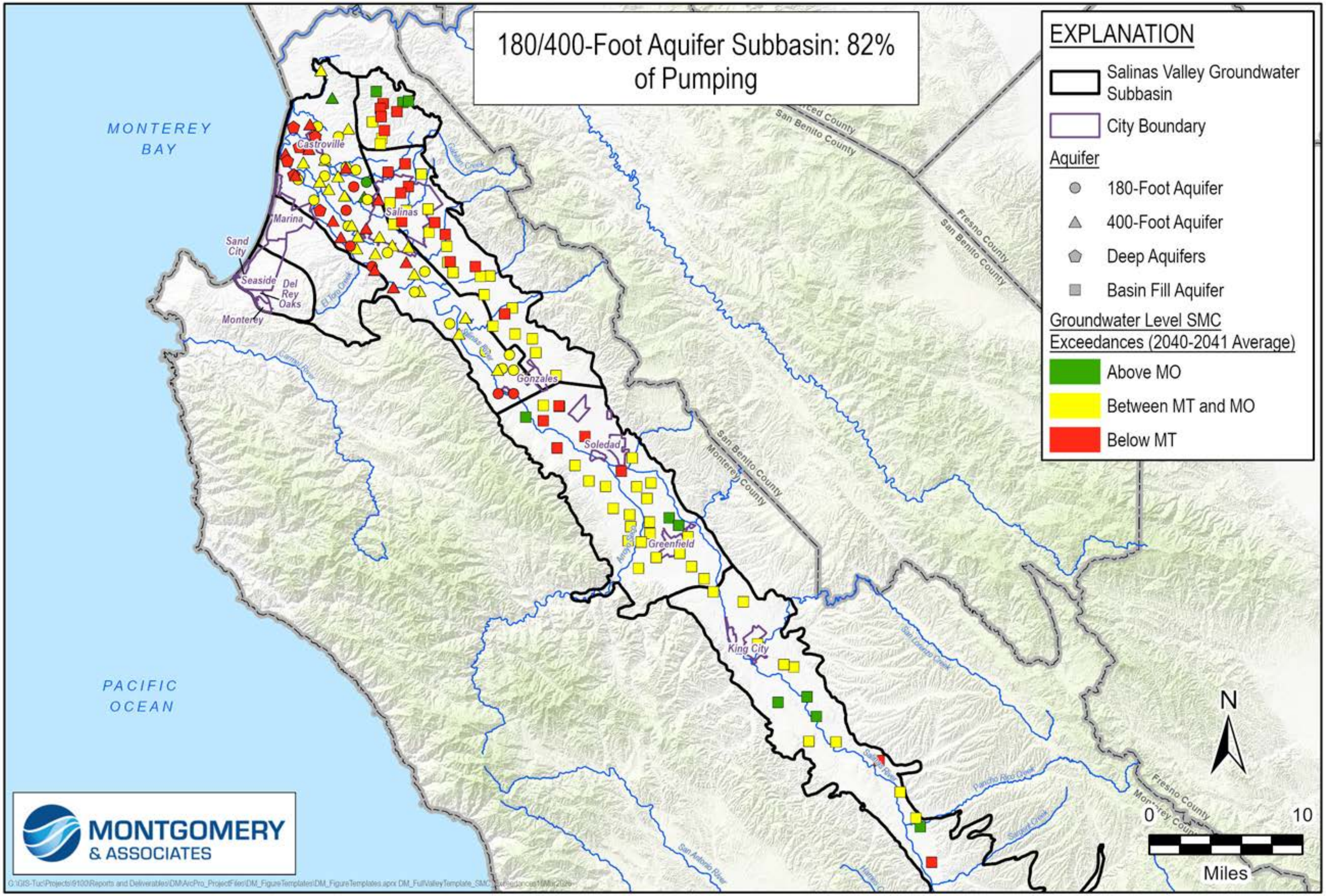
- ● 180-Foot Aquifer
- ▲ 400-Foot Aquifer
- ⬟ Deep Aquifers
- ■ Basin Fill Aquifer

Groundwater Level SMC Exceedances (2040-2041 Average)

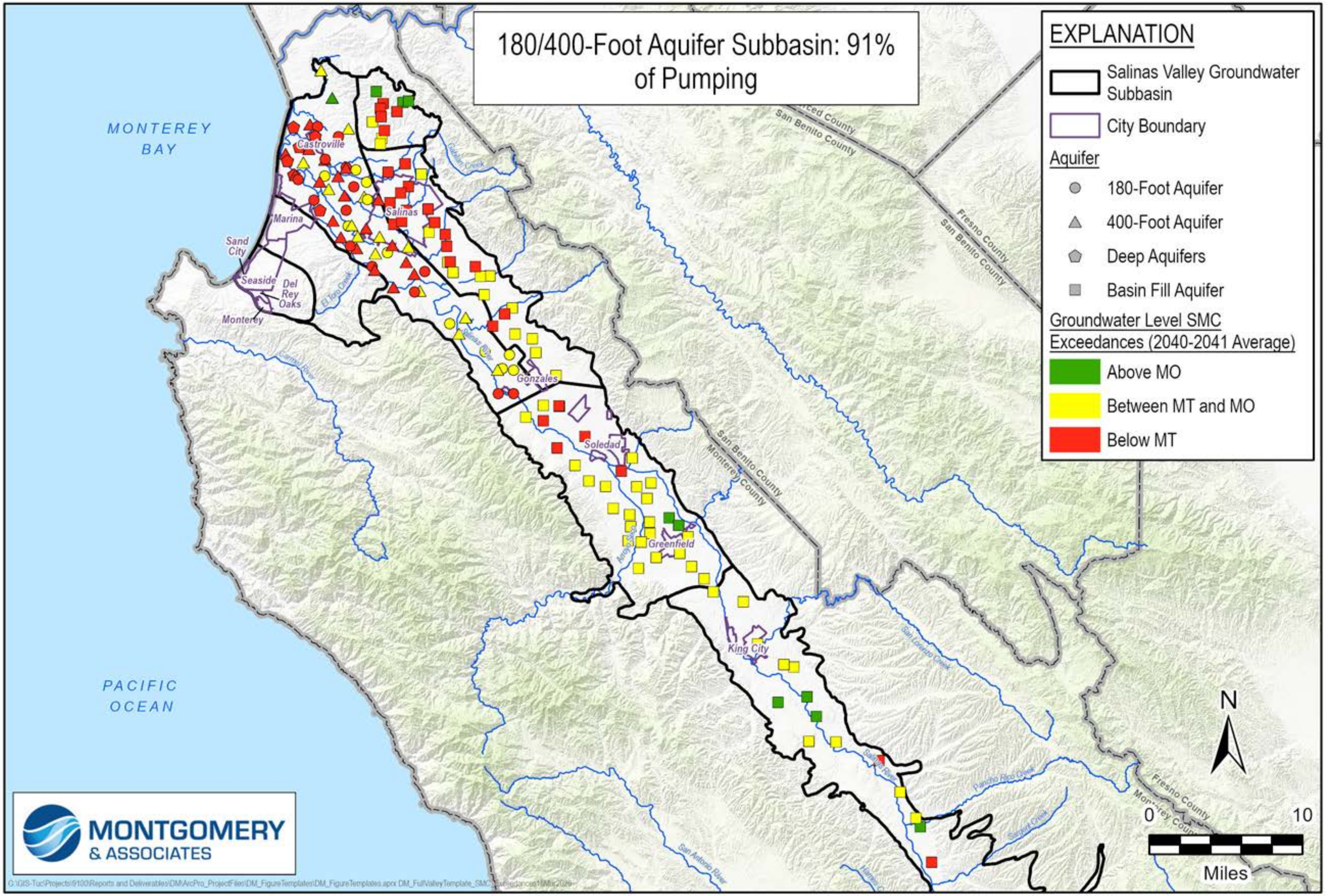
- 🟩 Above MO
- 🟨 Between MT and MO
- 🟥 Below MT



180/400-Foot Aquifer Subbasin: 73% of Pumping



180/400-Foot Aquifer Subbasin: 82% of Pumping



180/400-Foot Aquifer Subbasin: 91% of Pumping

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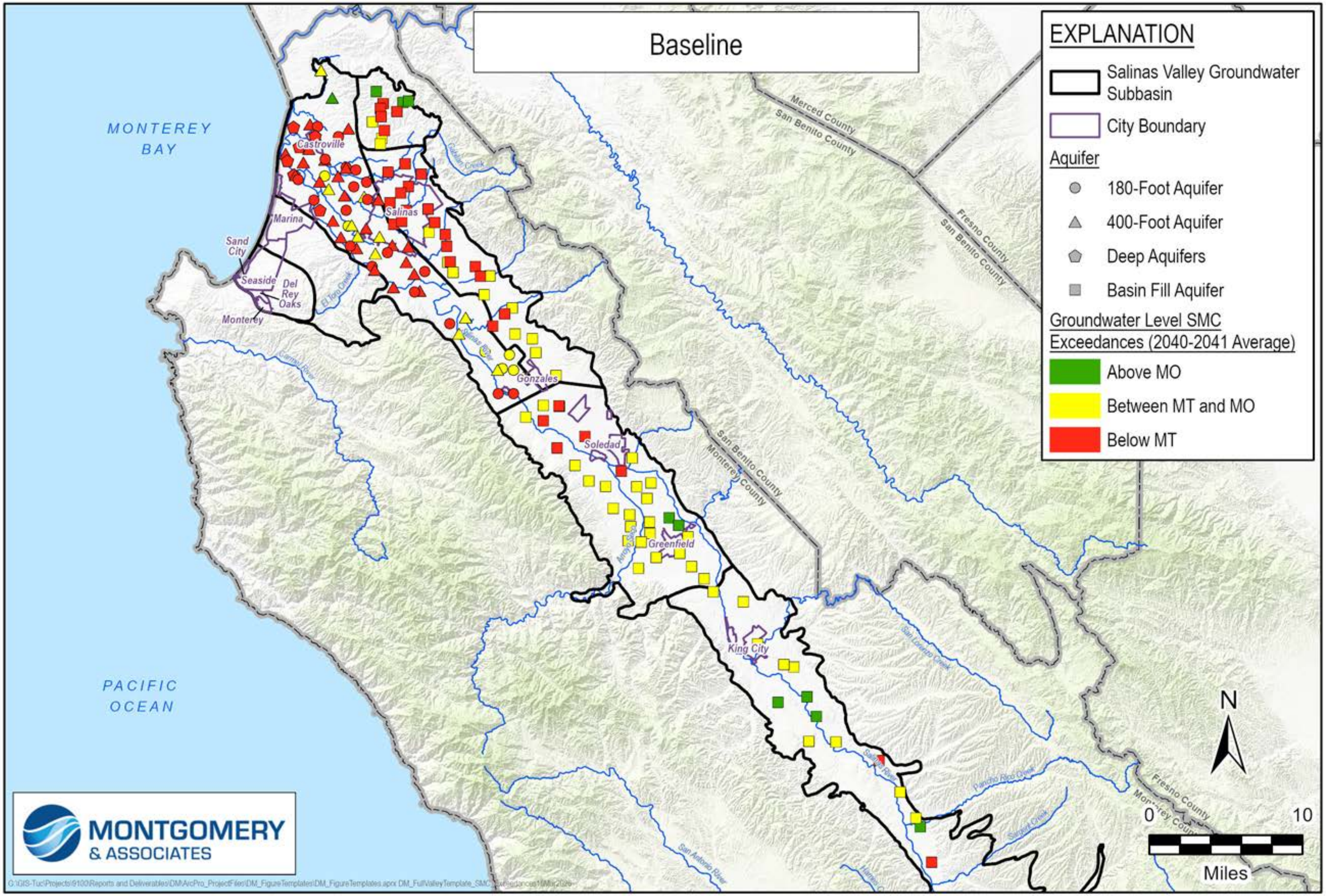
Baseline
EXPLANATION
Salinas Valley Groundwater Subbasin
City Boundary
Aquifer
180-Foot Aquifer
400-Foot Aquifer
Deep Aquifers
Basin Fill Aquifer
Groundwater Level SMC Exceedances (2040-2041 Average)
Above MO
Between MT and MO
Below MT
MONTEREY BAY
PACIFIC OCEAN
Castroville
Salinas
Marina
Sand City
Seaside
Del Rey Oaks
Monterey
Gonzales
Soledad
Greenfield
King City
Merced County
San Benito County
Fresno County
San Benito County
San Benito County
Monterey County
Fresno County
Monterey County
Gabilan Creek
El Toro Creek
Carmel River
Salinas River
Arroyo Seco
San Lorenzo Creek
Pancho Rico Creek
Sargent Creek
San Antonio River
Salinas River
N
0
10
Miles
MONTGOMERY & ASSOCIATES
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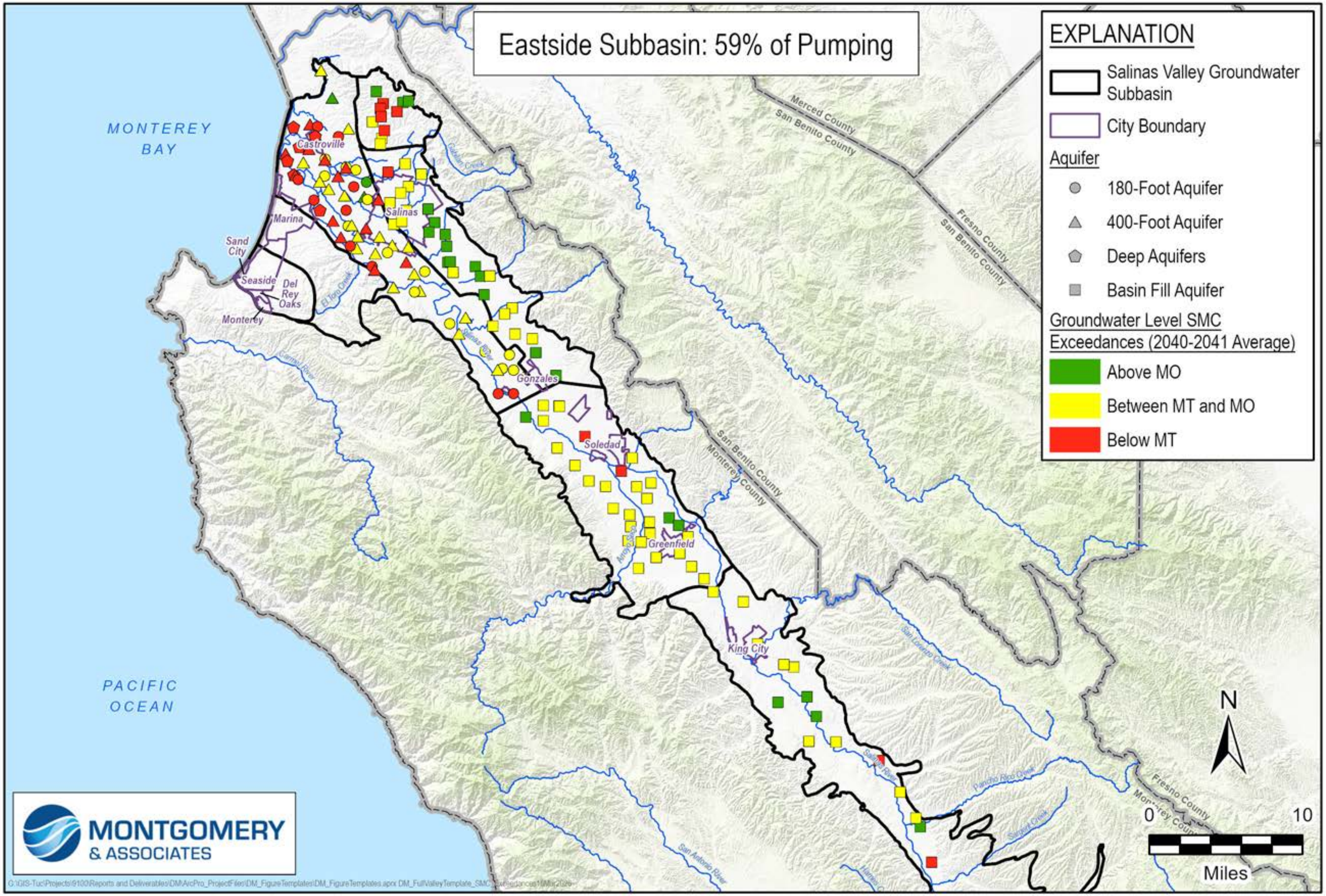Eastside Subbasin: 59% of Pumping
EXPLANATION
Salinas Valley Groundwater Subbasin
City Boundary
Aquifer
● 180-Foot Aquifer
▲ 400-Foot Aquifer
⬟ Deep Aquifers
■ Basin Fill Aquifer
Groundwater Level SMC Exceedances (2040-2041 Average)
🟩 Above MO
🟨 Between MT and MO
🟥 Below MT
MONTEREY BAY
PACIFIC OCEAN
Castroville
Salinas
Marina
Sand City
Seaside
Del Rey Oaks
Monterey
Gonzales
Soledad
Greenfield
King City
Merced County
San Benito County
Fresno County
San Benito County
San Benito County
Monterey County
Fresno County
Monterey County
Gabilan Creek
El Toro Creek
Salinas River
Carmel River
Arroyo Seco
San Lorenzo Creek
Pancho Rico Creek
Sargent Creek
San Antonio River
Salinas River
N
0
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Miles
MONTGOMERY & ASSOCIATES
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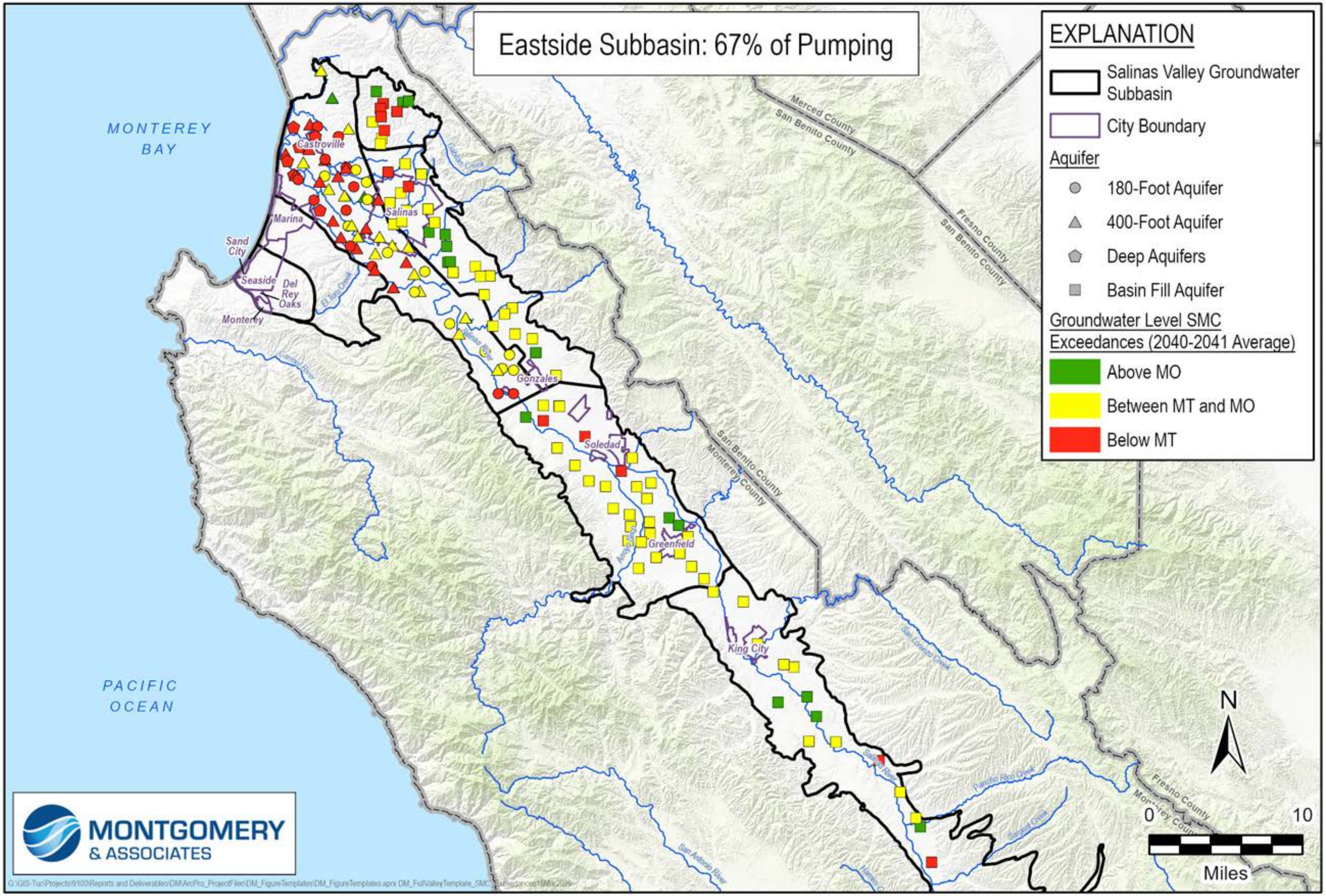
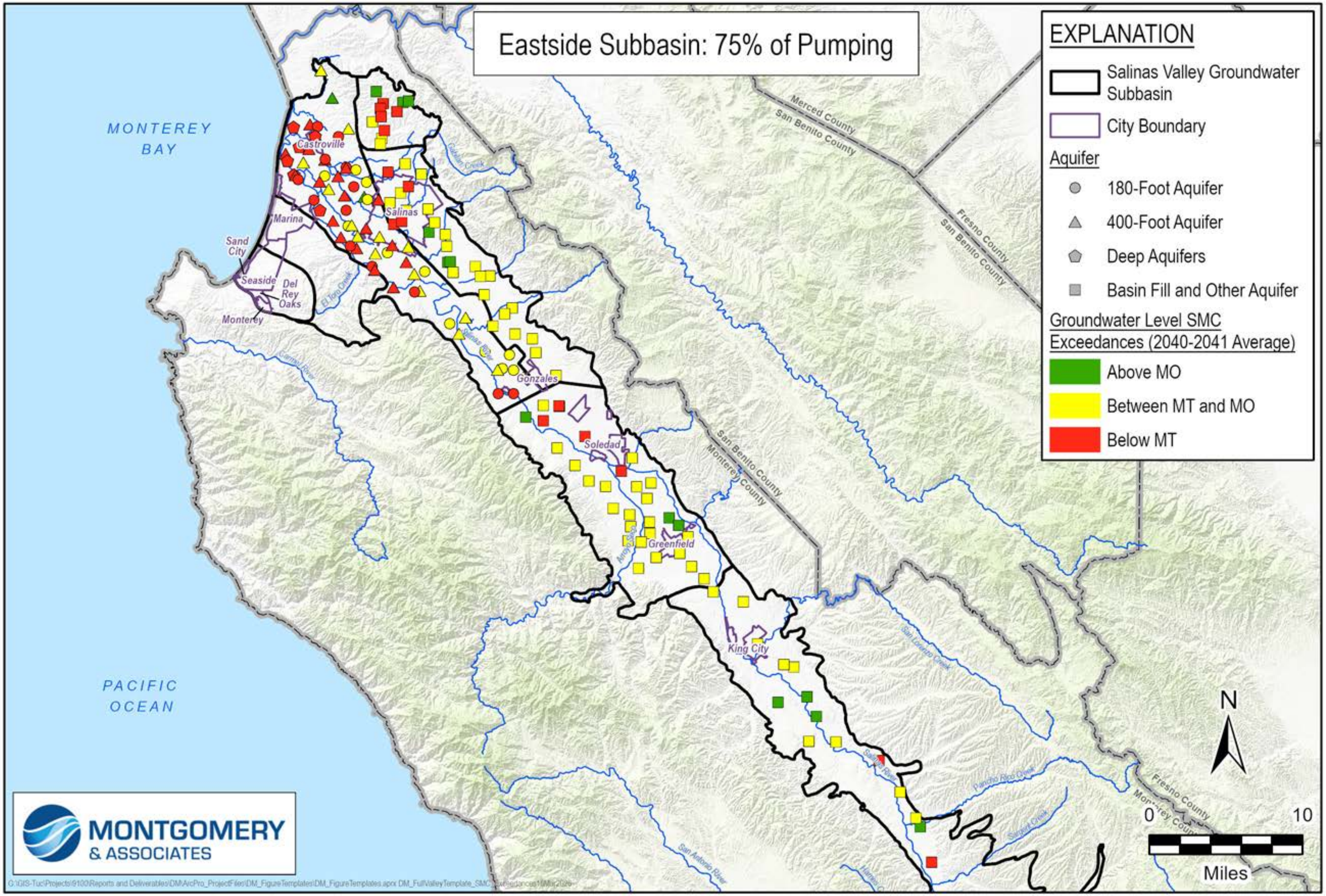
Eastside Subbasin: 67% of Pumping
EXPLANATION
Salinas Valley Groundwater Subbasin
City Boundary
Aquifer
180-Foot Aquifer
400-Foot Aquifer
Deep Aquifers
Basin Fill Aquifer
Groundwater Level SMC Exceedances (2040-2041 Average)
Above MO
Between MT and MO
Below MT
MONTEREY BAY
PACIFIC OCEAN
Castroville
Salinas
Marina
Sand City
Seaside
Del Rey Oaks
Monterey
Gonzales
Soledad
Greenfield
King City
Merced County
San Benito County
Fresno County
Monterey County
Gabilan Creek
El Toro Creek
Carmel River
Salinas River
Arroyo Seco
San Lorenzo Creek
Pancho Rico Creek
Sargent Creek
San Antonio River
N
0
10
Miles
MONTGOMERY & ASSOCIATES
G:\GIS-Tuc\Projects\9100\Reports and Deliverables\DM\ArcPro_ProjectFiles\DM_FigureTemplates\DM_FigureTemplates.aprx DM_FullValleyTemplate_SMC_Exceedances 10Mar2026


Eastside Subbasin: 75% of Pumping
EXPLANATION
Salinas Valley Groundwater Subbasin
City Boundary
Aquifer
● 180-Foot Aquifer
▲ 400-Foot Aquifer
⬟ Deep Aquifers
■ Basin Fill and Other Aquifer
Groundwater Level SMC Exceedances (2040-2041 Average)
🟩 Above MO
🟨 Between MT and MO
🟥 Below MT
MONTEREY BAY
PACIFIC OCEAN
Castroville
Salinas
Marina
Sand City
Seaside
Del Rey Oaks
Monterey
Gonzales
Soledad
Greenfield
King City
Merced County
San Benito County
Fresno County
San Benito County
San Benito County
Monterey County
Fresno County
Monterey County
Gabilan Creek
El Toro Creek
Salinas River
Carmel River
Arroyo Seco
San Lorenzo Creek
Pancho Rico Creek
Sargent Creek
San Antonio River
N
0
10
Miles
MONTGOMERY & ASSOCIATES
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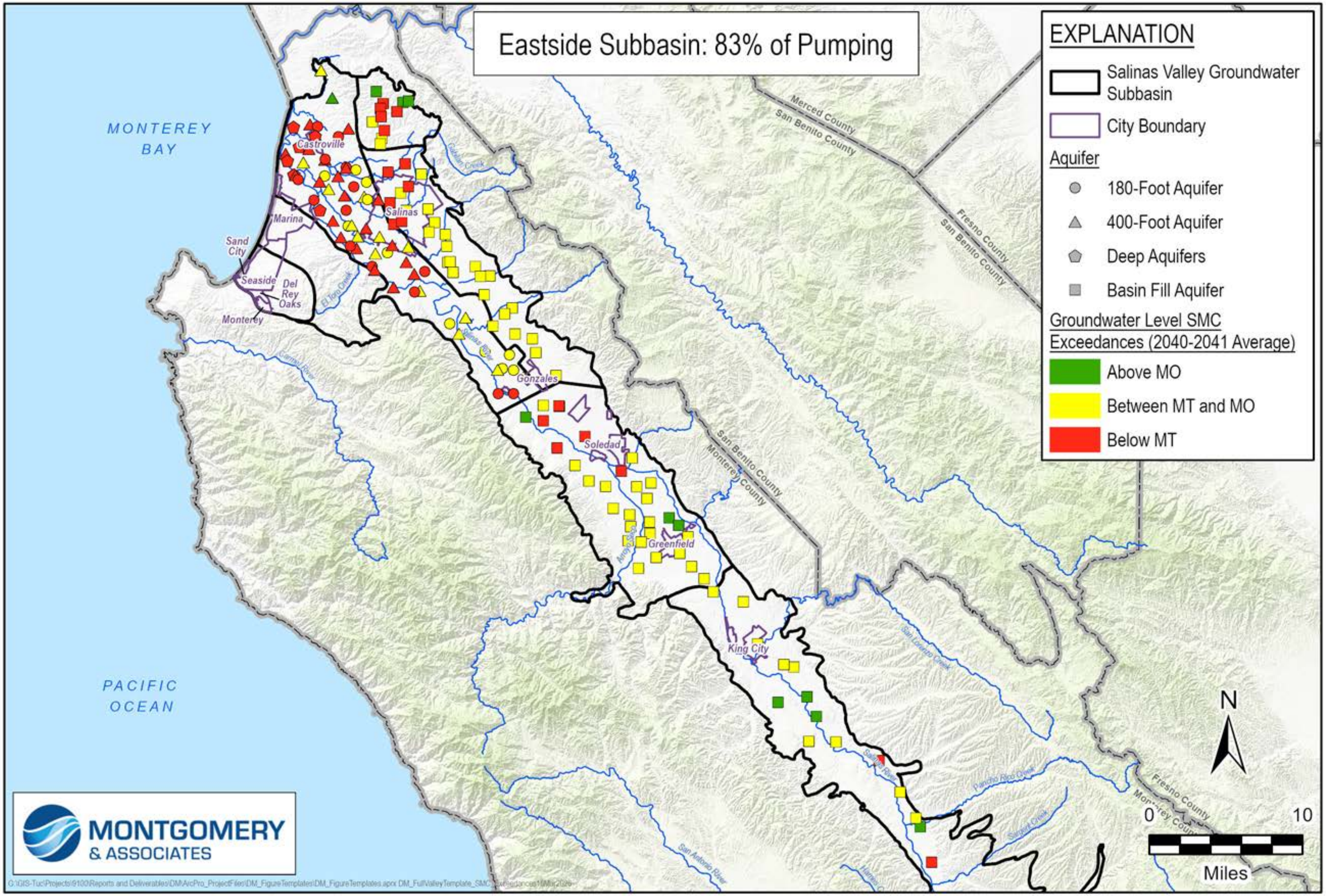
Eastside Subbasin: 83% of Pumping



MONTGOMERY & ASSOCIATES

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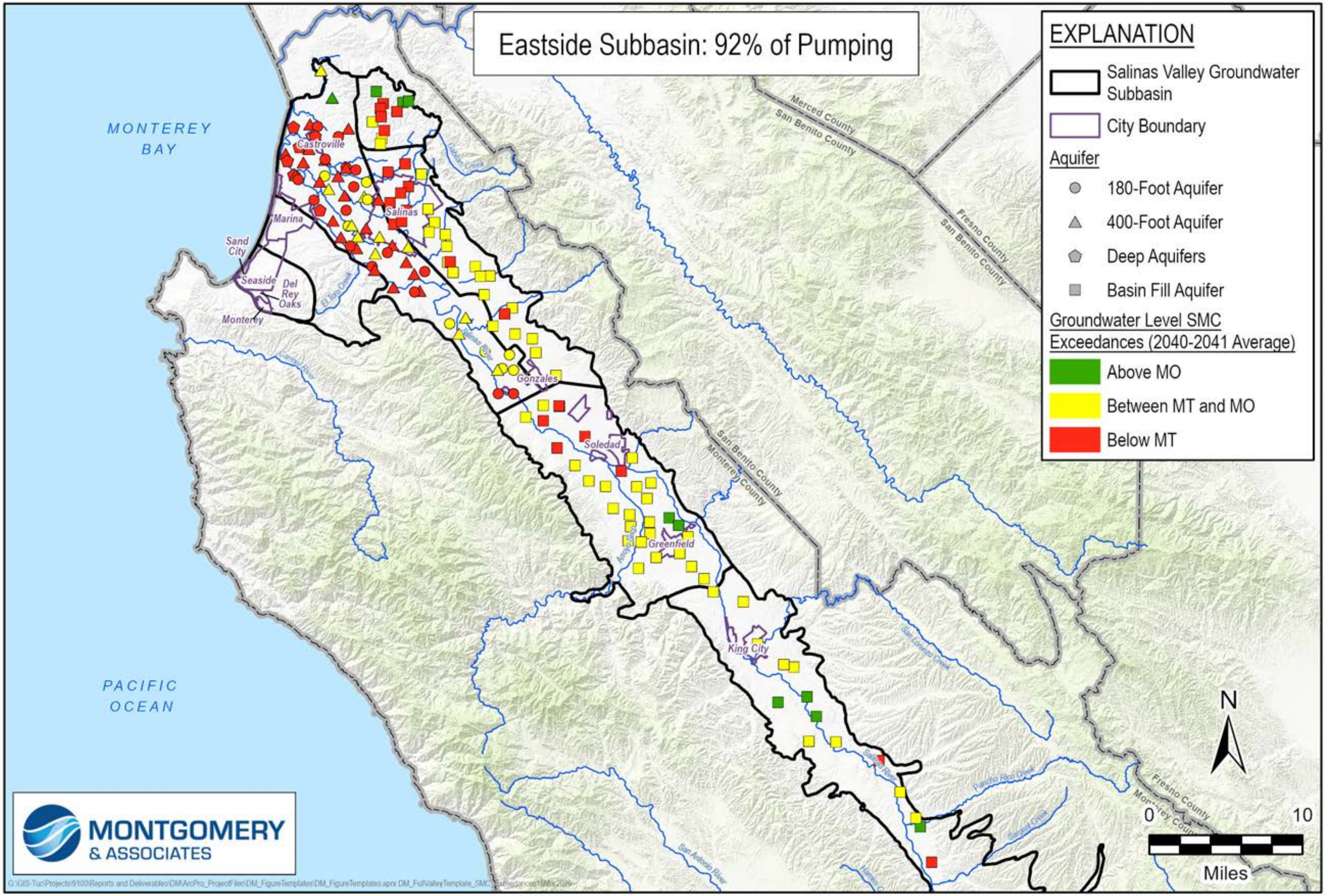
Eastside Subbasin: 92% of Pumping
EXPLANATION
Salinas Valley Groundwater Subbasin
City Boundary
Aquifer
180-Foot Aquifer
400-Foot Aquifer
Deep Aquifers
Basin Fill Aquifer
Groundwater Level SMC Exceedances (2040-2041 Average)
Above MO
Between MT and MO
Below MT
MONTEREY BAY
PACIFIC OCEAN
Castroville
Salinas
Marina
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Gonzales
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Arroyo Seco
San Lorenzo Creek
Pancho Rico Creek
Sargent Creek
San Antonio River
Merced County
San Benito County
Fresno County
Monterey County
N
0
10
Miles
MONTGOMERY & ASSOCIATES
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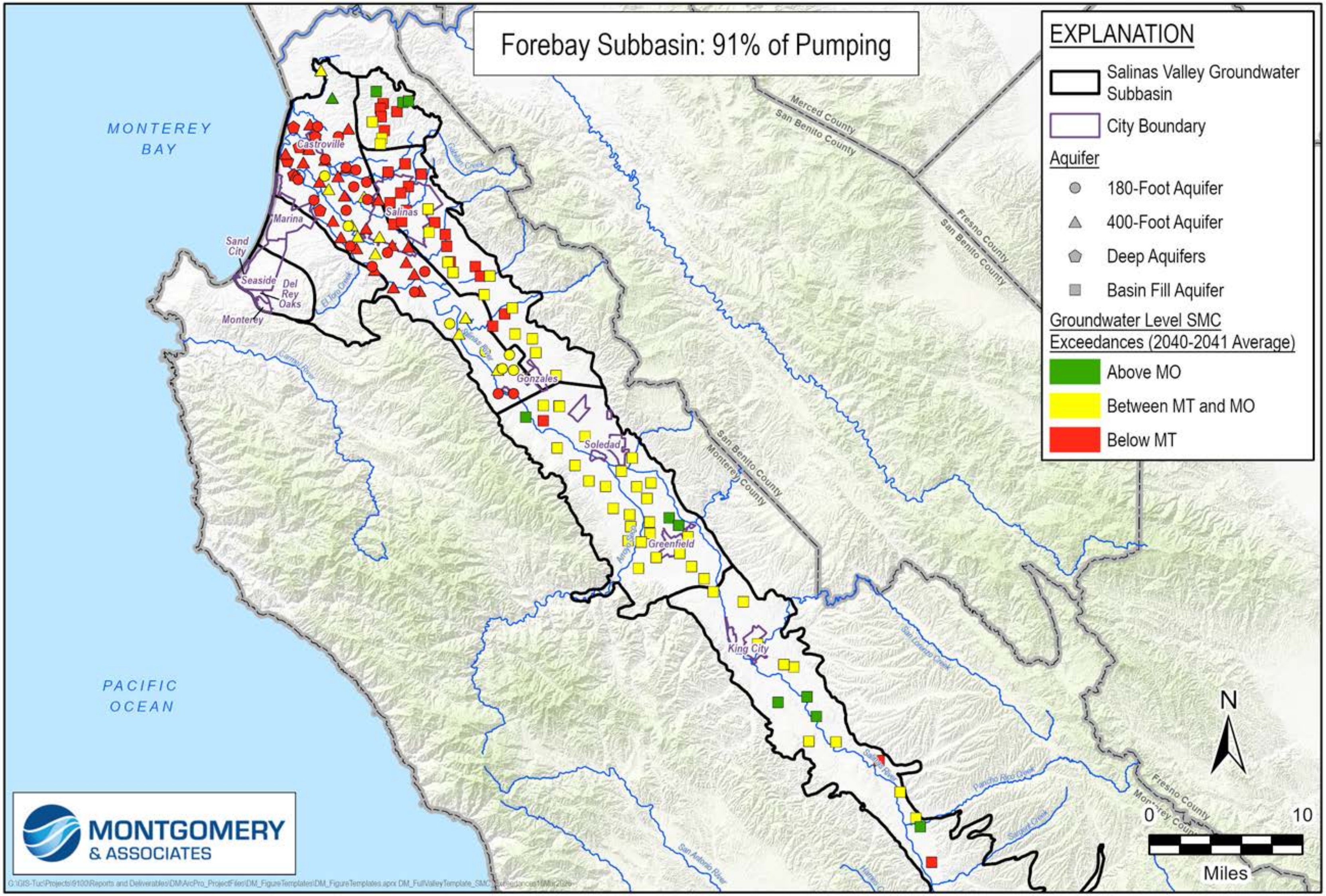
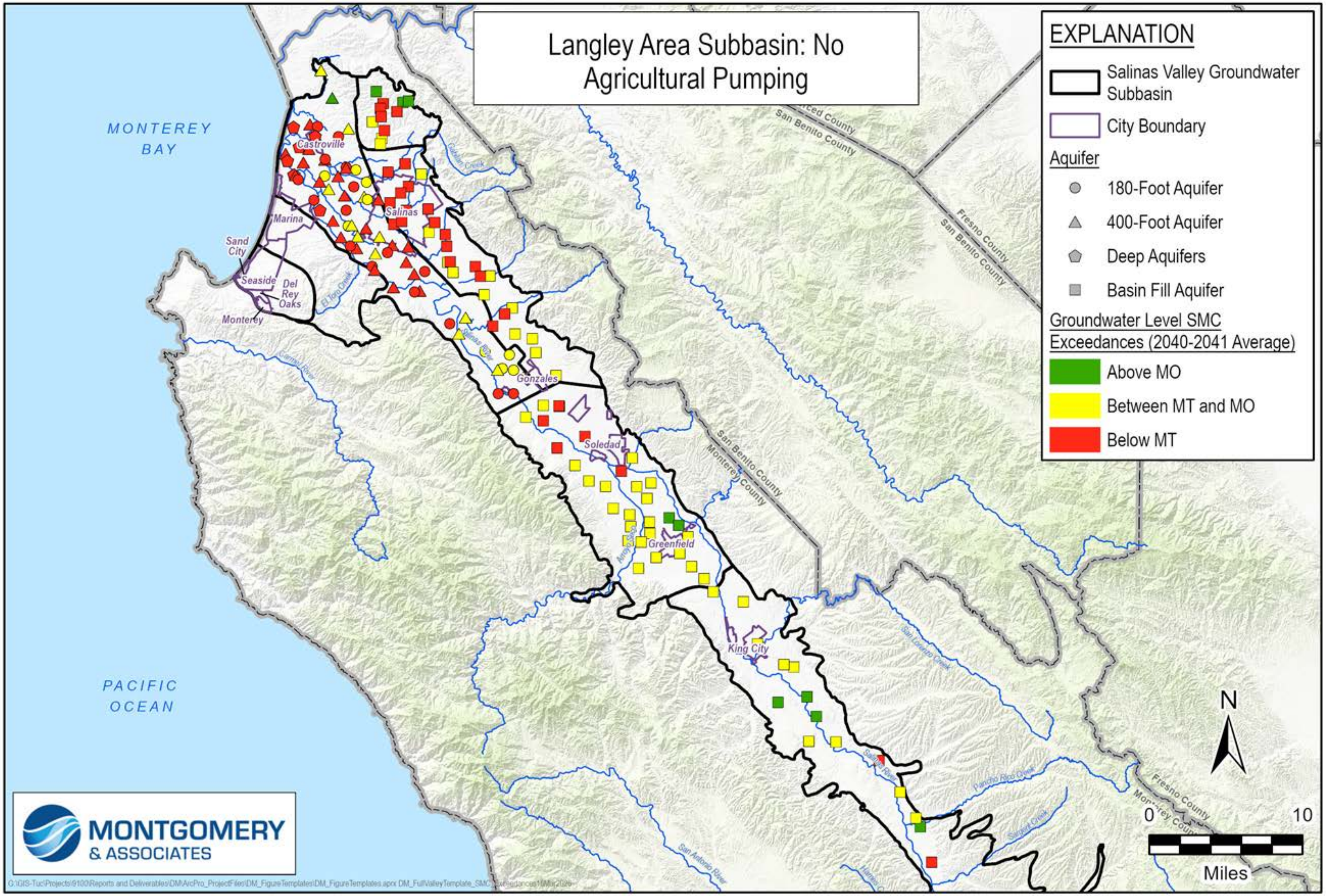
Forebay Subbasin: 91% of Pumping



Langley Area Subbasin: No Agricultural Pumping



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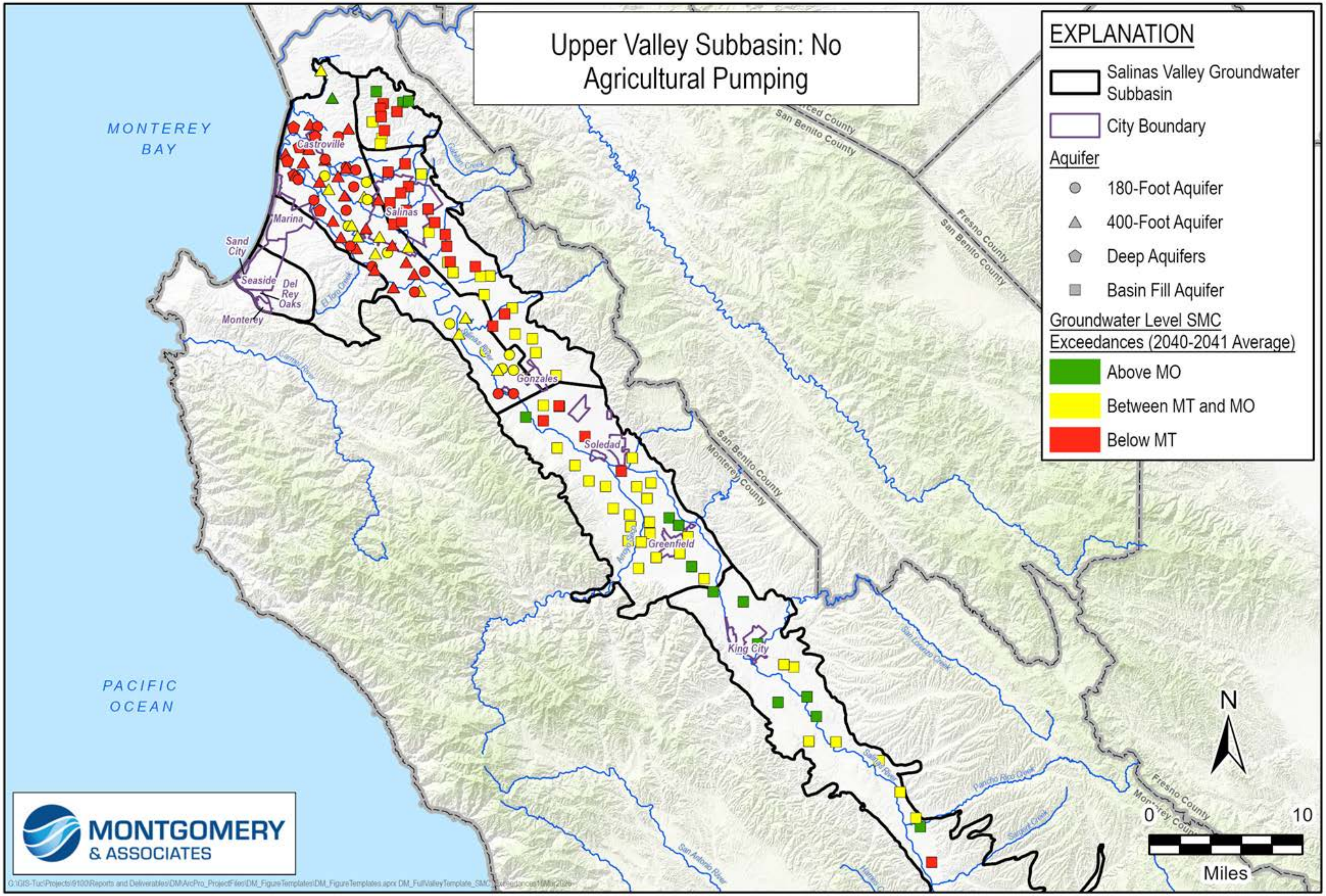

Upper Valley Subbasin: No Agricultural Pumping