SVBGSA Upper Valley Subbasin Planning Committee
Supplement to April Meeting on
Projects & Management Actions

INTRODUCTION

SVBGSA is providing this informational supplement to help Subbasin Committee members develop views and ideas about appropriate projects to prioritize for their specific subbasin. This information should be reviewed in the context of prioritizing projects to meet sustainability in the Upper Valley Subbasin.

Stakeholders are being asked to consider various projects and project types to provide strategic direction for the GSP, knowing this GSP will be adapted and improved over time. Individual subbasins may prioritize projects that have more benefit to their own unique situations. All projects will ultimately need to be assessed in the context of valley-wide benefits, as they will need to be approved by the Board of Directors. The feedback from subbasin committee members is critical for the development of subbasin GSPs, as GSP development is an iterative process designed to incorporate feedback from stakeholders, managers, board members, and the public in order to create a living plan to get the Subbasin to sustainability in the long term.

Some important points regarding projects and management actions include:

- ***Projects implement the GSP*** and enable the subbasin to reach sustainability by 2042, then maintain sustainability for another 30 years.
- ***Projects show that reaching sustainability is feasible***; however, further work is required to determine which projects to implement and project design.
- ***Projects must address all of the SMCs*** relevant to the subbasin, and help subbasins reach interim milestones and work towards measurable objectives to show actual progress.

To meet SMC measurable objectives, the Upper Valley Subbasin must address susceptibility to droughts and take into account the relationship with other subbasins.

This data packet provides initial information on potential projects to include in the Upper Valley Subbasin Groundwater Sustainability Plan. The projects considered here include:

Recharge Projects

1. Multi-benefit stream channel improvements
2. Managed aquifer recharge of overland flow

Projects that result in Reservoir Reoperation

3. Winter releases from reservoirs, with ASR in the 180/400-Foot Aquifer Subbasin
4. Interlake Tunnel and Spillway Modification
5. Drought reoperation

Management Actions

6. Conservation and agricultural BMPs
7. Fallowing, fallow bank, and agricultural land retirement

Implementation Actions

8. GEMS Expansion
9. Well registration
10. Domestic water partnership
11. Local groundwater elevation trigger

SVBGSA is also analyzing additional projects as both back-up options and as part of the overall program of projects for the entire Salinas Valley.

DATA ON POTENTIAL PROJECTS AND MANAGEMENT ACTIONS

This section contains descriptions of the current set of projects and management actions, based on both Upper Valley Subbasin Committee and Valley-wide discussions. The Valley-wide set of projects will need to meet the objectives of all subbasins; however, the project ideas focus on those directly related to the Upper Valley (e.g. not CSIP). If the Valley-wide set of projects are not acceptable to stakeholders, back-up projects will need to be analyzed in greater depth. Projects included in the GSP need to show that the Subbasin can reach and maintain sustainability. It may not be necessary to implement all projects, but inclusion of supply-side and demand-side options show the Subbasin has sufficient options

Recharge Projects

1. Multi-benefit stream channel improvements

Project Description:

Over the past half a century, the Salinas River has been impacted by the construction of the San Antonio and Nacimiento Dams and flood control levees intended to move water away from

agricultural fields. These have changed natural river geomorphology, resulting in sediment build up and vegetation encroachment on the historically dynamic channels of the River. This alteration of natural floodplains and geomorphology has increased flood risk, decreased direct groundwater recharge, and contributed to increased evapotranspiration through vegetation build-up. Targeted, geomorphically-informed stream maintenance and floodplain enhancement can improve stream function both morphologically and biologically.

This program takes a three-pronged approach to stream channel improvements. First, it addresses vegetation growth and geomorphic conditions in the river channel by removing perennial native and non-native vegetation in designated maintenance channels. Second, the program reduces the height of sediment bars that have been identified to meet criteria for impeding flow. Third, it enhances floodplains to increase groundwater recharge.

This three-pronged approach increase flows by removing dense native and non-native vegetation, provide vegetation free channel bottom areas for infiltration, stabilize stream banks and earthen levees by reducing downstream velocities, and reduces flood risk. This program's activities also benefit native species throughout the river ecosystem. By improving geomorphological function through vegetation and sediment removal activities, the coordinated efforts allow native species to reestablish in areas where invasive species have become dominant. River maintenance activities enhance groundwater recharge efforts through the streambed by providing additional open channel bed for infiltration, and floodplain enhancement can further recharge potential of high flows. Infiltration through the streambed accounts for a significant portion of the groundwater budget, and invasive species such as *Arundo donax*, which can take up to four times as much water as native riparian species thereby negatively impacting both river flows as well as infiltration in to the subsurface through the streambed (Cal-IPC, 2020).

Surface water flows, and notably flood flows, can be impacted by the density of vegetation and whether the vegetation is comprised of native or non-native species. Native riparian species allow for dynamic action that scours the riverbed and resorts sediment in a manner that encourages natural infiltration and conveyance of flood waters in the broader active flood terraces in the river. This wider use of the floodplain by flood waters slows velocities and distributes flood waters over a broader spatial area of the riverbed.

Stream channel vegetation removes water from the river through evapotranspiration (ET). Water loss through ET from invasive species such as Arundo can take up to 20 to 24 AF/yr. per acre, whereas ET from native vegetation can take up to 4 AF/yr. per acre. This illustrates the difference in water consumption between vegetation types and how these water consumptions can have major impacts on water in the river (Cal-IPC, 2011). The Salinas River is characterized by a braided channel in some areas of the floodplain and a confined channel in other areas. Plants can take root in channel locations that adversely impact the flow of water, resulting in either a channelized river or in creating directional velocities that can cause localized damages including

levee failure. Poorly functioning sedimentation can also negatively impact water flow in drought and flood conditions, as well as impeded proper infiltration to the subsurface. Geomorphological processes are important to managing a natural riverbed and floodplain to enhance recharge, groundwater levels, and groundwater storage.

This program is not meant to restore the Salinas River to historical conditions, but rather to enhance geomorphological function through targeted maintenance sites for flood risk reduction and floodplain enhancement for increased recharge. MCWRA has developed a science-based approach to river management that recognizes the value of critical habitat, environmental resources, cost to landowners, and coordination among stakeholders (MCWRA, 2016). A key feature of this modified management approach is providing protection for critical habitats and water quality (MCWRA, 2016). One of the important functions of a river is to provide habitat for native species. In a poorly functioning river, invasive species have more opportunities to crowd out native species and in turn, further degrade the river conditions. Therefore, this program will result in flood risk reduction, increased recharge, and a multitude of benefits that address critical functions of the Salinas River.

This program includes four main types of tasks: vegetation maintenance, non-native vegetation removal, sediment management, and floodplain enhancement and recharge.

- **Vegetation Maintenance** – Vegetation, both native and non-native, will be removed within designated maintenance areas using a scraper, mower, bulldozer, excavator, truck or similar equipment to remove the vegetation above the ground and finishing by ripping roots to further mobilize the channel bottom. Vegetation maintenance includes pruning up to 25 percent of canopy cover and removing dead mass. Maintenance activities will not include disturbance of emergent vegetation that provides suitable habitat for threatened California red-legged frogs or for the endangered tidewater gobies. In instances where native vegetation needs to be removed for site-specific conditions or tie-ins, these impacts can be compensated with replanting and revegetation in other areas as a form of mitigation offset for stream channel maintenance. Native trees will be planted during the rainy season to enhance their rate of success.

- **Non-Native Vegetation Removal –** Non-native vegetation removal primarily focuses on the Arundo present in the region, but may include tamarisk trees as well. Arundo is a grass that was introduced to the Americas in the 1800s for construction material and for erosion control purposes (Giessow et al, 2011). The Salinas River watershed has the second-largest infestation of non-native *Arundo donax* in California: approximately 1,500 to 1,800 acres. While Arundo thrives near water, such as wetlands and rivers, it grows in many habitats and soil types. It requires a substantial amount of water, upwards of 40 AF/yr. per acre, 19.4 AF/yr. per acre in the Central Valley, making it one of the thirstier plants in a given region and outpacing the water demands of native vegetation (TNC,

2019). To manage this invasive species, it is treated with herbicide application followed by mechanical removal. Permits typically allow Arundo removal in both designated secondary or high flow channels as well as on the floodplain.

- **Sediment Management** – Sediment management includes channel bed grading and sediment removal. Sediment grading and removal may occur exclusively, or after vegetation maintenance activities described above. Sediment removal and grading activities help reestablish proper gradients to allow for improved drainage downstream, encourage preferential flow into and through secondary channels, and minimize resistance to flow (until dunes form) (MCWRA, 2016). Sediment removal will follow best practices to protect native species while producing maximum benefit for flood reduction and groundwater recharge.

- **Floodplain Enhancement and Recharge** – Floodplain enhancement restores areas along creeks and floodplains to slow and sink high flows and encourage groundwater recharge. Restored floodplain and riparian habitat along creeks can slow down the velocity of creeks and encourage greater infiltration. Due to agricultural and urban encroachment, streams have become more highly channelized and flow has increased in velocity, particularly during storm events. This flow has resulted in greater erosion and loss of functional floodplains. Floodplain restoration efforts could be focused on lands directly adjacent to creeks, so as to not interfere with active farming. In addition, efforts to restore creeks and floodplains could be extended to the foothills to slow water closer to its source.

Program Components

This multi-benefit stream channel improvements program is implemented through various program components. These build off existing programs and permits to undertake the four main types of tasks. During GSP implementation, these components may be modified as needed to most efficiently accomplish the program goals.

Component 1: Stream Maintenance Program

The first component continues the Salinas River Stream Maintenance Project (SMP), which maintains the river corridor to reduce flood risk and minimize bank and levee erosion, while maintaining and improving ecological conditions for fish and wildlife consistent with other priorities for the Salinas River (MCWRA, 2016). It is a coordinated Stream Maintenance Program that includes MCWRA, the Resource Conservation District of Monterey County (RCDMC), and the Salinas River Management Unit Association representing approximately 50 landowner members along the river corridor. Project benefits include increased water availability, flood risk reduction, reduced velocities during high flows to lessen bank and levee

erosion, and enhanced infiltration by managing vegetation and sediment throughout the river and its tributaries.

The Salinas River Stream Maintenance Program occurs along the area of the Salinas in Monterey County. The 92-miles of the river in Monterey County is broken into seven River Management Units from San Ardo in the north to Highway 1in the south. The management activities are focused on the secondary channels of the Salinas River located outside of the primary low-flow channel, and are preferentially aligned with low-lying undeveloped areas that are active during times of higher flow (MCWRA, 2016).The SMP includes three main activities as part of stream maintenance: vegetation maintenance, non-native vegetation removal, and sediment management.

Component 2: Invasive Species Eradication

The second Component supports and/or undertakes removal of Arundo and tamarisk done by the Resource Conservation District of Monterey County (RCDMC). RCDMC is the lead agency on an estimated 15 to 20-year effort to fully eradicate Arundo from the Salinas River Watershed, working in a complementary manner with the SMP. This project focuses on removal of invasive species such as Arundo (and others) along the Salinas River, as well as retreatments needed to keep it from coming back. It includes three distinct phases: initial treatment, re-treatment, and on-going monitoring and maintenance treatments. The initial treatment phase includes mechanical and/or chemical treatment of the remaining 1,000 to 1,300 acres of invasive species removal in all areas of the river that have yet to be treated. The re-treatment phase includes re-treatment of the approximately 500 acres that have already had an initial treatment and re-treatment of all 1,500 to 1,800 acres over a 3-year period. The final phase is the on-going monitoring and maintenance treatment phase. This phase requires annual monitoring for re-growth or new invasive species and chemical treatment every three to five years.

Component 3: Floodplain Enhancement and Recharge

The third component complements the first two by restoring floodplains to enable high flows to be slowed and directed toward areas where it can infiltrate into the ground. For this component, SVBGSA could partner with the Integrated Regional Water Management (IRWM) Group, Central Coast Wetlands Group, and other organizations that are already undertaking creek and floodplain restoration efforts and encourage inclusion of features that would enhance recharge.

Restored floodplain and riparian habitat along creeks can slow down the velocity of creeks and encourage greater infiltration. Due to agricultural and urban encroachment, streams have become more highly channelized and flow has increased in velocity, particularly during storm events. This flow has resulted in greater erosion and loss of functional floodplains. Floodplain restoration efforts could be focused on lands directly adjacent to creeks, so as to not interfere with active farming. In addition, efforts to restore creeks and floodplains could be extended to the foothills to slow water closer to its source.

Project Benefits:

The groundwater-related expected benefits are increased groundwater elevations in the vicinity of the river channel due to increased infiltration and percolation to the principal aquifers, increased groundwater in storage, better water quality, decreased depletion of interconnected surface water, and protection against land subsidence due to unsustainable groundwater extractions. In addition, the project provides habitat restoration, increased connectivity for wildlife, and flood risk reduction.

Increased storage of flood waters can increase groundwater elevations in the vicinity of the Salinas River. This typically will be seen as groundwater mounding subparallel to the river corridor. However, as more water infiltrates into the subsurface, more water will flow laterally, thereby expanding the zone of influence from the river outward and raise groundwater elevations laterally. Additionally, water stored underground is not subject to evapotranspiration in the same way water stored above ground is. With annual removal of Arundo, evapotranspiration will decrease over time, allowing for more water to remain in the system. Arundo removal is coupled with identified native species removal where native species have encroached in the stream channel where they may not typically grow; however, there is significant uncertainty in the recharge benefits, as Arundo and many native species draw both surface and groundwater.

Removal of vegetation along the Salinas River will decrease evapotranspiration and leave more water in the River to get down to the Castroville Seawater Intrusion Project, where surface water is used in lieu of groundwater to help address seawater intrusion and declining groundwater elevations. With this reduction of non-productive water consumption, less water can be released from the reservoirs to get the same amount of water downstream, which increases the Valley's sustainable yield and drought resilience. It also results in indirect recharge as removal reduces groundwater use by the plants.

This program will also enhance stream flow by returning patterns of flow to a more natural state. Arundo infestation decreases the natural channel migration and complexity of sandy-bottomed streams by confining the channel to an armored, single stem with faster flowing water, which then becomes susceptible to erosion and incision. A narrowing channel with reduced capacity also heightens flood risk. Removing Arundo will allow greater normalization of natural geomorphic processes and sediment transport by de-armoring low-flow channel banks and adjacent floodplain areas to enable channel migration and braiding.

Stream channel improvements will provide many additional ecosystem benefits, including:

- Habitat restoration
- Increased connectivity for wildlife
- Flood risk reduction
- Enhanced Conveyance and Infrastructure Protection

Estimated Cost:

The annual administrative cost of this program is approximately $150,000. This cost does not include maintenance activities, required biological monitoring, and reporting. These costs vary from year to year based on number of participants and work site conditions but again are paid by participants.

Program permits have been completed and are operational through 2026. Renewal of the 401 Certification with the Central Coast Regional Water Control Board will include a cost of $95,000 in the timeframe of 2024 to 2026.

For Component 2, the capital cost is estimated at $35,230,000. Annual O&M costs are anticipated to be approximately $325,000. The indirect projected yield for the invasive species eradication project is estimated at 20,000 AF per year. The amortized cost of water for this project is estimated at $160/AF/yr.

2. Managed Aquifer Recharge of Overland Flow

Description:

This program incentivizes development of groundwater recharge basins that recharge overland flow and stormwater runoff from the mountains before it reaches streams and the Salinas River. This program is structured similar to the program instituted in Pajaro Valley, whereby growers dedicate a portion of their land to recharge ponds and direct overland flood flows into the ponds in exchange for extraction credits. Recharge basins would be situated to collect runoff before it enters a local stream and allowed to infiltrate. It could also be combined with Project #2 and include multi-benefit projects along the floodway to increase floodplain capacity, since floodplains have high recharge capacity. This program could be modeled after Pajaro Valley's program whereby individual growers build recharge ponds, direct flood flows into the ponds, and receive credit for the amount of water that infiltrates.

This program will require additional analysis on actual available runoff from each of the watersheds. It assumes that the stormwater is not being diverted upstream; however, many of the mountain ranges have diversion operations already occurring upstream in the watershed. Rain gauges and studies will be required to determine the true estimate of water available from each subwatershed.

Aquifer recharge potential is highest where there are areas of highly permeable soils, good connection to underlying aquifers, and topography that directs surface runoff toward retention/catchment areas. The SVBGSA could investigate where recharge ponds would yield the greatest amount of groundwater recharge. It could combine data on soil permeability, stratigraphy, and land use to map areas of high potential recharge. Additionally, the SVBGSA

could partner with interested landowners and undertake potential site analyses with pilot boreholes to reduce initial planning costs. Any recharge project would include monitoring to ensure it does not result in negative impacts to water quality.

The program would reach out to landowners to increase awareness of the benefits of recharge basins and work with local stakeholders to identify lands with high recharge capacity. It could also work with interested landowners to identify sites and design recharge basins and potentially include development of a permit coordination program for recharge projects. The program could also work with various organizations and government agencies to connect existing incentivization programs and funding to landowners interested in collaborative recharge projects that require land and access.

Benefits:

The primary benefits expected for this project is to enhance sustainable yield and groundwater elevations. Further analysis is needed for quantification of projected project benefits.

Cost: The cost has not been estimated at this time.

Projects that Result in Reservoir Reoperation

Multiple projects under consideration would alter reservoir releases for groundwater benefits and other purposes. Three projects are considered here: winter releases with aquifer storage and recovery, the inter-lake tunnel and spillway modification, and drought reoperation. All three of these projects rely on infrastructure owned by MCWRA, and implementing any one of these is a cooperative effort between the two agencies. These projects will affect the entire Salinas Valley, and the analyses of these projects must consider the impact on all subbasins. This GSP is primarily concerned with project benefits that achieve groundwater sustainability. However, ancillary benefits and relative costs must also be addressed and carefully evaluated.

This GSP prioritizes the three reservoir reoperation projects based on our current assessment of each project's ability to achieve Valley-wide groundwater sustainability. However, each project should be retained and further evaluated during GSP implementation.

3. Winter Releases with Aquifer Storage and Recovery in the 180/400-Foot Aquifer Subbasin

Project Description:

This project entails shifting reservoir releases for the MCWRA's Conservation Program and SRDF diversions to the winter and storing winter releases in the 180-Foot and 400-Foot Aquifers in lieu of summer releases. This water would be diverted to recharge ASR wells in the winter and later extracted during peak irrigation season demands for use through the CSIP system.

Some potential constraints on this project are clarifying water rights, establishing compliant reservoir operation rules, and possibly needing to alter the permit from the Division of Safety of Dams to allow the SRDF diversion structure to operate outside its current window of April-October.

Under this project, water released from Nacimiento and San Antonio Reservoirs would be diverted from the Salinas River using the existing SRDF at a maximum flow rate of 36 cfs. Water would then be pumped to an expanded surface water treatment plant where it would be treated to the standard necessary for groundwater injection, and conveyed to new injection wells in the 180/400-Foot Aquifer Subbasin.

The existing facilities have a maximum diversion flow of 36 cfs, or 16,000 gpm. Based on an injection rate of 1,000 gpm per injection well, 16 new injection wells would be installed. New injection well facilities will include wells completed in both the 180- and 400-Foot Aquifers, back-flush facilities including back wash pumps and percolation basin for water disposal into the vadose zone, electrical and power distribution and motor control facilities.

Project Benefits:

The benefits are currently being quantified using the Salinas Valley Operational Model (SVOM). The main groundwater-related expected benefits include:

- By allowing more water to be released during the wintertime when there is less pumping and less evapotranspiration, there will be more water added to the principal aquifer. Recharge to the principal aquifer is highly dependent on surface flows in the river infiltrating into the subsurface through the streambed. Adding water into the principal aquifer will raise groundwater elevations over time.
- Improve the ability to maximize annual diversions at the SRDF. Diversions at the SRDF no longer rely on large summer reservoir releases, of which less than 10% get to the SRDF. Winter releases can be coordinated with environmental releases.
- More water available for CSIP or other beneficial users. The consistent diversions provide a more reliable supply to CSIP. Additionally, any water not used by CSIP can be extracted for beneficial use by other groundwater pumpers, such as municipalities.

- A reduction in, or reversal of, seawater intrusion. Providing more water for extractors reduces seawater intrusion. The groundwater from natural recharge that occurs in addition to the injection may be able to mitigate seawater intrusion by minimizing native groundwater extraction and altering the hydraulic gradients to reverse inland flow of saline waters.
- Increased annual carryover in the reservoirs, allowing for more consistent winter releases. Eliminating summer reservoir releases would allow more water to be retained in Nacimiento and San Antonio reservoirs. This increased amount of water in the reservoirs can be used to ensure more consistent annual winter releases during droughts.
- Reduced summer water supporting invasive species in riparian zones. Eliminating summer reservoir releases will result in less shallow water supporting invasive species such as Arundo or tamarisk.

Estimated Cost:

Costs for the injection of winter flows from the SRDF were estimated based upon the assumption that the diversion will take advantage of the existing SRDF facilities. The majority of the costs are for the construction of the injection wells. Capital costs are assumed to be $51,191,000 for construction of an injection well field consisting of 16 wells as well as construction of a 4-mile conveyance pipeline between the SRDF site and the injection well system. The cost of a surface water treatment system for the SRDF expansion is not included in this estimate, but is in the process of being included. These costs include engineering, overhead, and contingencies.

Annual O&M costs are estimated at $3,624,000 for the operation of the injection well field, including a 20% contingency. Total annualized cost is $7,629,000. This cost estimate is being updated to include needed filtration and chlorination.

4. Interlake Tunnel and Spillway Modification

Project Description:

The proposed Interlake Tunnel project consists of design, permitting, construction, and maintenance of a tunnel for diversion of water from the Nacimiento Reservoir to the San Antonio Reservoir. The San Antonio and Nacimiento Reservoirs have storage capacities of 335,000 and 377,900 AF, respectively; however, the Nacimiento River watershed produces nearly three times the average annual flow of the San Antonio River watershed. Consequently, more available storage capacity must be maintained in Nacimiento Reservoir to prevent downstream flooding during storm events than must be maintained in San Antonio Reservoir. The proposed Interlake Tunnel project would divert this flood control water from Nacimiento Reservoir to San Antonio Reservoir. This would increase the total volume of water in storage and could increase water available for conservation releases to the Salinas River between April and October. Any additional conservation releases would be diverted at the Salinas River

Diversion Facility (SRDF) for irrigation within the Castroville Seawater Intrusion Project (CSIP) area.

The proposed Interlake Tunnel concept was developed by MCWRA and is described in the July 6, 2018 Project Status Report (MCWRA, 2018). According to the Project Status Report, the proposed project consists of a 10,940-foot-long, 10-foot diameter concrete lined tunnel with an intake structure in Nacimiento Reservoir and an exit structure in San Antonio Reservoir. The intake at Nacimiento Reservoir would include a fish screen and water would flow by gravity due to the 55-foot planned elevation difference between the intake and outfall. The outfall at San Antonio Reservoir would include an energy dissipator to reduce velocity and prevent erosion.

MCWRA modeled the Interlake Tunnel project benefits using a draft version of the SVOM during the project planning stages prior to development of the GSP. Based on historical precipitation and storm events, the proposed tunnel would have been used approximately 68% of years in the historical record (MCWRA, 2021). On average, 49,400 AF/yr. would have been transferred through the tunnel from Nacimiento to San Antonio Reservoir (MCWRA, 2021). The modeled tunnel transfer would increase the average total water in storage in the reservoirs by 39,000 AF/yr. by increasing the average stage in San Antonio Reservoir by 30 ft and decreasing the average stage in Nacimiento Reservoir by 16 feet (MCWRA, 2018). The lower stage in Nacimiento Reservoir would reduce total flood control releases from the reservoirs by an average of 25,600 AF/yr. (MCWRA, 2021).

Greater reservoir storage capacity with the tunnel would allow for an increase in total reservoir releases from the dams, which would maintain more water in the Salinas River for a longer portion of the year. The modeled average annual conservation releases with implementation of the Tunnel Project would increase by 34,300 AF/yr. (MCWRA, 2021). The project is intended to primarily increase releases from the reservoirs between April and October. Releases in these warmer months are subject to evapotranspiration losses. The additional conservation releases would result in approximately 30,500 AF/yr. of additional groundwater recharge from the Salinas River in the basin (MCWRA, 2021). However, the additional storage capacity generated by the project would not guarantee that flood control releases would be available every winter.

The project benefits could be enhanced with additional modifications to raise the elevation of the San Antonio Dam Spillway and performance of other deferred maintenance on both reservoirs. However, the spillway modifications and deferred maintenance are being addressed by a Proposition 218 vote and are not considered in the project description for the GSP.

The Interlake tunnel project is currently at the 60%.design phase. One constraint on the project is that it requires a modification to the existing water rights for the Nacimiento reservoir.

Project Benefits:

The Interlake Tunnel project benefits were modeled and presented to the MCWRA Board of Directors. According to this model simulation, the project would increase groundwater recharge throughout the Salinas Valley due to greater volumes of water in the Salinas River. A portion of the total conservation flows and groundwater recharge would benefit the Upper Valley Subbasin. An initial estimate from MCWRA presented to their board of directors in February 2021 shows over 30,000 AFY increase in recharge for two variations on the project (Table 1). The specific impact on groundwater recharge in the Upper Valley Subbasin will be evaluated with the SVOM during the GSP implementation period.

Table 1. Initial estimated water savings (MCWRA, 2021)

Interlake Tunnel Modeling Results		
	Tunnel Only	Tunnel + 7-foot spillway modification
Increase in average water storage	39,002 AF	54,265 AF
Increase in conservation release	34,256 AFY	35,945 AFY
Reduction in flood release	-25,628 AFY	-28,138 AFY
Reduction in flood release	-32%	-35%
Additional SRDF days	32 days	34 days
Increase in recharge	30,536 AFY	32,073 AFY

Estimated Cost:

The total estimated cost of the project is $173,319,000. A DWR grant of $10,000,000 was awarded to fund project development. The total annualized cost for 30 years is estimates at $12 million per year. Based on a project yield of 30,500 AF/yr. for groundwater recharge benefits, the unit cost of water is $393/AF/yr.

5. Drought Reoperation

Project Description:

MCWRA formed a Drought Operations Technical Advisory Committee (D-TAC) to provide, when drought triggers occur, technical input and advice regarding the operations of Nacimiento and San Antonio Reservoirs. The D-TAC developed Standards and Guiding Principles to be used in the development of a proposed reservoir release schedule triggered under specific, seasonally

defined conditions. This management action would result in decisions on reservoir operation and flow releases during a drought.

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.

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. 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.

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.

Expected Benefits:

The D-TAC will help manage the reservoirs so as to mitigate negative effects from droughts, including from surface water flows, groundwater recharge, and flood control. The proposed reservoir release schedule will acknowledge, address, and balance the water needs of various stakeholders for limited resources during a drought. The proposed reservoir release schedule will avoid, to the extent possible, consecutive years where only minimum releases are made from the reservoirs. Annual reservoir releases will help recharge the aquifer in the Upper Valley, which will help prevent declines in groundwater elevations and storage during drought periods. Subsequently, this will help reduce the risk of subsidence and prevent water quality degradation.

Cost:

This management action is already underway. MCWRA is already funding costs associated with facilitation of the D-TAC. SVBGSA costs include staff participation in the Drought TAC.

Management Actions

6. Conservation and Agricultural BMPs

Description:

This would be a program to incentivize and/or assist with conservation and agricultural BMPs to reduce groundwater pumping. SVBGSA acknowledges that BMPs are being developed as part of Ag Order 4.0 and will work to complement and not replicate those efforts. Potential practices that could be part of a program include:

- EVAPOTRANSPIRATION (ET) DATA
  ET data indicate crops' theoretical water needs as determined by crop type and weather conditions. Some ET data sets are 100% automated, relying on satellite imagery and weather stations to provide affordable data for large areas of land. Other ET data sets are generated automatically, but then subjected to expert verification, resulting in higher quality data at higher cost. The incorporation of ET data with soil moisture sensors, soil nutrient data and flow meter data can help inform more efficient irrigation practices. The GSA could support the development and utilization of these tools through securing funding or coordinating with existing local agricultural extension specialists who conduct research and provide technical assistance to growers.
- EDUCATION AND OUTREACH
  SVBGSA could support existing local agricultural extension specialists with their education and outreach on Best Management Practices (BMPs) that would increase water conservation and decrease pumping. Effective implementation of BMPs would require

buy-in from growers. SVBGSA will work with local agricultural extension specialists and growers to understand preferred BMPs and those that could yield the greatest water savings. SVBGSA can partner with existing organizations or technical assistance providers to help growers identify which BMPs they could pursue and analyze the potential savings from their implementation. Technical workshops and professional referrals can be utilized with partners to accomplish outreach effectively and efficiently with growers.

Benefits:

Improving ET data allows for improved modeling and sets more accurate expectations for climate change impacts on crops. This in turn is translated into expected water demand for the crops. With more accurate data and information, pumpers can work with the SVBGSA to improve water extractions and potentially keep more water in the ground. This would result in protected groundwater elevations and storage. Furthermore, education and outreach activities can help inform farmers about cutting-edge technology that would help maximize irrigation efficiency. This would also improve groundwater elevations and storage. No quantification of benefits has been determined at this time.

Cost:

The cost of this program has not been estimated at this time.

7. Fallowing, Fallow Bank, and Agricultural Land Retirement

Description:

To reduce groundwater extraction temporarily or permanently, this management action includes three actions to reduce irrigated land. The following could be included under the same overarching program:

- **Rotational fallowing**: Participating growers fallow some percentage of land or fallow on a rotating basis. This could be modified to require partial fallowing, such as growing fewer crops per year instead of completely fallowing land.

- **Fallow bank**: Growers could contribute to a fallow bank whereby anybody fallowing land could draw against the bank to offset the lost income from fallowing. This could be combined with other fallowing plans. The specific design of a fallow bank will be developed during GSP implementation, including options such as exempting growers from rotational fallowing if they contribute a certain amount of money to the fallow bank.

- **Agricultural land retirement**: SVBGSA could develop a system for voluntary agricultural land retirement or pay to retire agricultural land, effectively reducing the

amount of groundwater used in the Subbasin. Payment would likely be limited since there are no pumping allocations and most of the Subbasin is not currently irrigated. The benefit from this program depends on identifying willing participants.

Benefits:

The primary benefit from these series of management actions are reduced overall pumping. The less water that is extracted from the principal aquifer, the more water is in storage and contributing to increased groundwater elevations. These management actions reduce the demand that has driven unsustainable extraction putting the Subbasin at risk during droughts.

Cost:

The cost for voluntary fallowing and land retirement would be relatively low cost in comparison to other projects; however, a more detailed analysis is needed. This does not include costs to incentivize these actions.

Implementation Actions

This section includes actions that contribute to groundwater management and GSP implementation but do not directly help the Subbasin reach or maintain sustainability. Three included here for the Upper Valley are GEMS expansion, domestic water partnership, and local groundwater elevation trigger.

8. GEMS Expansion

SGMA requires Groundwater Sustainability Agencies to manage groundwater extractions within a basin's sustainable yield. Accurate extraction data is fundamental to this management. The Monterey County Water Resources Agency's (MCWRA) Groundwater Extraction Monitoring System (GEMS) collects groundwater extraction data from certain areas in the Salinas Valley. The system was enacted in 1993 under Ordinance 3663, and was later modified by Ordinances 3717 and 3718. The MCWRA provides the Salinas Valley Basin GSA (SVBGSA) annual GEMS data that can be used for groundwater management.

Most of the Upper Valley Subbasin's estimated groundwater extraction data is derived from MCWRA's GEMS Program, which is only implemented in Zones 2, 2A, and 2B. There are limited data on groundwater extraction within the Upper Valley Subbasin outside of MCWRA Zones 2, 2A and 2B.

SVBGSA will work with MCWRA to expand the existing GEMS Program to cover the entire Upper Valley Subbasin, which would capture all wells that have at least a 3-inch internal diameter discharge pipe. Alternatively, SVBGSA could implement a new groundwater extraction reporting program that collects data outside of MCWRA Zones 2, 2A, and 2B. The groundwater

extraction information will be used to report total annual extractions in the Subbasin, and assess progress on the groundwater storage SMC as described in Chapter 8. Additional improvements to the existing MCWRA groundwater extraction reporting system may include some subset of the following:

- Develop a comprehensive database of extraction wells
- Expanding reporting requirements to all areas of the Salinas Valley Groundwater Basin
- Including all wells with a 2-inch discharge or greater
- Requiring automatically reporting flow meters
- Comparing flow meter data to remote sensing data to identify potential errors and irrigation inefficiencies.

9. Well Registration

All groundwater production wells, including wells used by *de-minimis* pumpers, will be required to be registered with the SVBGSA. If the well has a meter, the meter must be calibrated on a regular schedule in accordance with manufacturer standards and any programs developed by the SVBGSA or MCWRA. Well registration is intended to establish a relatively accurate count of all the active wells in the Subbasin. Well metering is intended to improve estimates of the amount of groundwater extracted from the Subbasin. SGMA does not allow metering of *de-minimis* well users, and therefore well metering is limited to non-*de minimis* wells. The details of the well registration program, and how it integrates with existing ordinances and requirements, will be developed during the first two years of GSP implementation.

10. Domestic Water Partnership

Drinking water access and quality is a critical issue throughout the Upper Valley Subbasin. Numerous agencies at the local and State levels are involved in various aspects of domestic water provision. For example, at the State level, the Division of Drinking Water's Safe and Affordable Funding for Equity and Resilience (SAFER) program is designed to meet the goal of safe drinking water for all Californians. At the local level, the County of Monterey Health Department Drinking Water Protection Service is designed to regulate and monitor water systems and tests water quality for new building permits for private wells. Both the State and the County have committed to a Human Right to Safe Drinking Water. SGMA outlines a specific role for GSAs related to beneficial users, including drinking water. This implementation action reflects a unique role for the SVBGSA, not related to specific sustainability metrics.

Under this implementation action, SVBGSA will play a convening role by developing and coordinating a domestic water partnership (Partnership). The Partnership will review data regarding domestic water supplies, identify data gaps, and coordinate agency communication. The Partnership will include local agencies and organizations, water providers, domestic well

owners, technical experts, and other stakeholders. The goal of the Partnership will include documenting agency actions to address domestic water concerns.

This Partnership could also work together with the local groundwater elevation trigger implementation action through which SVBGSA will assist well owners whose wells go dry.

Local groundwater elevation trigger

The GSA could develop or support the development of a program to assist well owners (domestic or small water systems) whose wells go dry due to declining groundwater elevations. A mitigation program could include a notification system whereby well owners can notify the GSA or relevant partner agency if their well goes dry, such as the Household Water Supply Shortage System (https://mydrywatersupply.water.ca.gov/report/). The information collected through this portal is intended to inform state and local agencies on drought impacts on household water supplies. It could also include referral to assistance with short-term supply solutions, technical assistance to assess why it went dry, and/or long-term supply solutions. For example, the GSA could set up a trigger system whereby it would convene a working group to assess the groundwater situation if the number of wells that go dry in a specific area cross a specified threshold. A smaller area trigger system would initiate action independent of monitoring related to the groundwater level SMC. The GSA could also support public outreach and education.

REFERENCES

Cal-IPC (California Invasive Plant Council). 2020. *Central Valley Arundo: Distribution, Impacts, and Management*. Final Report to the State of California Wildlife Conservation Board, Agreement No. WC-1561MM. March 2020. www.cal-ipc.org.

Giessow, Jason, J. Casanova, R. Leclerc, and G. Fleming. 2011. *Arundo donax: Distribution and Impacts.* California Invasive Plant Council.

MCWRA et al (Monterey County Water Resources Agency), Resource Conservation District of Monterey County, and Lux Environmental Consulting. 2016. *Salinas River Stream Maintenance Program, Permit Application Supplemental Attachment*. January 2016.

MCWRA (Monterey County Water Resources Agency). 2018. Interlake Tunnel and Spillway Modification. Project Status Report

MCWRA (Monterey County Water Resources Agency). 2021. *Interlake Tunnel and Spillway Modification Overview*. Board of Directors Meeting. February, 2021.

TNC (The Nature Conservancy). 2018. *Enhancing Water Supply through Invasive Plant Removal: A Literature Review of Evapotranspiration Studies on Arundo Donax*. February 11, 2018.