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CHAPTER 4: PROJECTS AND MANAGEMENT ACTIONS

SISKIYOU COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

Scott Valley Groundwater Sustainability Plan

PUBLIC DRAFT REPORT

SISKIYOU COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT GROUNDWATER SUSTAINABILITY AGENCY SCOTT RIVER VALLEY GROUNDWATER SUSTAINABILITY PLAN

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Chapter 4. Projects and Management Actions

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4.1 Introduction and Overview

To achieve this Plan's sustainability goal by 2042 and avoid undesirable results as required by SGMA regulations, multiple projects and management actions (PMAs) have been designed for implementation by the GSA. This section provides a description of PMAs necessary to achieve and maintain the Basin sustainability goal and to respond to changing conditions in the Basin. PMAs are described in accordance with §354.42 and §354.44 of the SGMA regulations. Projects generally refer to infrastructure features and other capital investments, their planning, and their implementation, whereas management actions are typically programs or policies that do not require capital investments, but are geared toward engagement, education, outreach, changing groundwater use behavior, adoption of land use practices, etc. PMAs discussed in this section will help achieve and maintain the sustainability goals and measurable objectives, and avoid the undesirable results identified for the Basin in Chapter 3. These efforts will be periodically assessed during the implementation period, at minimum every five years.

In developing PMAs, priorities for consideration include effectiveness toward maintaining the sustainability of the Basin, minimizing impacts to the Basin's economy, seeking cost-effective solutions for external funding and prioritizing voluntary and incentive-based programs over mandatory programs. As the planned or proposed PMAs are at varying stages of development, complete information on construction requirements, operations, permitting requirements, overall costs, and other details are not uniformly available. A description of the operation of PMAs as part of the overall GSP implementation is provided in Chapter 5.

In Scott Valley, the PMAs are designed to achieve two major objectives related to the SMC:

- to achieve the thresholds and objectives for the interconnected surface water sustainability indicator (Section 3.4.5);
- to prevent the lowering of groundwater levels to protect wells from outages;
- to preserve ground-water dependent ecosystems; and
- to avoid additional stresses on interconnected surface water and their habitat.

The identified PMAs reflect a range of options to achieve the goals of the GSP and will be completed through an integrative and collaborative approach with other agencies, organizations, landowners, and beneficial users. Few PMAs will be implemented by the GSA alone. The GSA considers itself to be one of multiple parties collaborating to achieve overlapping, complementary, and multi-benefit goals across the integrated water and land use management nexus in the Basin. Furthermore, PMAs related to water quality, interconnected surface waters, and groundwater-dependent ecosystems will be most successful if implemented to meet the multiple objectives of collaborating partners. For many of the PMAs, the GSA will enter into informal or formal partnerships with other agencies, NGOs, or individuals. These partnerships may take various forms, from GSA participation in informal technical or information exchange meetings, to collaborating on third-party proposals, projects, and management actions, to leading proposals and subsequently implementing PMAs.

The GSA and individual GSA partners will have varying but clearly identified responsibilities with respect to permitting and other specific implementation oversight. These responsibilities may vary from PMA to PMA or even within individual phases of a PMA. Inclusion in this GSP does not forego any obligations under local, state, or federal regulatory programs. Inclusion in this GSP also does not assume any specific project governance or role for the GSA. While the GSA does have an obligation to oversee progress towards groundwater sustainability, it is not the primary regulator of land use, water quality, or environmental project compliance. It is the responsibility of the respective implementing, lead agency to collaborate with appropriate regulatory agencies to ensure that the PMAs for which the lead agency is responsible are in compliance with all applicable laws. The GSA may choose to collaborate with regulatory agencies on specific overlapping interests such as water quality monitoring and oversight of projects developed within the Basin.

PMAs are classified under four categories: groundwater demand management, surface water supply augmentation, stream habitat improvement, and groundwater recharge. Examples of project types within these four categories are shown in Table 1. Further, PMAs are organized into three tiers reflective of their timeline for implementation:

1. **TIER I:** Existing PMAs that are currently being implemented and are anticipated to continue to be implemented.
2. **TIER II**: PMAs planned for near-term initiation and implementation (2022–2027) by individual collaborating/partner agencies.
3. **TIER III**: Additional PMAs that may be implemented in the future, as necessary (initiation and/or implementation 2027–2042).

PMAs recently completed in the Basin are discussed in Chapter 2. A general description of existing and ongoing (Tier I) PMAs is provided in Table 1; descriptions of Tier II and Tier III PMAs are provided in Section 4.1 and Section 4.2, respectively. The process of identifying, screening, and finalizing PMAs is illustrated in Figure 1. Existing and planned projects were first identified through review of different reports, documents, and websites. Planned and new projects also received stakeholder input in their identification. These projects were then categorized into four categories: supply augmentation, demand management, stream habitat improvement, and groundwater recharge. In the next step, all projects were evaluated to identify those with the highest potential to be included in the GSP. Using the Scott Valley Integrated Hydrogeological Model (SVIHM), the effectiveness of some projects, or a combination of projects, was assessed to identify those projects that, if implemented, will most likely bring the Basin into sustainability. Monitoring will be a critical component in evaluating PMA benefits and measuring potential impacts from PMAs.

Funding is an important part of successfully implementing a PMA. The ability to secure funding is an important component in the viability of implementing a particular PMA. Funding sources may include grants or other fee structures (Section 5). Under the

Sustainable Groundwater Management Implementation Grant Program Proposition 68, grants can be awarded for planning activities and for projects with a capital improvement component. As such, state funds for reimbursing landowners for implementation of PMAs, including land fallowing and well-shut offs, currently cannot be obtained under this program. Funding will also be sought from other local, state, federal, and private (NGO) sources.

The existing PMAs have been extracted from the following documents:

- Supply Enhancement (in Streams)
    - Siskiyou Land Trust (website)
    - Scott River Water Trust (website)
- Demand Management (of Groundwater)
    - Permit required for groundwater extraction for use outside the basin from which it was extracted (Title 3, Chapter 13- Groundwater Management, Siskiyou County Code of Ordinances)
    - Siskiyou County Groundwater Use Ordinance (Title 3, Chapter 13, Article 7- Waste and Unreasonable Use, Siskiyou County Code of Ordinances)
    - Well Drilling Permits
        - Siskiyou County Well Drilling Permits (Standards for Wells, Title 5, Chapter 8 of Siskiyou County Code of Ordinances)
        - Well location restrictions (Scott River Adjudication Decree No. 30662, 1980)
    - Scott Valley and Shasta Valley Watermaster District (website)
- Recharge
    - Existing reports, proposals
- Habitat Improvement
    - National Fish and Wildlife Foundation Grant Slates (website)
    - Siskiyou RCD (website)
    - Klamath National Forest (website)

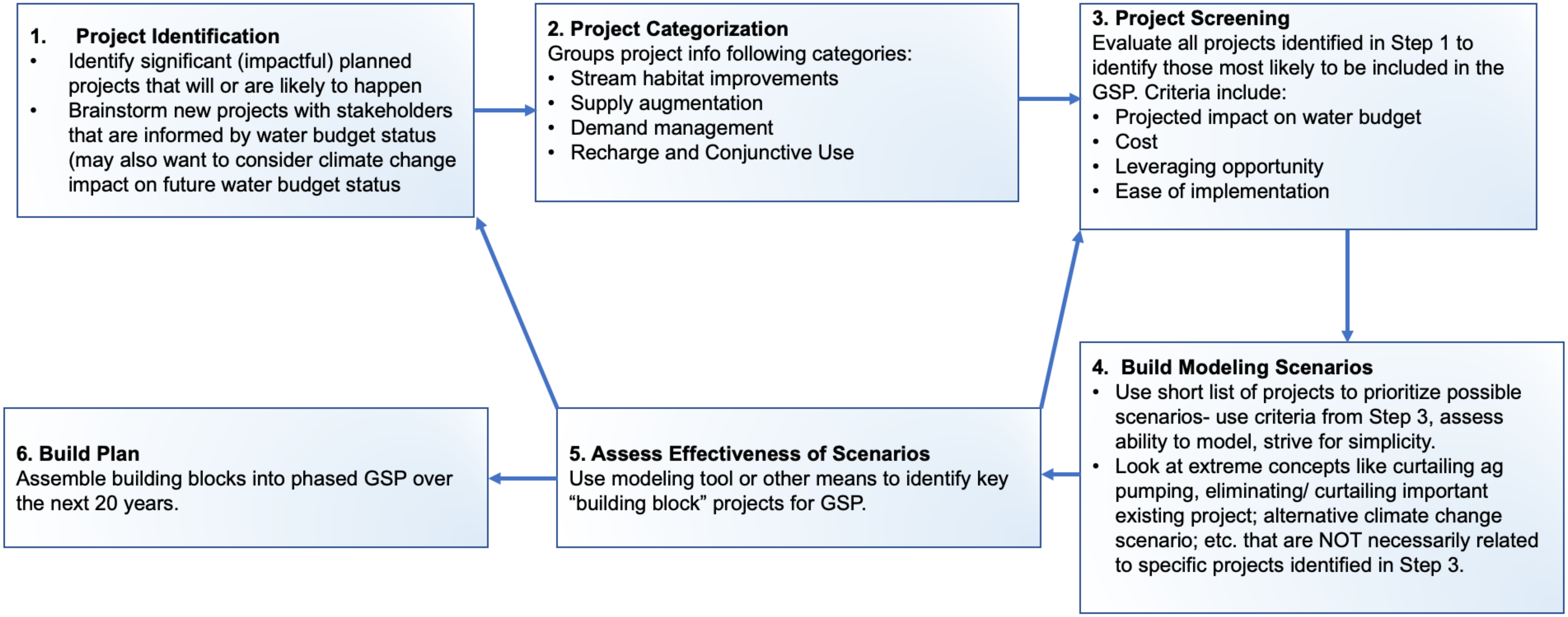

Figure 1: Process for identification and prioritization of PMAs.

Table 1 PMA Summary Table

Tier	Title	Description	Lead Agency	Category	Status	Anticipated Timeframe	Targeted Sustainability Indicator(s)/ beneficiaries
I	Well Drilling Permits	Siskiyou County Well Drilling Permits (Standards for Wells, Title 5, Chapter 8 of Siskiyou County Code of Ordinances). Location limitations for new wells with respect to the interconnected zone (per Scott River Adjudication Decree No. 30662).	County of Siskiyou	Demand Management	Existing/ Ongoing	Active	Groundwater levels, Interconnected surface water.
I	Groundwater Use Restrictions	Prohibition of the use of groundwater underlying Siskiyou County for cannabis cultivation (Article 7, Chapter 13, Title 3 of Siskiyou County Code of Ordinances).	County of Siskiyou	Demand Management	Existing/ Ongoing	N/A	Groundwater levels
I	Permit required for groundwater extraction for use outside the basin from which it was extracted (Siskiyou County Code of Ordinances)	Permit requirement for extraction of groundwater underlying the Basin for use outside the Basin.	County of Siskiyou	Demand Management	Existing/ Ongoing	Active	Groundwater levels
I	Watermaster Program	Watermaster services currently exist on Wildcat Creek and French Creek. Among other things, a watermaster provides enforcement of water leases under the authority of Scott River Water Trust and 1707 dedications and transfers.	Scott Valley and Shasta Valley Watermaster District	Demand Management	Existing/ Ongoing	N/A	Interconnected surface water
I	Scott River Water Trust Leasing Program	Voluntary program leases water from active water diverters on priority stream reaches in exchange for financial compensation. Diverters include but are not limited to SVID, Farmers Ditch, and locations on French Creek, Sugar Creek, and Shackleford Creek.	Scott River Water Trust	Supply Augmentation	Existing/ Ongoing	N/A	Interconnected surface water
I	Scott River Tailings Streamflow and Ecological Benefit	Improve instream connectivity in the tailings section of the Scott River, which connects the East Fork, South Fork, and Sugar Creek tributaries to the main stem Scott River.	Scott River Watershed Council	Supply Augmentation	Existing/ Ongoing	N/A	Interconnected surface water

	Planning Restoration Projects						
I	Patterson Creek Wood Loading	Uses streamside trees that are felled into the channel to create cover, scour pools, increase slow water habitat and improve floodplain connectivity.	Scott River Watershed Council	Habitat Improvement	Existing/ Ongoing	Phase I and Phase II were implemented in 2018 and 2019, respectively. Phase III is planned for summer 2021.	Improve habitat for GDEs
I	French Creek Wood & Gravel Enhancement	This project aims to improve coho salmon spawning and rearing conditions by adding large wood and spawning gravels.	Scott River Watershed Council	Habitat Improvement	Existing/ Ongoing	Phase I was implemented in 2018 and Phase II is planned to begin summer 2021.	Improve habitat for GDEs (coho salmon)
I	Irrigation Improvements	Improvements in irrigation efficiency in Scott River Valley (as detailed in Chapter 2.2.1.5).	N/A	Demand Management	Existing	N/A	Groundwater levels, interconnected surface water
II	Avoiding Significant Increase of Total Net Groundwater Use from the Basin	Avoid significant future increase of total net groundwater use within the Basin through planning and coordination with land use zoning and well permitting agencies	GSA, County of Siskiyou, City of Etna, City of Fort Jones	Demand Management	Conceptual Phase	Conceptual Phase	Groundwater levels, interconnected surface water
II	Beaver Dam Analogues	Beaver dam analogues (BDAs) are instream structures that mimic beaver dams. BDAs can be used to increase beaver abundance and promote watershed restoration.	Scott River Watershed Council	Habitat Improvements	Planning Phase	Planning Phase	Instream habitat improvement
II	Upslope Water Yield Projects	Building green infrastructure in the upper watershed, especially of the East Fork (e.g., former Hayden Ranch, now Beaver Valley Headwater Preserve) and French Creek to	Scott River Watershed Council	Supply Augmentation	Planning Phase	Planning Phase, East Fork Scott in	Interconnected surface water

		increase water yield. Green infrastructure includes fuel reduction, road improvements, canopy opening to manage snow shade and accumulation, and other large landscape projects that increase water storage within the upper watershed during wet periods and baseflow from the upper watershed during dry periods.				Implementation Phase	
II	East Fork Scott Project	To improve conditions within the E Fork Scott watershed. Potential activities include riparian areas, fuels reduction, mine reclamation, stand density reduction, and wildlife habitat improvements.	Salmon/ Scott River Ranger District, Klamath National Forest	Habitat Improvements	Implementation Phase	Active	Improve habitat for GDEs.
II	Irrigation Efficiency Improvements	Increase irrigation efficiency (and in some cases, yields) through infrastructure or equipment improvements. Consider funding incentives through the NRCS EQIP program.	GSA, UCCE	Demand Management	Planning Phase	Planning Phase	Groundwater levels, interconnected surface water
II	MAR & ILR - NFWF Scott Recharge Project	Evaluate use of groundwater recharge as to augment Scott River flows during critical periods (i.e., late summer and fall).	Scott Valley Irrigation District	Recharge	Active	Expected completion by February 2023.	Groundwater levels, interconnected surface water
II	MAR & ILR	Managed aquifer recharge and - during the irrigation season - in lieu recharge on irrigated agricultural land to increase baseflow during the critical summer and fall low flow period.	GSA	Recharge	Planning Phase	Planning Phase	Groundwater levels, interconnected surface water
II	Voluntary Managed Land Repurposing	Reduce water use through voluntary managed land repurposing activities including term contracts, crop rotation, irrigated margin reduction, conservation easements, and other uses	GSA, TBD	Demand Management	Conceptual Phase	Conceptual phase	Groundwater levels, interconnected surface water
III	Alternative, lower ET crops	Pilot programs on introducing alternative crops with lower ET but sufficient economic value. Incentivize and provide extension on long-term shift to lower ET crops.	GSA, UCCE, TBD	Demand Management	Conceptual Phase	Conceptual Phase	Groundwater levels, interconnected surface water

III	Floodplain Reconnection/ Expansion	Expand access of the Scott River to old or new floodplain features to promote groundwater recharge, create habitat, provide more functional ecosystem, while also recharging groundwater, possibly as part of conservation easements	TBD	Supply Augmentation, Habitat Improvements	Conceptual Phase	Conceptual Phase	Groundwater levels, interconnected surface water
III	High Mountain Lakes	Use of dams at the outlets of high-altitude lakes in Scott Valley to increase streamflow.	TBD	Supply Augmentation	Conceptual Phase	Conceptual Phase	Interconnected surface water
III	Reservoirs	Construct surface water reservoir (s) to capture and store runoff and excess stream flows to augment Scott River flows during critical periods	TBD	Supply Augmentation	Conceptual Phase	Conceptual Phase	Groundwater levels, interconnected surface water
III	Sediment Removal and River Restoration	River restoration project to remove significant sediment from main stem of Scott River from Fort Jones to the mouth of the canyon to improve in-stream flow, channel geomorphology, and habitat for fish.	TBD	Habitat Improvement	Scoping Phase	Scoping Phase	Instream habitat improvement
III	Strategic Groundwater Pumping Curtailment	Strategic timing of groundwater pumping curtailments. This management action would only be developed if Tier I and Tier II PMAs are insufficient. It would be an alternative tool for the GSA in support of the groundwater level SMC.	GSA	Demand Management	Conceptual Phase	Conceptual Phase	Groundwater levels
III	Watermaster Program	Water master services on tributaries other than Wildcat Creek and French Creek and on the Scott River. Among other things, a water master provides enforcement of water leases and 1707 dedications and transfers.	Scott Valley and Shasta Valley Watermaster District	Demand Management	Conceptual Phase	Conceptual Phase	Interconnected surface water

4.2 TIER I: Existing or Ongoing Projects and Management Actions

As shown in Table 1, there are multiple existing and ongoing PMAs in the Basin (Tier I). The Basin has a range of existing PMAs in place to provide demand management, supply augmentation, and habitat improvement.

Well Drilling Permits and County of Siskiyou Groundwater Use Restrictions

There are several existing regulations that are included in the demand management category of PMAs. These include the permitting requirements for new wells, as detailed in Title 5, Chapter 8 of the Siskiyou County Code of Ordinances and well drilling restrictions per the Scott River Adjudication Decree No, 30662. Siskiyou County also has ordinances that require permitting for extraction of groundwater underlying the Basin for use outside the Basin (per Title 3, Chapter 13) and a prohibition on wasting groundwater with underlying Siskiyou County for use cannabis cultivation (Article 7, Chapter 13, Title 3 of Siskiyou County Code of Ordinances). Providing demand management, these management actions benefit multiple sustainability indicators, including declining groundwater levels, groundwater storage, and depletion of interconnected surface waters.

Scott and Shasta Valley Watermaster District

Water Master services currently exist on Wildcat Creek and French Creek. Among other things, a Water Master provides enforcement of water leases and 1707 dedications and transfers (see Water Trust PMA, below). Expanding current Water Master services to Shackleford, Kidder, Etna, Patterson, Sugar, Crystal, Mill, Orofino Creeks, the main stem of the Scott River, and the interconnected zone in the Scott River Decree could further help enforce and expanded the Water Trust program (see Tier III PMAs for further discussion).

Scott River Water Trust Leasing Program

This MA is a voluntary program that leases water from active water diverters on priority stream reaches in exchange for financial compensation. Diverters include, but are not limited to, SVID, Farmers Ditch, and locations on French Creek, Sugar Creek, and Shackleford Creek. Benefits from implementation of this MA include leaving water in the stream and thus, providing benefit to instream flows. Leases in the fall months benefit flows for migration of Chinook and coho spawning adults, while leases throughout the summer months benefit the juvenile fish through improvements in rearing habitat for juvenile fish in tributaries to the Scott River. Leases are either temporary through forbearance agreements or permanent instream transfers through the Water Code 1707, which are facilitated by SWRCB. This program is ongoing but there is potential to expand its operations in the future.

Scott River Tailings Streamflow and Ecological Benefit Restoration Projects

This project, with ongoing implementation by the Scott River Watershed Council, aims to improve instream connectivity in the tailings section of the Scott River, which connects the East Fork, South Fork, and Sugar Creek tributaries to the mains stem Scott River. Benefits from this project include instream habitat improvement with particular benefit to anadromous fish species in the Scott River.

Patterson Creek Wood Loading

This project, implemented by the Scott River Watershed Council, uses streamside trees that are felled into the channel to create cover, scour pools, increase slow water habitat, and improve floodplain connectivity. Partially completed in 2018 and 2019, additional work is ongoing. The primary benefit from this project includes improvement of spawning habitat for anadromous fish.

French Creek Wood & Gravel Enhancement

This Scott River Watershed Council project aims to improve coho salmon spawning and rearing conditions by adding large wood and spawning gravels. Using a phased approach, the first series of wood structures and gravel augmentation began in 2019 with a second phase scheduled to begin late summer of 2021. The primary benefit expected from this project includes habitat improvement for coho salmon.

4.3 TIER II: Planned Projects and Management Actions

Tier II PMAs, planned for near-term initiation and implementation (2022-2027) by individual agencies, exist at varying stages in their development. Project descriptions are provided below for each of the identified Tier II PMAs. The level of detail provided for the eight PMAs described below depends on the status of the PMA; where possible the project descriptions include information relevant to §354.42 and §354.44 of the SGMA regulations.

- **i. Avoiding Significant Increase of Total Net Groundwater Use from the Basin**
- **ii. Beaver Dam Analogues**
- **iii. Conservation Easements**
- **iv. Upslope Water Yield Projects**
- **v. East Fork Scott Project**
- **vi. Irrigation Efficiency Improvements**
- **vii. MAR & ILR - NFWF Scott Recharge Project**
- **viii. MAR & ILR**
- **ix. Voluntary Managed Land Repurposing**

Avoiding Significant Increase of Total Net Groundwater Use from the Basin

Project Description

The goal of this MA is to avoid water level declines and additional streamflow depletion in Scott Valley that would result from significant expansion of net groundwater use relative to the practice over the past two decades. Net groundwater use is defined as the difference between groundwater pumping and groundwater recharge in the Basin. Under conditions of long-term stable recharge (from precipitation, irrigation, streams, floods) and long-term stable surface water supplies in the Basin, significant increases in long-term average ET (or other consumptive uses) in the Basin lead to significant increases in long-term average net groundwater use. While not leading to overdraft, such increase of net groundwater use would result in less groundwater discharge toward the Scott River and, hence, lower dynamic equilibrium water levels in the Basin or portions of the Basin, possibly at levels lower than the minimum threshold (MT) for groundwater levels or for interconnected surface water, for significant periods of time (see Chapter 2.2.3.3). This MA helps to ensure that the sustainable yield of the basin is not exceeded (see Chapter 2.2.4) and that sustainable management criteria are met.

The MA sets a framework to develop a process for avoiding significant long-term increases in average net groundwater use in the Basin, while protecting current groundwater and surface water users, allowing Basin total groundwater extraction to remain at levels that have occurred over the most recent twenty-year period (2000-2020). By preventing future declining water levels, the MA will help the GSA achieve the measurable objectives of several sustainability indicators: groundwater levels, groundwater storage, subsidence, and interconnected surface water and GDEs.

Due to the direct relationship between net groundwater use and ET, implementation of the MA is measured by comparing the most recent five- and ten-year running averages of agricultural and urban ET over both the Basin and watershed, to the maximum value of Basin ET measured in the 2010-2020 period, within the limits of measurement uncertainty. Basin ET from anthropogenic activities in the Basin and surrounding watershed cannot increase significantly in the future without impacting sustainable yield. This design is intended to achieve the following:

- To avoid disruption of existing urban and agricultural activities.
- To provide an efficient, effective, and transparent planning tool that allows for new urban, domestic, and agricultural groundwater extraction without increase of total net groundwater use. This can be achieved through exchanges, conservation easements, and other voluntary market mechanisms while also meeting current zoning restrictions for open space, agricultural conservation, etc. (see Chapter 2).

    - To be flexible in adjusting the limit on total net groundwater extraction if and where additional groundwater resources become available due to additional recharge dedicated to later extraction.

Critical tools of the MA will be monitoring and assessment of long-term changes in Basin and surrounding watershed hydrology (ET, precipitation, streamflow, groundwater levels, see chapter 3), outreach and communication with stakeholders, well permitting, collaboration with land use planning and zoning agencies, and limiting groundwater extraction to not exceed the sustainable yield.

Measurable Objectives Expected to Benefit

This MA directly benefits the measurable objectives of the following sustainability indicators:

- Groundwater levels – Avoids declining water levels below those corresponding to the most recent twenty-year period.
- Groundwater storage – Avoids declining storage levels below those corresponding to the most recent twenty-year period.
- Depletion of Interconnected Surface Waters and Protection of Groundwater-Dependent Ecosystems – Avoids depletion of interconnected surface waters with declining groundwater levels.

Circumstances for Implementation

Currently, there is no threat of chronically declining water levels in Scott River Valley. The Basin is not in a condition of overdraft. Future threats to groundwater levels fall into two categories (Chapter 2.2.3.3), further explained below:

- Increased total net groundwater use in the Basin (total net groundwater use: difference between Basin landscape recharge and Basin pumping).
- Reduced recharge into and runoff from the watershed surrounding the Basin.

This MA ensures that future declining water levels are not the result of any significant expansion of groundwater pumping in the Basin (first category), which would lead to new, lower equilibrium groundwater level conditions (see Chapter 2). While not constituting a condition of overdraft, these new dynamic equilibrium conditions may possibly exceed the MT for water level, also affecting the protection of GDEs and increasing the depletion of interconnected surface water due to groundwater pumping at periods of critically low streamflow conditions (summer and fall).

Increasing Basin Net Groundwater Extraction

Groundwater levels in the basin are fundamentally controlled by (Chapter 2.2.3.3):

- The elevation and location of the Scott River along the valley trough. The main-stem Scott River is a net gaining stream, naturally draining the Basin.

- The amount of recharge along the tributaries on the upper and middle alluvial fan sections.
- The amount of recharge from the Basin landscape due to precipitation, irrigation return flows, flooding, and managed aquifer recharge (MAR).
- The amount of groundwater pumping for irrigation (the net consumptive groundwater use by domestic and public users is relatively small after accounting for return flows from septic systems and wastewater treatment plants to either groundwater or streams).

A dynamic equilibrium already exists between the recharge across the Basin, groundwater pumping, and net discharge to the Scott River. Water levels near the Scott River vary within a relatively small range due to the interconnectedness of groundwater and surface water at the Scott River. Water levels generally slope from the valley margins toward the Scott River. Water levels fluctuate most near the valley margins: the upper eastside gulches and near the western mountain front.

A significant future increase in net groundwater use within the Basin would lead to less groundwater discharge toward the Scott River and, hence, a lowering of the water level gradient toward the Scott River. A lower water level gradient means permanent lowering of the water table in the Basin or portions of the Basin. By preventing a significant long-term increase in total net groundwater use through proactive planning, the groundwater basin, which is not in overdraft conditions, remains at a dynamic equilibrium in water level conditions, above the MT, as long as natural recharge from streams flowing into the Basin remains stable.

Decreasing Recharge in or Runoff from the Surrounding Watershed

The Basin is part of the larger Scott River Valley watershed. The Basin has negligible groundwater inflow and outflow across its aquifer boundaries. As a result, pumping and recharge outside the Basin do not affect groundwater levels. Long-term climatic changes cause changes in both precipitation amount and in snowmelt timing over the surrounding watershed. This will affect the dynamics of streamflow into the Basin, especially on the upper alluvial fans of the tributaries, and the amount of recharge. Finally, the amount of surface water diversions may change, which in turn affects pumping in the Basin. The SVIHM will be used throughout the implementation period to assess the impacts of these changes on sustainable yield.

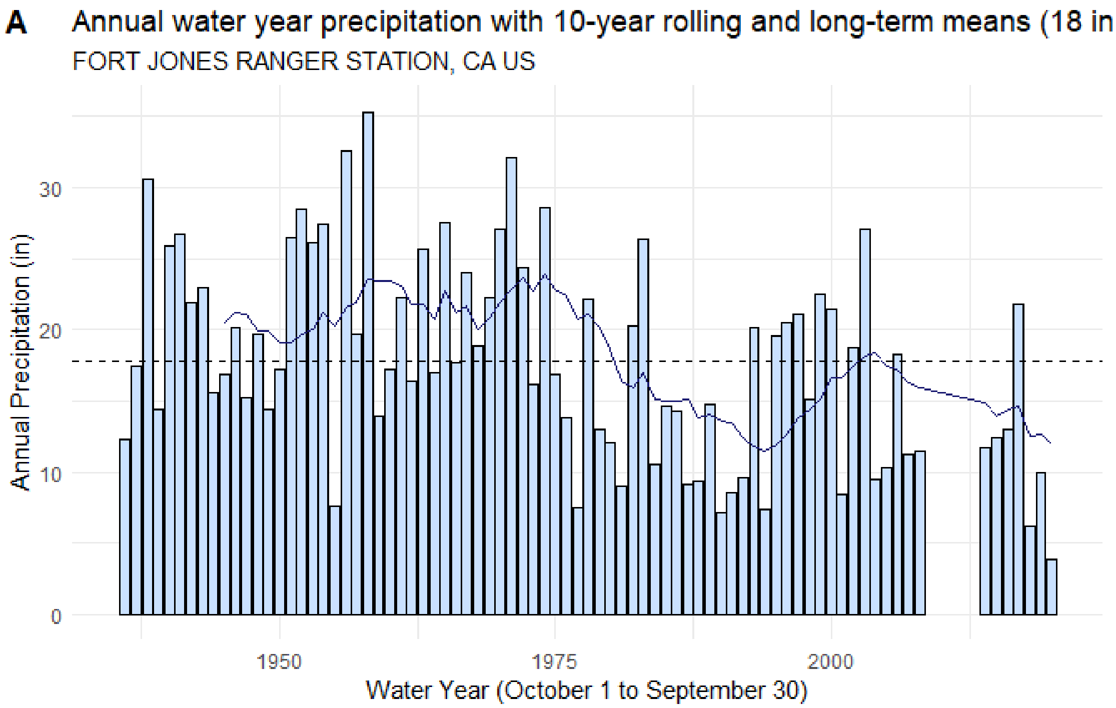

Figure 2: Annual precipitation over the 1936-2019 record as measured at the Fort Jones Ranger weather station (USC00043182).

Historic water levels indicate that there is no overdraft and no long-term decline in water levels. Where water levels have been observed to fluctuate since the 1960s, declines in dry year fall water levels occurred in the 1970s, relative to prior decades, but have been steady over the past 40 years. Average precipitation over the past 20 years (2000–2020) has been significantly lower than the average precipitation during the measured record in the 20th century (Figure 2, also see Chapter 2).

Based on current conditions in the Basin, this MA will be implemented immediately upon approval of the GSP by DWR in partnership with other relevant agencies. During MA implementation, if groundwater levels stabilize at higher elevations due to GSA activities or climate change, total net groundwater use and the sustainable yield may be adjusted upward. The mechanism for off-ramping the MA is described in the implementation section below.

Public Noticing

The GSA will implement the following education and outreach actions regarding the MA:

- Post and advertise the progress of MA implementation through the submittal of annual progress reports to DWR.

Implementation: Collaboration with Permitting and Regulatory Agencies

Implementation of the MA is focused on developing active coordination between the GSA with other planning, permitting, and regulatory entities within the Basin, including the Siskiyou County Department of Environmental Health and local land use zoning agencies:

Siskiyou County Department of Environmental Health

The GSA will develop a formal partnership with the well construction permitting agency that operates within the Basin, the Siskiyou County Department of Environmental Health. The objective of the partnership is to develop a well permitting program for agricultural, urban, and large domestic wells that is supportive of and consistent with the GSA's goal not to expand total net groundwater use in the Scott Valley Basin. The permitting program would ensure that construction of new extraction wells does not significantly expand current total net groundwater use in the Basin (to the degree that such expansion may cause the occurrence of undesirable results). This can be achieved through commensurate well retirements and through water market instruments.

Land Use Zoning Agencies

The GSA will develop a partnership with all relevant land use zoning agencies in the watershed. Land use zoning agencies in the Basin include:

- Siskiyou County
- City of Etna
- Town of Fort Jones

The objective of the partnership is for those agencies to develop land use zoning and land use permitting programs that are supportive of and consistent with the GSA's goal not to expand total net groundwater use in the Basin. Developing close partnerships and timely transfer of information will best prevent an expansion of total anthropogenic consumptive water use in the Basin. Preventing an expansion of total net groundwater use in the Basin and surrounding areas still allows for both urban and agricultural growth.

> Well replacement may not require that the new well has the same construction design as the old well, including well capacity. Here are two illustrative examples of an appropriate use of well replacement:
>
> **Example 1:** Replacement of a 1,000-gpm agricultural well that will be properly decommissioned with a new 1,000-gpm agricultural well is permissible.
>
> **Example 2:** Replacement of a 1,000-gpm agricultural well that will be properly decommissioned with a new 2,000-gpm capacity agricultural well is permissible with the explicit condition that the 10-year average total net groundwater extraction within the combined area serviced by the old and the new well does not exceed the average groundwater extraction over the most recent 10-years.

Urban expansion is not currently planned to occur in Scott Valley in the near future. If needed it would be by expansion into either agricultural or natural lands, within the constraints of land use planning objectives and zoning laws. Agriculture-to-urban land use conversion does not increase net groundwater use within the footprint of that conversion. Sometimes the net groundwater use may be lower after conversion (due to lower evapotranspiration). The total annual volume of net groundwater use reduction can be made available for net groundwater use increase elsewhere in the Basin through designing appropriate land use zoning and permitting processes, and after considering ecologic, public interest, and hydrologic or hydrogeologic constraints to such exchanges.

Market instruments encompass a wide range of management tools that rely on monetary transactions to efficiently and effectively trade water uses in ways that do not affect the overall water balance of a basin. The following are two hypothetical examples of water market transactions to illustrate how such instruments may be applied, if circumstances and zoning regulations are appropriate:

Example 1: Expansion of urban groundwater use into agricultural lands, where consistent with zoning and land use planning – Net groundwater use per acre of urban land is generally similar to or lower than under agricultural land use (this accounts for the fact that wastewater is recharged to groundwater and that the largest consumptive use in urban settings is ET from green landscapes). A hypothetical example: lets assume that urban net groundwater use is 1.5 acre-feet per acre, whereas it is 3 acre-feet per acre on agricultural land. Net water use is the difference between groundwater pumping and groundwater recharge over the area in question. Let's further assume that an urban expansion occurs into 500 acres of agricultural land. Prior to the land use conversion, net water use was 3 x 500 = 1,500 acre-feet. After the land use conversion, net water use is 1.5 x 500 = 750 acre-feet. The land use conversion makes 750 acre-feet available for additional annual groundwater pumping elsewhere in the Basin.

Example 2: Expansion of urban groundwater use into natural lands, where consistent with zoning and land use planning – Net groundwater use of urban land is generally larger than under natural land use. A hypothetical example: urban net groundwater use is 1.5 acre-feet per acre, whereas it is 0.5 acre-feet per acre prior to the land-use conversion. Let's again assume that the urban expansion is 500 acres. Prior to the land use conversion, water use on the 500 acres was 0.5 x 500 = 250 acre-feet. After land use conversion, the net water use is 1.5 * 500 = 750 acre-feet. The land use conversion therefore requires an additional 500 acre-feet of water.

If the city also purchases 500 acres of agricultural land for urban development, as in example 1, it already has a credit of 750 acre-feet, of which it may apply 500 acre-feet toward this additional 500 acre expansion into natural land.

Alternatively, the city would need to purchase a conservation easement on 200 acres of agricultural land elsewhere in the basin (net groundwater use: 3 acre-feet per acre, or 3 x 200 = 600 acre-feet) that converts that agricultural land to natural land (net groundwater use: 0.5 acre-feet per acre, or 0.5 x 200 = 100 acre-feet). The net groundwater use on the easement would be reduced from 600 acre-feet to 100 acre-feet, a 500 acre-feet gain to balance the city's development into natural lands, above. Costs for the easement may include costs for purchasing or leasing that land and the cost for maintaining the conservation easement. We note that conversion to natural land may require significant and habitat development and management as appropriate.

The above examples do not account for possible water rights issues that will also need to be considered. In California, urban groundwater rights are generally appropriative, while agricultural water rights are overlying, correlative rights.

Agricultural expansion, where permissible under zoning regulations, is similarly made possible, e.g., by voluntary managed land repurposing of existing agricultural activities in the same location or elsewhere within the Basin and ensuring that there is no increase in net groundwater extraction between the expansion on one hand and land repurposing on the other. This may be achieved through land purchasing or trade of net groundwater extraction rights (water markets) or through contractual arrangements for land repurposing (e.g., conservation easements) to balance expansion and reduction of net groundwater use. If additional Basin total net groundwater extraction capacity becomes available (after a prolonged period of water level increase), the GSA will work with the land use zoning agencies to ensure land use zoning and permitting is adjusted accordingly, following a hydrologic assessment.

De minimis exceptions to net groundwater use expansion: domestic water use, up to 2 acre-feet per house-hold, contributes minimally to net groundwater extraction of a basin. Nearly all household water use other than irrigation is returned to groundwater via septic systems leachate. Larger household water use, above *de minimis* levels, is typically due to irrigation of pasture or lawn and therefore, will be considered a net groundwater extraction.

If additional net groundwater extraction becomes available (after a prolonged period of water level increase), the partnership will ensure that well permitting is adjusted accordingly.

Implementation: Monitoring

In a groundwater basin where agricultural pumping exceeds 95% of applied groundwater use in the basin, the total long-term change in the amount of net groundwater use (groundwater pumping minus recharge) can be estimated by quantifying the long-term changes in the basin's evapotranspiration (ET) from irrigated landscapes. This assumes that long-term trends in precipitation and applied surface water are sufficiently negligible such that only a significant increase in Basin ET leads to changes in the long-term groundwater balance or that their impacts are separately assessed using a model (Section 2.2.4). Monitoring of Basin ET, together with the monitoring programs outlined in chapter 3 and use of the Scott Valley Integrated Hydrologic Model (SVIHM) provide the basis for comprehensive monitoring of net groundwater use in the Basin. Furthermore, water level and groundwater storage monitoring (chapter 3) provide an instrument to continually assess the effectiveness of avoiding the expansion of total net groundwater use.

Legal Authority

The GSA only has authority for groundwater within the Scott Valley Groundwater Basin, outside of the adjudicated zone. The GSA has no land use zoning authority. The GSA will collaboratively work with the County of Siskiyou, other land use zoning agencies, and stakeholders within the Scott Valley Basin to implement this MA.

Schedule

The schedule for implementing the MA is as follows:

- The GSA will create partnerships within the first year of the GSP, by January 31, 2023.
- The partnerships will have the MA program in place no later than January 31, 2024.
- Benefits are to be seen immediately; that is, total net groundwater use during the 2020-2030 decade will not exceed total net groundwater use in the Basin during the 2000-2020 baseline period.

Expected Benefits

Benefits generated by the MA will include:

- Security of groundwater pumping for existing groundwater users.
- Efficient, effective, and transparent planning tools available for new groundwater uses through voluntary market instruments.

Estimated Costs and Funding Plan

Note: This information will be supplied by the economic contractor.

Beaver Dam Analogues

Project Description

Beaver dam analogues (BDAs) are instream structures that mimic beaver dams and create structural complexity. The Scott River Watershed Council (SRWC) has been implementing BDAs in the Watershed since 2014. The primary objective of BDAs is to improve habitat for anadromous fish, particularly coho salmon, in the Basin (see Chapter 2). BDAs may require permitting and/or approval from the National Oceanic and Atmospheric Administration (NOAA), U.S. Army Corps of Engineers, SWRCB, and CDFW (Charnley 2018). The Scott River Watershed was the first location in California to use BDAs for watershed restoration, implementing the first BDAs in 2014 (Charnley 2018). The first three BDAs in the Basin were constructed on Sugar Creek and since 2014, additional BDAs have been constructed on French Creek, Miner's Creek, and Rattlesnake Creek. Monitoring associated with existing BDAs in the Scott River Watershed have shown improvements in stream temperatures, amount of aquatic habitat, and groundwater levels (Yokel et al., 2018). Additional proposed BDAs are in the planning phase. Implementation of additional BDA projects would require:

- Securing funding.
- Site selection and access agreements, if on private lands.
- Securing required permits.
- Installation of monitoring equipment, as necessary.

Based on current conditions in the Basin, these projects will continue to be implemented by SRWC. In the future, the GSA and other potentially interested organizations may be cooperators, project partners, or take the lead on additional BDA projects.

Monitoring data in the BDA program include, but are not limited to:

- Location and date of operation of the BDA.
- Major construction details of the BDA (width, height).
- Water level elevation in the BDA under typical operation.
- Groundwater level monitoring data, if available.
- Scientific and technical reports, if available.

Upslope Water Yield Projects

Project Description

The objective of these types of projects is to increase water yield from the upper watershed, especially East Fork and French Creek, through green infrastructure. Green infrastructure may include fuel reduction, road improvements, canopy opening to manage snow shade and accumulation, and other actions that reduce direct runoff to surface waters.

These projects are currently in the planning phase, apart from the East Fork Scott Project (see below), which is in the implementation phase. Anticipated benefits from these types of projects include increased water storage in the upper watershed during the wet season, improved flows from the upper watershed during the dry season, and the support of desired instream flow conditions.

Changes in streamflow entering the Basin will be monitored and evaluated through existing and proposed new streamflow gauges on key tributaries to the Scott River (see Section 3.3) and through statistical analyses of these data.

East Fork Scott Project

Project Description

The Salmon/ Scott River Ranger District of the Klamath National Forest is the lead agency for this project to improve conditions in the East Fork Scott River Watershed. This project has multiple components, the most relevant to the GSA being a combination of treatments including the addition of large woody debris along four miles of stream, modification of stream crossing structures, meadow restoration, and others. The objective of these activities is to add stream habitat structure and complexity and improve connectivity and aquatic organism passage. This project is currently in the implementation phase, following the decision notice and a finding of no significant impact issued on November 18, 2020[1].

[1] https://www.fs.usda.gov/nfs/11558/www/nepa/105793_FSPLT3_5536448.pdf

Changes in streamflow entering the Basin will be monitored and evaluated through existing and proposed new streamflow gauges on key tributaries to the Scott River (see Section 3.3) and through statistical analyses of these data.

Irrigation Efficiency Improvements

Project Description

Achieving increases in irrigation efficiency through equipment improvements are anticipated to reduce overall water demand, lessening the chance of river disconnection during critical periods. This is expected to support desired instream flows, fish migration, and aquatic habitat. Potential benefits were quantified through modelled scenarios of a 10% increase, 20% increase, and 10% decrease in irrigation efficiency. Relative stream depletion reversals resulting from these scenarios were 4%, 12% and -2%, respectively (Appendix 4-A).

Currently, this project is in the planning phase and funding options will be explored during the first five years of GSP implementation. This project involves an exploration of options to improve irrigation efficiency, assessment of irrigator willingness, outreach and extension activities, demonstration projects, and development of funding options, primarily by cooperators, possibly in cooperation with NRCS. This PMA is likely to be accomplished through a voluntary, incentive-based program. Cost estimates have not yet been completed for this PMA.

Future benefits of implemented projects to streamflow depletion reversal (and remaining streamflow depletion) will be evaluated and assessed with SVIHM using the methodology described in Section 3.3 and using monitoring data that describes the implementation of the irrigation efficiency improvement program.

Monitoring data collected in this irrigation efficiency improvement program include, but are not limited to:

- Total acreage with improved irrigation efficiency equipment.
- Location of fields under improved irrigation efficiency equipment.
- Assessment of the increase in irrigation efficiency, with particular emphasis on assessing the reduction or changes in consumptive water use (evaporation, evapotranspiration) based on equipment specification, scientific literature, or field experiments.
- Cropping systems in fields with improved irrigation efficiency equipment.

MAR & ILR - NFWF Scott Valley Managed Aquifer Recharge Project

Project Description

The project will divert up to 43 cfs of water from the Scott River into the Scott Valley Irrigation District (SVID) ditch in winter when enough water is available in the river based on CDFW requirements, starting in the winter of 2021 through at least the winter of 2023. This water will be applied on dormant agricultural fields for recharge.

Measurable Objective

The purpose of this study is to evaluate the use of groundwater recharge to augment Scott River flows during critical periods (i.e., late summer and fall). Key outcomes of this study include determination of when and where water that is recharged enters the Scott River, the amount of water that recharges the groundwater system, and potential water quality benefits associated with groundwater recharge.

Circumstances for Implementation

Previous work has been completed in the Basin examining the potential benefits of managed groundwater recharge in the Basin and findings from this study will build on that previous work [2]. This project is included in the Tier II projects, as planned for near-term implementation. Currently in the implementation phase, this project is scheduled to continue through winter of 2023.

Public Noticing

Groundwater recharge testing began in January and February of 2021 in one pilot area. Public notice was provided prior to the start of the project and outreach was conducted to landowners that are SVID users. Outreach will continue to be conducted for additional recharge activities in 2022 and 2023 and following project completion. Findings from this project will be made publicly available following project completion.

Permitting and Regulatory Process

A temporary Water Rights Permit (i.e., SWRCB Application for Temporary Permit filed pursuant to Water Code 1425 to Divert to Underground Storage During High Flow Events) is needed to allow diversion of water from the Scott River during winter months. As permits can be issued for up to 180 days, this permit will be needed for every application year. CDFW also requires a Lake and Streambed Alteration Agreement when a project may affect fish and wildlife resources. The appropriate coordination will be completed to secure these permits.

[2] Dahlke H, Brown A, Orloff S, Putnam D, O'Geen T. 2018. Managed winter flooding of alfalfa recharges groundwater with minimal crop damage. Calif Agr 72(1):65-75. https://doi.org/10.3733/ca.2018a0001.

Schedule for Implementation

This project began in January of 2021 but will be developed at larger scale starting in January 2022. Surface water diversions through temporary permit are planned for both the 2022 and 2023 winter seasons.

Implementation

Prior to 2022 and 2023 implementation of this project, baseline conditions have been monitored and studied at the pilot site. Sites selection for the next steps is being considered, water conveyance infrastructure evaluated, and landowner permission and outreach conducted.

2021 Scott Valley Winter Recharge – Pilot Project Methodology

Using existing water rights, the water started to be diverted from the Scott Valley Irrigation Ditch (SVID) on February 10, 2021. During the first week the grower collaborator turned the flood off for a couple of days. The water was running continuously from the second week until the end of March. Water samples from Scott River, SVID, recharge water, groundwater, and rain have been collected weekly and shipped to UC Davis for isotope analysis.

Groundwater levels have been monitored weekly using a water level sounder. Initially, groundwater levels were measured in one location between the recharge field and Scott River (piezometer access closer to Scott River). A second groundwater level measurement point was added to the pilot project during the third week of recharge (piezometer access closer to the recharge site).

During summer 2021, continuous pressure transducers will be installed to measure water levels and temperature in transects across the river near the fields that are expected to be flooded in winter 2022. Outreach to stakeholders is ongoing.

2022-2023 full scale implementation

A temporary permit will be obtained for winter 2022 and has already been discussed with SWRCB and CDFW. Potentially flooded land acreage will be extended with respect to the pilot 2021 project. Isotopes and water quality connection will complement the data collected through the continuous transducers in the piezometers and will help the understanding of flow direction and the evaluation of the portion of potential recharge contributing to the aquifer and the portion contributing to the river.

Expected Benefits

This study is expected to provide information on the amount and timing of groundwater recharge and associated benefits, including to water quality, that will help inform future recharge projects. Benefits of future recharge projects are further discussed with SVIHM model results under MAR and ILR (see Section 4.3) and in Appendix 4-A.

Future benefits of implemented projects on streamflow depletion reversal (and remaining streamflow depletion) will be evaluated and assessed with SVIHM using the methodology described in Section 3.3 and using monitoring data that describes the implementation of this managed aquifer recharge program.

Monitoring Data

Monitoring for this project includes a minimum of ten shallow piezometers with pressure transducers to measure continuous groundwater level and temperature with a subset also containing sensors to collect electrical conductivity data. During the period of time when water is diverted for groundwater recharge, the flow will be analyzed at the USGS station at river-mile 21 to ensure that the CDFW instream flows are met. Additional monitoring data that will collected in this managed aquifer recharge program include, but are not limited to:

- Total acreage used each winter for MAR.
- Location of fields used for MAR.
- Monthly total volume of MAR applied.
- Summer crop yields to assess agronomic impacts, as applicable

Legal Authority

This project would require appropriate permitting from the State Water Board and avoidance of injury to other water rights holders or neighboring landowners. Permitting includes temporary Water Rights Permit which provides the authority to divert water from the Scott River during winter months for groundwater recharge.

Estimated Costs and Funding Plan

This project is funded through a grant administered by the National Fish and Wildlife Foundation with federal funding from the U.S. Fish and Wildlife Service. Funding already has been secured for this project and the total contract amount is $199,338.

Managed Aquifer Recharge and In-Lieu Recharge

Project Description

Managed Aquifer Recharge (MAR) is the process of intentionally adding water to aquifers and In-Lieu Recharge (ILR) is intentionally storing or preserving groundwater through replacement of some or all of groundwater use with surface water. This project uses MAR and ILR (during the irrigation season) to recharge groundwater. The project is an upscale of the ongoing groundwater recharge project presented under Tier II.

Measurable Objective

Use of MAR and ILR has been explored in the Basin and elsewhere in California as an option to increase groundwater recharge. The purpose of this PMA is to increase baseflow in Scott River during the critical summer and fall low-flow period and support the reversal of streamflow depletion, as presented in Chapter 3 as part of the discussion on sustainable management criteria for Interconnected Surface Water.

Public Noticing

Public noticing for this project will be conducted by the GSA prior to project implementation and will include submittal of the appropriate CEQA/NEPA or other environmental documentation, if required. Additional public notification is planned with significant project changes or additional project elements.

Permitting and Regulatory Process

A temporary Water Rights Permit (i.e., SWRCB Application for Temporary Permit filed pursuant to Water Code 1425 to Divert to Underground Storage During High Flow Events) is needed to allow diversion of water from the Scott River during winter months. As permits can be issued for up to 180 days, this permit will be needed for every application year. CDFW also requires a Lake and Streambed Alteration Agreement when a project may affect fish and wildlife resources. The appropriate coordination will be completed to secure these permits.

Schedule for Implementation

This PMA is in the planning and conceptualization stage. An exploration of funding sources, project location, and project feasibility are planned within the first five years of GSP implementation. Several years ago, a groundwater advisory committee provided UC Davis a map with specific fields that may be most suitable for MAR and/or ILR (Tolley et al., 2019).

Implementation

This PMA utilizes excess winter and spring flows for recharge to temporarily increase groundwater storage to augment streamflows during critical periods (increased baseflow). The project includes:

- Finding landowners willing to participate.
- Securing project funding.
- Obtaining water rights and other permit requirements, as necessary.
- Constructing infrastructure and installing monitoring equipment, as necessary, to identify potential project impacts and quantify project benefits.

Expected Benefits

The primary benefit of MAR and ILR is to reverse streamflow depletion through augmenting baseflow in Scott River during the critical summer and fall periods. This is expected to provide benefits to aquatic species, including anadromous fish (as discussed in Chapter 2), water quality, and habitat. Potential expected benefits from implementation of these projects were modelled and results are presented in Appendix 4-A. MAR and ILR were modelled both separately and together to identify the benefits associated with each practice, and in combination. Benefits are quantified using relative depletion reversal as a metric (see Section 3.4.5). The potential relative depletion reversal using MAR on 1,390 acres from January to March was found to be 10%. Using available surface water applied to 5,490 acres for ILR during the early growing season, a potential relative depletion reversal of 9% was estimated. The combination of MAR and ILR yielded a potential depletion reversal of 19%.

Legal Authority

With the appropriate permitting, and without infringement on existing water rights, the GSA is authorized to divert surface water for use with MAR and ILR.

Estimated Costs and Funding Plan

Costs and funding for this project have not yet been explored. Potential funding sources will be explored during the first five years of GSP implementation.

Voluntary Managed Land Repurposing

Project Description

Voluntary managed land repurposing programs include a wide range of voluntary activities that make dedicated, managed changes to land use (including crop type) on specific parcels in an effort to reduce consumptive water use in the Basin to improve and increase groundwater levels and instream flow during the critical late spring recess, summer baseflow, and early fall flush flow period. These activities may include any of the following:

Term Contracts: In some circumstances, programs like the Conservation Reserve Program (CRP) could provide a means of limiting irrigation on a given area for a term of years. Because of low rates, the CRP has not been utilized much in California, but this could change in the future. In addition, other term agreements may be developed at the state or local level. The Scott River Water Trust Leasing Program is an example of such a term contract.

Crop Rotation: Landowners may agree to include a limited portion of their irrigated acreage in crops that require only early season irrigation. For example, a farmer may agree to include 10% of their land in grain crops that will not be irrigated after June 30.

Irrigated Margin Reduction: Farmers could be encouraged to reduce irrigated acreage by ceasing irrigation of field margins where the incentives are sufficient to offset production losses. For corners, irregular margins, and pivot end guns, this could include ceasing irrigation after a certain date or even ceasing irrigation entirely in some instances.

Crop Support: To support crop rotation, particularly for grain crops, access to crop support programs may be important to ensure that this option is economically viable. Some type of crop insurance and prevented planting payment programs could provide financial assurances to farmers interested in planting grain crops.

Other Uses: In some circumstances, portions of a farm that are currently irrigated may be well suited for other uses that do not consume water. For example, a corner of a field may be well suited for wildlife habitat or solar panel, subject to appropriate zoning requirements to avoid undesirable outcomes. Other voluntary managed land repurposing projects include conservation easements that reduce or eliminate surface water diversion for irrigation (streamflow augmentation). Such streamflow augmentations effectively offset an equivalent amount of (pre-existing) depletion of interconnected surface water due to groundwater pumping. Conservation easements or similar instruments may also include temporary, seasonal, or permanent curtailment of groundwater, where the curtailment may be defined either by an amount of groundwater pumping curtailment or by the acreage not receiving irrigation from groundwater. Depending on the circumstances of an individual project, conservation easements may include habitat conservation easements, wetland reserve easements, or other easements that limit irrigation with surface water or groundwater on a certain area of land. It may be established that certain portions of a property may be suitable for an easement, while the rest of the property remains in irrigated agriculture. Many form of such temporary, seasonal, or permanent easements are possible. They may additionally specify restrictions or requirements on the repurposed use, e.g., to ensure appropriate habitat management.

Currently in the planning phase, this project type is to be developed throughout the next 5 years.

Implementation of this project type includes consideration of the following elements:

- Role of the GSA versus other agencies, local organizations, and NGOs
- Development of education and outreach programs in collaboration with local organizations
- Exploration of program structure.
- Contracting options.
- Exploration and securing of funding source(s).
- Identification of areas and options for easements or other contractual instruments (especially within the Adjudicated Zone).

Anticipated benefits from this type of project include improvement in instream flow conditions on the Scott River and its tributaries during critical late spring recess, summer and fall baseflow, and fall flush flow periods.

Monitoring data collected in this voluntary managed land repurposing program include, but are not limited to:

- Total acreage and timing of land repurposing.
- Location of parcels with land repurposing.

- Assessment of the effective decrease in evapotranspiration (consumptive water use) and applied water use.
- Description of the alternative management on repurposed land with:
  - Quantification and timeline of surface water dedications to instream flow specified in the easement.
  - Quantification and timeline of groundwater pumping curtailments, including water year type or similar rule to be applied and specified in the easement.
- Annual Water Master certification of easement implementation, as appropriate.

Future benefits of implemented projects to streamflow depletion reversal (and remaining streamflow depletion) will be evaluated and assessed with SVIHM using the methodology described in Section 3.3 and using the above monitoring data that describe the implementation of voluntary managed land repurposing programs.

4.4 TIER III: Potential Future Project and Management Actions

i. Alternative, Lower ET Crops
ii. Floodplain Reconnection/Expansion
iii. High Mountain Lakes
iv. Reservoirs
v. Sediment Removal and River Restoration
vi. Strategic Groundwater Pumping Reductions
vii. Watermaster Program

Alternative, Lower ET Crops

The “alternative, lower ET crop” PMA is a pilot program to develop and introduce alternative crops with lower ET but sufficient economic value to the Basin’s agricultural landscape. The implementation of such crop changes would occur as part of the Tier II Voluntary Managed Land Repurposing PMA. The objective of this PMA is to develop capacity in the Basin to facilitate crop conversion in some of the agricultural landscape that would reduce total crop consumptive use (evapotranspiration) of water in the Basin, as needed. The management action is to develop a program to develop and implement pilot studies with alternative crops that have a lower net water consumption for ET, and to provide extension assistance and outreach to growers to facilitate and potentially incentivize the crop conversion process. This PMA will be implemented jointly with University of California Cooperative Extension, the Siskiyou County Farm Bureau, the Siskiyou County Resources Conservation District, and/or other partners. Currently in the conceptual phase, this project involves:

- Scoping of potential crops.
- Pilot research and demonstrations.
- Defining project plan.
- Exploration of funding options.
- Securing funding.

- Development of an incentives program.
- Implementation of education and outreach.

Anticipated benefits from this project include introduction of lower consumptive water use crops and either an increase in recharge (on surface water irrigated crops) or a reduction in the amount of irrigation or both. As a result, water levels in the aquifer system will rise. This will also lead to an increase in instream flows and some reversal of streamflow depletion will occur. The potential benefits associated with transitioning to alternative, lower ET crops were investigated using the SVIHM. The relative depletion reversal (see Section 3.3 for explanation), used as a metric to quantify potential benefits, was 61% for a generic reduction of total crop ET in the Basin to 80%, and 29% for a generic reduction of total crop ET in the Basin to 90% due to a hypothetical crop change (see Appendix 4-A). Implementation of this project will include an assessment of the economic value of alternative, lower ET crops to growers.

Future benefits of implemented projects to streamflow depletion reversal (and remaining streamflow depletion) will be evaluated and assessed with SVIHM using the methodology described in Section 3.3 and using monitoring data that describes the implementation of the alternative, lower evapotranspiration program.

Monitoring data collected in this alternative, lower evapotranspiration program include, but are not limited to:

- Total acreage with alternative, lower ET crops.
- Location of fields with alternative, lower ET crops.
- Assessment of the effective decrease in ET.
- Cropping systems used as alternative, lower ET crops.

Floodplain Reconnection/Expansion

While little understood, the profound effects of the hydrogeomorphic change in the Basin due to channel straightening and resulting stream incision has historically lowered groundwater levels and conveyed water out of the valley at a higher rate. The floodplain reconnection/expansion program will reverse some of these historical effects on groundwater dynamics by reconnecting the river to the floodplain and thus, avoiding further channel incision and leading to stable or even increased water level elevations from flooding.

This program will involve a series of stream infrastructure improvements. Areas have been identified where such a reconnection can be constructed with relatively minor physical landscape alterations (SRWC 2018). At this time, the assessment is based on physical characteristics and the ability to seasonally inundate the accessed floodplain for recharge. The identified areas may not all be suitable due to existing infrastructure and the need for landowner agreements. However, the areas identified provide an initial assessment of the potential to improve floodplain reconnection as a multi-benefit project, improving habitat, stream conditions, and increasing recharge.

Floodplain reconnection/expansion may be achieved using various tools, including a part of the conservation easements program (see above), to expand the use of the conserved property to include ecological habitat flood recharging.

Another option that may be explored is seasonal flooding of pastureland, which also would have multiple benefits, including improved animal forage production with nutrient deposition, and increased recharge. Grazing management would need to be adjusted to a new regime. Floodplain Reconnection/ Expansion would require appropriate permitting from the State Water Board and avoidance of injury to other water rights holders.

This type of restoration falls into the "process based" restoration category (Pollock 2017; Wheaton 2019). To achieve a significant scale of restoration likely would require some land easement/purchases to allow streams and rivers to be moved out of their currently confined and incised condition. The program will therefore work closely with the conservation easement program.

Future benefits of implemented projects to streamflow depletion reversal (and remaining streamflow depletion) will be evaluated and assessed with SVIHM using the methodology described in **Section 3.3** and using monitoring data that describes the implementation of the floodplain reconnection/expansion program.

Monitoring data collected in the floodplain reconnection/expansion program include, but are not limited to:

- Geospatial description of geomorphic alterations completed.
- Monitoring of flooding frequency, duration, and depth.
- Monitoring of adjacent groundwater levels, if available.

High Mountain Lakes

This potential project class supports the restoration or modification of high-altitude lakes within the Scott River Basin to store water through addition of a dam with a natural outlet. Though use of high-altitude lakes for flow augmentation in Scott River Valley previously was explored (DWR 1991), this type of project is still in the conceptualization phase and additional investigations would be required to pursue implementation of any such project. At full build-out, DWR (1991) estimated that these expanded, high mountain lakes may provide an additional 3,500 AF of storage. An initial assessment will be implemented to determine (a) the feasibility of implementing such a project, and (b) the benefits of making this water available, in one form or another, to improve streamflow conditions during the most critical, early fall, low-flow period. This project class provides additional surface water and functions to offset depletions of interconnected surface water and improve streamflow. High Mountain Lakes would require appropriate permitting from the State Water Board and avoidance of injury to other water rights holders. If located on USFS lands, permitting from USFS would also be required.

Reservoirs

The objective of this PMA is to capture and store runoff and excess stream flows to augment Scott River flows during critical periods. Still in the conceptualization phase, details of a reservoir project have not yet been confirmed. However, it is conceptualized that a reservoir of up to 5,000–10,000 AF would be constructed in a an off-stream location (possibly Hamlin Gulch or other eastside locations). The SVID canal would be used to divert up to 42 cfs during winter flows to store in a reservoir for later use as streamflow augmentation during summer and fall critical periods. Augmentation may be direct or in-lieu. Previous, preliminary studies included three locations for a 20,000 AF reservoir at Noyes Valley (East Fork Scott River), Meadow Gulch (East Fork Scott River), or French Creek (DWR, 1991).

Anticipated benefits from this project include reversal of stream depletion to increase instream flows in Scott River during critical periods. Quantification of potential benefits was completed using the SVIHM (scenarios and results included in Appendix 4-A). For a 9 TAF reservoir with a 30 cfs release, relative depletion reversal ranges from 26 to 58%, dependent on reservoir location. For reservoirs that are “entirely reliable” (i.e., provides guaranteed, desired, dry-season release), a 29 TAF reservoir with a 30 cfs release would result in 53% relative stream depletion reversal and a 134 TAF reservoir with a 60 cfs release result would provide a 184% relative stream depletion reversal. One or multiple reservoirs may be implemented to meet the interconnected surface water minimum threshold (as described in Chapter 3). Temperature consideration may limit direct discharge into streams or require management of discharge, i.e., as recharge near streams (to lower temperatures) or use for irrigation in lieu of groundwater pumping and (cold) surface water diversions.

Significant regulatory, policy, and funding challenges come with this PMA. A first step for the GSA would be to implement a feasibility and scoping study to develop a long-term strategy, if any, for determining feasibility, funding, design, and implementing of this PMA option.

Sediment Removal and River Restoration

A river restoration project to remove significant sediment from the main stem Scott River from Fort Jones to the mouth of the canyon is envisioned to improve in-stream flow, channel geomorphology, and habitat for fish. Still in the scoping phase, implementation of this project would require additional scoping, studies, planning, identification of funding, obtaining any applicable permits, and implementation. Anticipated benefits from this project include supporting instream flows and increasing the probability and duration of river connection during critical periods to support fish migration and habitat in the lower section of Scott River Valley.

Strategic Groundwater Pumping Curtailment

In many of the groundwater basins subject to SGMA throughout the State, pumping restrictions are one of the key components of the GSP. In Scott Valley, the current level of Basin pumping, minus voluntary pumping reductions, can be continued with the effective implementation of Tier I and Tier II PMAs. However, the GSA also acknowledges that pumping curtailments are an effective tool that may need to be used in the future to achieve groundwater sustainability.

For the purpose of the GSP, pumping curtailments are defined as voluntary or mandatory reductions or limitations in the amount of water a current or future groundwater user can pump from the Basin. This would be applied in the case of a situation where the planned Projects and Management Actions are insufficient to reach and/or maintain sustainability and one or more sustainability indicators are likely to dip below the minimum threshold by 2042. Under such a curtailment scenario, the GSA would first determine, using SVIHM and other hydrologic assessment tools, the amount of water that affected pumpers could take sustainably, and the pumpers would be required to reduce their groundwater extraction to that allocation. All pumpers subject to allocations and curtailment would be required to be metered. Curtailments may be temporary, seasonal, or permanent.

SGMA legislation allows for charging fees for pumping in excess of allocations, or for noncompliance with other GSA regulations (CWC Section 10732 (a)). The GSA will consider adoption of fees and/or other penalties for violations of pumping allowance and/or reporting if curtailments are implemented.

In the event of a need to restrict pumping, pumping restrictions could also be placed on new wells. Restrictions on permits for new groundwater wells would be considered if there was high demand for wells that, if constructed, could lead to the basin water extractions exceeding the sustainable yield for the basin. Alternative, restrictions on permits in specific areas would be considered if additional localized pumping could drive one or more sustainability indicators below the minimum threshold. In the absence of a basin adjudication, pumping restrictions on new uses would need to be applied equitably and in a similar proportion to restrictions on existing users.

Considerably more work and discussion would need to be done to define the policies and procedures for pumping curtailments if pumping curtailments are determined necessary to attain and maintain sustainability.

Monitoring data collected in the Strategic Groundwater Pumping Curtailment Program may include, but are not limited to:

- Well construction records.
- Land area serviced by the well through irrigation.
- Metering of extraction
- Amount of historic pumping, if known.
- Amount and timing of curtailed pumping.

Watermaster Program

A Watermaster Program currently exists on Wildcat Creek and French Creek. This MA would expand watermaster services to other tributaries and to the mainstem of the Scott River. The main objective of these expanded watermaster services would be to enforce surface water rights diversions in more areas in Scott River Valley, reducing unauthorized diversions to benefit instream flows.

The benefits of this program will be further incentives for conservation easement programs and water leases and more transparent, reliable, and better documented implementation of such conservation easements and water leases. Future benefits of actual implementation status to streamflow depletion reversal (and remaining streamflow depletion) will be evaluated and assessed with SVIHM using the methodology described in Section 3.3 and using monitoring data that describes the implementation of the irrigation efficiency improvement program.

Monitoring data that may be collected as part of implementation of this PMA include:

- Monitoring of diversions.
- Monitoring of instream flow dedications.
- Quantification of instream flow dedications and conservation easements.

4.5 Other Management Actions

Monitoring Activities

Chapter 3 and the data gap Appendix (Appendix 3-A) clearly describe the importance of establishing an extensive monitoring network which will be used to support future GSP updates. A summary of the proposed monitoring activities includes, but is not limited to:

- Development of new RMPs (Representative Monitoring Points) to support the groundwater quality SMC
- New stream gauges in both the mainstem of Scott River and in key tributaries
- Use of satellite images, twice per year, to evaluate status of Groundwater Dependent Ecosystems

Well Inventory Program

In feedback from DWR on other GSPs, a better inventory and definition of active wells was requested along with discussion of impacts to these wells in annual reports, as some shallow wells may be impacted if MTs are reached.

A detailed well inventory will improve the understanding of the Basin conditions and will be valuable for modelled results. It will also help solve ongoing issues with evaluation of de-minimus users and their proper inclusion in SVIHM.

Voluntary Well Metering

This project would facilitate the collection and reporting of groundwater extraction data. Accurate groundwater extraction data improves the quality of information used in modelling, and in decision-making. Additionally, collection of pumping data is useful for tracking the effectiveness of the proposed demand reduction PMAs.

Future of the Basin

This project would entail developing a study of the economic impacts of the projects and management actions included in the GSP. This would include an evaluation of how implementation of the project could affect the economic health of the region and on local agricultural industry. It would also consider the projected changes to the region's land uses and population and whether implementation of these projects would support projected and planned growth.

Note: Several additional PMAs have been suggested through the April 2021 public comment process and will be evaluated for inclusion in this chapter. These suggestions include: a study of the tailings for groundwater storage, recharge weirs, fish-friendly structures to decrease flow rates in Scott River and its tributaries, construction of a clay dam or permeable plug at the lower end of Scott Valley, and direct addition of water to the river during periods of low flow but have not yet been investigated.

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