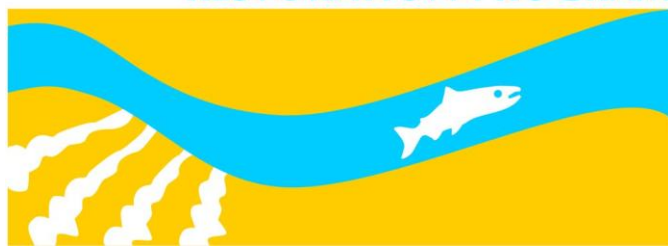


Seepage Management Actions Final Environmental Assessment

SAN JOAQUIN RIVER
RESTORATION PROGRAM



Mission Statements

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Appendices

Appendix A – Revised Seepage Management Plan

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List of Abbreviations and Acronyms

Act	Public Law 111-11: The San Joaquin River Restoration Settlement Act
CARB	California Air Resources Board
cfs	cubic feet per second
CH ₄	methane
CO ₂	carbon dioxide
Court	U.S. Eastern District Court of California
CVP	Central Valley Project
Delta	Sacramento-San Joaquin River Delta
DMC	Delta-Mendota Canal
DWR	California Department of Water Resources
EA	Environmental Assessment
EIS/R	Environmental Impact Statement / Environmental Impact Report
FMMP	Farmland Mapping and Monitoring Program
FWA	Friant Water Authority
GHG	greenhouse gas
IPaC	Information for Planning and Conservation
ITA	Indian Trust Asset
N ₂ O	nitrous oxide
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRDC	Natural Resources Defense Council
Reclamation	U.S. Bureau of Reclamation
Secretary	U.S. Secretary of the Interior
Settlement	Stipulation of Settlement in the case of Natural Resources Defense Council, et al. v. Kirk Rodgers, et al., United States District Court, Eastern District of California, No. CIV. S-88-1658-LKK/GGH
SJRRP	San Joaquin River Restoration Project
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMP	Seepage Management Plan
SPH	Seepage Project Handbook
SWRCB	State Water Resources Control Board
UCCE	University of California Cooperative Extension
USFWS	U.S. Fish and Wildlife Service

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1.0 Introduction

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC) filed a lawsuit, known as *NRDC, et al., v. Kirk Rodgers, et al.*, challenging the renewal of long-term water service contracts between the United States and the Central Valley Project (CVP) Friant Division contractors. On September 13, 2006, after more than 18 years of litigation, the Settling Parties, including NRDC, Friant Water Authority (FWA), and the U.S. Departments of the Interior and Commerce, agreed on the terms and conditions of a settlement subsequently approved by the U.S. Eastern District Court of California (Court) on October 23, 2006. The San Joaquin River Restoration Program (SJRRP) was established in late 2006 to implement the Stipulation of Settlement (Settlement) in *Natural Resources Defense Council (NRDC), et al., v. Kirk Rodgers, et al.* The San Joaquin River Restoration Settlement Act (Act), included in Public Law 111-11 and signed into law on March 30, 2009, authorizes and directs the Secretary of the Interior to implement the Settlement. The Settlement establishes two primary goals:

- Restoration Goal – To restore and maintain fish populations in “good condition” in the main stem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish
- Water Management Goal – To reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the Interim and Restoration flows provided for in the Settlement

To achieve the Restoration Goal, the Settlement calls for releases of water from Friant Dam to the confluence of the Merced River (referred to as Interim and Restoration Flows); and a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon. Interim Flows were experimental flows that began in 2009 with the purpose of collecting relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture, and reuse. Interim Flows continued until Restoration Flows were initiated in 2014.

Restoration Flows are specific volumes of water to be released from Friant Dam in accordance with Exhibit B of the Settlement (Figure 1-1). In 2012, Reclamation and the State of California Department of Water Resources (DWR) completed the San Joaquin River Restoration Program Environmental Impact Statement/Report (PEIS/R) (Reclamation 2012) which analyzed and disclosed the potential effects of implementing actions to meet the requirements of the Act and Settlement. Some components were analyzed at a project level, and others at a program level, depending on the level of planning detail available at the time. Reclamation completed the Record of Decision (ROD), and DWR completed the Notice of Determination, for the SJRRP in 2012. An October 2013 Water Rights Order by the State Water Resources Control Board provides

long-term authorization to modify Reclamation's water rights to implement Restoration Flows.

As described in Chapters 12 and 16 of the PEIS/R, the release of Restoration Flows (as described in Settlement Exhibit B) has the potential to cause seepage of groundwater from the San Joaquin River channel to adjacent lands, potentially affecting groundwater levels on parcels along the river. The Seepage Management Plan (SMP) was included in the Physical Monitoring and Management Plan (Appendix D to the PEIS/R) to disclose an approach for Reclamation to identify and address potential seepage concerns related to the release of Restoration Flows. The SMP outlines a monitoring program to identify parcels potentially affected by seepage related to release of Restoration Flows and a suite of actions that could be taken to address seepage concerns. Implementation of seepage monitoring and management actions as described in the SMP was included in the analysis of the potential effects of the SJRRP Selected Alternative (Alternative C1), as described in Chapter 2 of the PEIS/R, given the level of planning detail at the time. Environmental commitments (EC-7 and EC-8) included in the SJRRP Selected Alternative (Alternative C1) as described in the PEIS/R and ROD, and Condition 7 of the Water Rights Order referenced above, require implementation of seepage monitoring and management actions as described in the SMP, including a commitment to not release Interim or Restoration Flows into a channel unless it has adequate capacity and the release would not cause seepage issues for the surrounding areas.

In 2015, the SJRRP completed the Revised Framework for Implementation (Framework) (Reclamation 2015b) to establish a realistic schedule for implementation of the SJRRP actions in accordance with the Settlement and Act based on the best currently available information, and based on 5-year, 10-year, 15-year, and beyond 15-year visions. The Framework identified a goal of achieving the ability to release at least 1,300 cubic feet per second (cfs) by 2019 for the 5-Year Vision. To be consistent with the approach for the 5-Year Vision, Reclamation is completing planning and landowner coordination efforts for seepage management actions that will allow for the release of Restoration Flows to 1,300 cfs as a first phase of seepage management actions. Through modeling and monitoring efforts completed as outlined in the SMP, Reclamation has determined that some lands adjacent to the Eastside Bypass, and Reaches 2B, 3, 4A and 4B may experience groundwater seepage concerns at flows of up to 1,300 cfs. This environmental assessment (EA) analyzes and discloses the potential impacts, beyond those already analyzed and disclosed in the PEIS/R, of implementing specific seepage management actions that have been further defined based on landowner coordination efforts for potentially affected parcels with Restoration Flows up to 1,300 cfs, as further described in Section 2 of this EA. The potential effects of seepage management actions for the 10-Year and beyond visions, as described in the Framework, will be analyzed and disclosed in supplemental project-specific environmental compliance documentation, as appropriate, as site-specific planning information for those efforts becomes available. However, implementation of SJRRP seepage management actions to allow for full Restoration Flows of up to 4,500 cfs were considered at a programmatic level in the PEIS/R, and are also addressed in the cumulative effects analysis as further described in Section 3.8 of this EA.

San Joaquin River Restoration Program

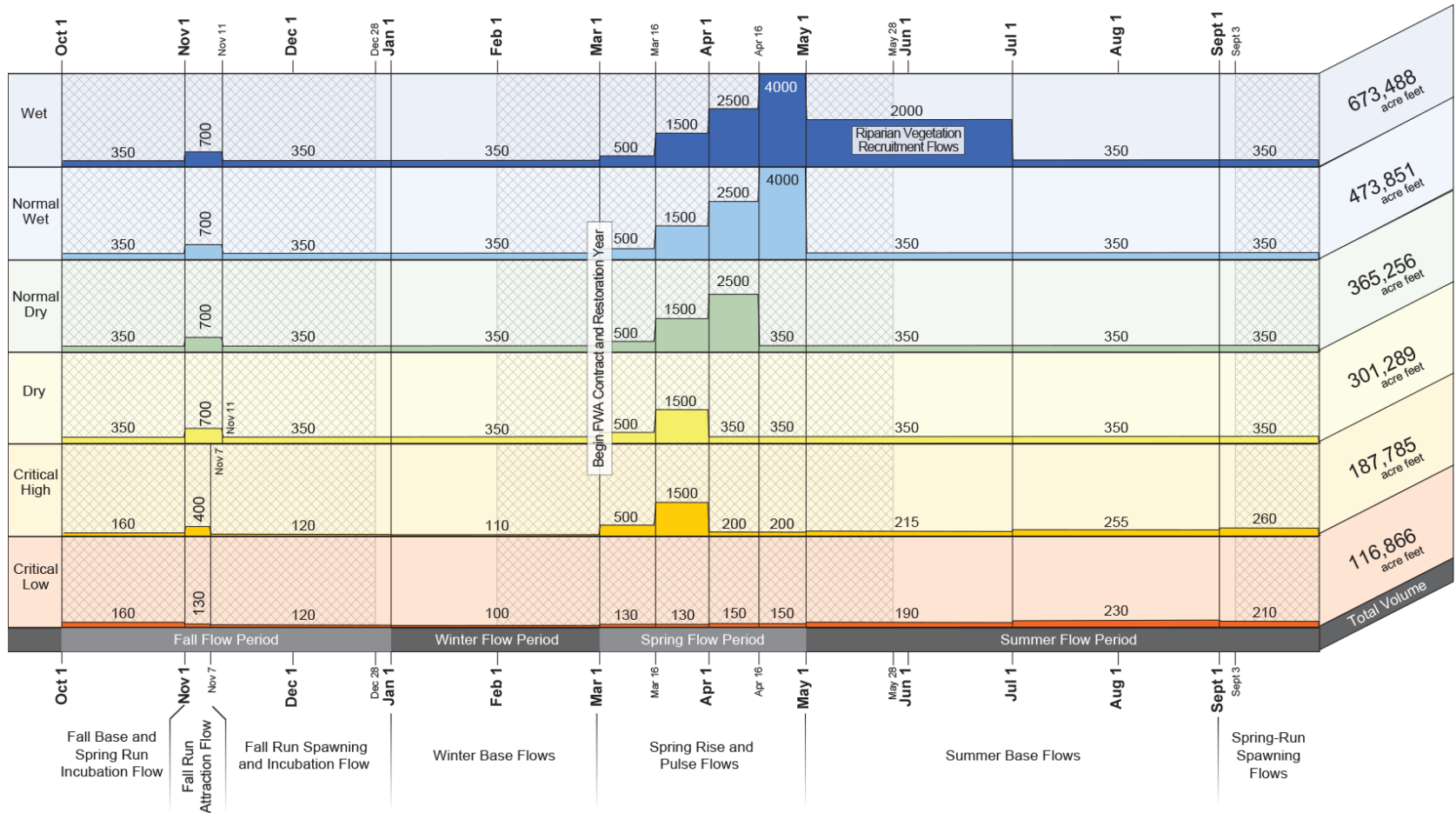


Figure 1-1.
Restoration Flows Hydrograph by Water Year (Settlement Exhibit B)

1.1 Need for the Proposed Action

As previously described, the release of Restoration Flows in accordance with the Settlement has the potential to cause seepage impacts to parcels in Reaches 2B, 3, 4A, and 4B of the San Joaquin River and the Eastside Bypass. Release of Restoration Flows is currently constrained by the potential for seepage impacts. The purpose of implementing the proposed seepage management actions is to account for these potential seepage impacts as authorized by the Act, and enable the release of Restoration Flows in a manner that is acceptable to landowners and is consistent with the Settlement, PEIS/R and Framework 5-Year Vision.

2.0 Alternatives

2.1 No Action Alternative

Under the No Action Alternative, Reclamation would not implement further seepage management actions beyond those analyzed at a project-specific level in the PEIS/R (monitoring activities and restricting Restoration Flows to levels that avoid seepage impacts), and those that have been addressed in project specific environmental compliance documentation. Reclamation completed project-specific environmental compliance for and implemented one fee title acquisition of approximately 400 acres and one seepage easement in 2015, as well as one seepage easement in 2016; which allow for Restoration Flow releases up to approximately 300 cubic feet per second below Sack Dam. Under the No Action Alternative, Restoration Flows would continue to be released from Friant Dam in accordance with Settlement Exhibit B. Most of these flows would make their way to Sack Dam, but flows downstream of Sack Dam would be limited to amounts that would not cause any material adverse impacts to surrounding agricultural lands, which is currently, and would continue to be, approximately 300 cubic feet per second without further action.

2.2 Proposed Action

The Proposed Action includes seepage management actions to compensate landowners for adverse impacts due to seepage caused by the passage of Restoration Flows consistent with the Framework 5-Year Vision (potential Restoration Flows up to 1,300 cfs). Figure 2-1 shows the proposed parcels where seepage management actions could be implemented with landowners under the Proposed Action. The Proposed Action includes seepage easements or fee title land acquisitions on up to 11,519 acres of land along Reaches 2B, 3, 4A, and 4B of the San Joaquin River. These parcels are located in Fresno, Madera, and Merced counties. Most landowners with parcels that could be affected by groundwater seepage in the 5-Year Vision have indicated an interest in Reclamation pursuing an easement as their preferred action to compensate for the potential effects of seepage and the resulting increase in groundwater levels on their parcels. Therefore, the Proposed Action analyzed in this EA includes Reclamation negotiating with landowners to implement either an easement allowing for the raising of groundwater levels potentially associated with passage of Restoration Flows in accordance with Settlement Exhibit B, or a willing seller fee-title acquisition on the parcels potentially affected by seepage. Based on initial coordination with landowners, it is anticipated that a combination of easements and land acquisitions, with mostly easements, would be implemented in the project area under the Proposed Action.

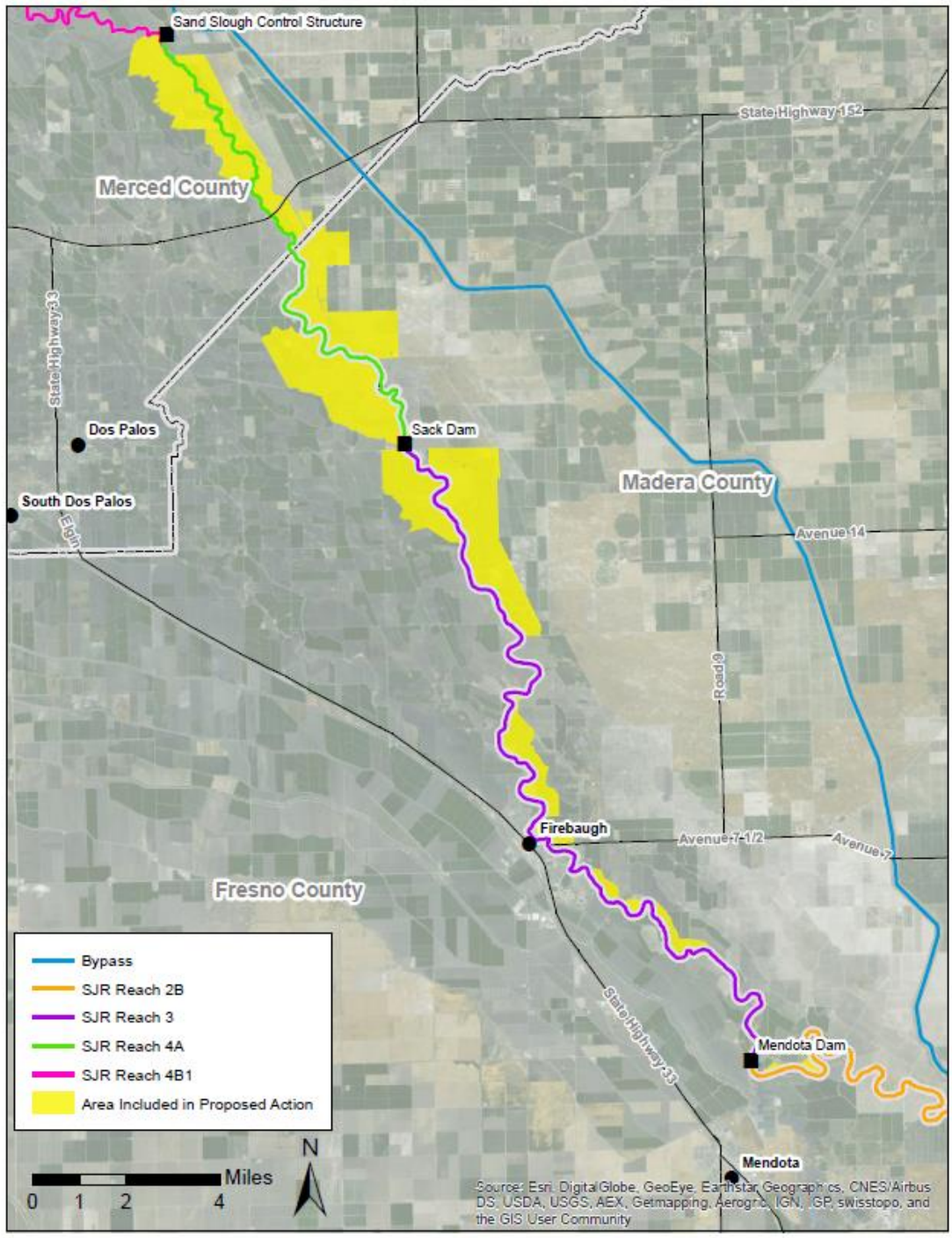


Figure 2-1.
Parcels Considered for Seepage Management Actions under the Proposed Action

A seepage easement would be a permanent easement (i.e., recorded on the deed) on the landowner's property that would allow Reclamation to increase groundwater levels on all or a portion of the property. By having an easement in place that allows an increase in groundwater levels on the property, Reclamation would be able to increase Restoration Flows in the San Joaquin River adjacent to the property. A seepage easement would include the area of land predicted to be impacted by seepage caused by full Restoration Flows in accordance with Settlement Exhibit B. The easement area would be determined by the geographic extent of damage or yield reduction predicted to the crop from the anticipated groundwater rise, as well as negotiation with the landowner. The seepage easement would be a permanent encumbrance recorded on the deed. Under the seepage easement agreement, the landowner would continue to own the property.

For a fee-title land acquisition, Reclamation would purchase the land from a willing seller. With the fee-title land acquisition, Reclamation would have the ability to increase groundwater levels on the property, thus being able to increase Restoration Flows in the San Joaquin River adjacent to the property. An acquisition could include just the area of land predicted to be impacted from Restoration Flows in accordance with Settlement Exhibit B, or, if the remaining parcel not impacted by seepage is so small as to be infeasible to practically farm, the acquisition could include the entire parcel as identified by Assessor Parcel Number. An independent appraisal would determine the initial acquisition value. After acquiring the land, Reclamation could lease the land back to a grower for agricultural production or retain the property for other uses.

The SMP establishes a process to determine the portion of each parcel that may be affected by seepage impacts. That evaluation process provides an estimate of acreage that would be required for easement or acquisition to reduce the potential seepage impacts. The action may or may not include the entire parcel depending on what portion of the parcel could be affected by seepage impacts. The SMP process for assessing impacts is based on thresholds (the allowable depth to groundwater). One of the methods to calculate thresholds relies on the effective root zones for the crops that are being grown on each parcel. The Almond Root Zone Study Plan considered the root zone for almonds. Based on the results of this study, Reclamation is recommending changes to the almond root zone as specified in the SMP based on this best available science. The almond root zone depth would change from 9 feet to 6 feet, and the capillary fringe buffer would change from a range of 0.5 inches to 1 foot, to a range of 0.5 to 3 feet depending on soil type. The groundwater threshold (the root zone depth plus the capillary fringe thickness) change would be revised from a range of 9.5 to 10 feet to a range of 6.5 to 9 feet.

No excavation, staging areas, or other construction would occur as part of the Proposed Action. Negotiations and realty agreements take time to implement; therefore, it is assumed the Proposed Action would be implemented over the next several years. As previously described, the SMP, as analyzed in the PEIS/R, includes a variety of other seepage management actions that could be implemented in the future, should landowners express an interest in pursuing them with Reclamation. Such actions could include but are not limited to: construction of slurry walls to reduce seepage flows, construction of seepage berms to protect against levee failure, construction of drainage interceptor

ditches or lines to protect affected lands, or installation of tile drains on affected lands. Subsequent project-specific environmental compliance documentation will be completed, as necessary, for other types of seepage management actions as they are identified as landowner-preferred options for specific parcels.

2.3 Environmental Commitments

The following commitments are consistent with those commitments described in the SJRRP ROD, and will be implemented under the Proposed Action to avoid and minimize potential adverse environmental impacts to the extent feasible.

Reclamation will review the land use of all properties with seepage easements or acquired in fee title by Reclamation every 5 years. If land use has changed to a non-agricultural use, Reclamation will either: (1) acquire agricultural conservation easements at a 1:1 ratio (i.e., one acre on which agricultural conservation easements are acquired to one acre of Important Farmland removed from agricultural use) to be held by land trusts or public agencies who will be responsible for enforcement of the deed restrictions maintaining these lands in agricultural use, or (2) provide funds to a land trust or government program that conserves agricultural land sufficient to obtain easements on comparable land at a 1:1 ratio.

For parcels acquired in fee title by Reclamation, Reclamation will strive to maintain existing agricultural uses if potential lessees are willing to accept the risk of increased groundwater levels and would like to continue agricultural operations on the parcel and it is compatible with other SJRRP actions.

Reclamation will implement the actions described in the SMP, including continued operation of a seepage hotline and other measures as described in SMP Appendix J, Operations.

3.0 Affected Environment and Environmental Consequences

3.1 Agricultural Resources

3.1.1 Affected Environment

The project area is entirely agricultural land uses. There are a variety of different crop types, including annual crops, such as tomatoes, corn, and cotton, and permanent crops, such as orchards and pistachios. Table 3-1 shows the estimated acreage of permanent and annual crops in the project area by county.

**Table 3-1.
Estimated Acreage of Permanent and Annual Crops in the Project Area**

County	Annual Crops (acres)	Permanent Crops (acres)	Total (acres)
Fresno	3,206	0	3,206
Madera	2,207	3,470	5,677
Merced	2,636	0	2,636
Total	8,049	3,470	11,519

Williamson Act

California has developed processes to discourage continued conversion of agricultural land to nonagricultural uses. The use of Williamson Act contracts enables local governments to provide private landowners with tax incentives to continue agricultural or related open space uses. The minimum term for contracts is ten years and the contract term automatically renews on each anniversary date of the contract. Any land where the Federal government is involved to create a “public improvement” (e.g., easements, rights-of-way, and interests in fee title) are subject to California Government Code §51290 - §51295.

Farmland Mapping and Monitoring Program

The California Department of Conservation maintains a statewide inventory of farmlands. As part of the Farmland Mapping and Monitoring Program (FMMP), the Division of Land Resource Protection produces maps and statistical data used for analyzing impacts on California’s agricultural resources. Agricultural land is rated according to soil quality and irrigation status; the best quality land is called Prime Farmland. The maps, referred to as Important Farmland Maps, are updated every two years with the use of a computer mapping system, aerial imagery, public review, and field reconnaissance (California Department of Conservation 2015a). The following definitions are used in preparing Important Farmland Maps.

- **Prime Farmland** – Farmland with the best combination of physical and chemical features able to sustain long term agricultural production. This land has the soil

quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.

- **Farmland of Statewide Importance** – Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.
- **Unique Farmland** – Farmland of lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.
- **Farmland of Local Importance** – Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee. For counties in the project area, the following definitions of Farmland of Local Importance apply:
 - **Fresno County** - All farmable lands within Fresno County that do not meet the definitions of Prime, Statewide, or Unique. This includes land that is or has been used for irrigated pasture, dryland farming, confined livestock and dairy, poultry facilities, aquaculture and grazing land.
 - **Madera County** - Lands that are presently under cultivation for small grain crops, but are not irrigated. Also lands that are currently irrigated pasture, but have the potential to be cultivated for row/field crop use.
 - **Merced County** - Farmlands that have physical characteristics that would qualify for Prime or Statewide except for the lack of irrigation water. Also, farmlands that produce crops that are not listed under Unique but are important to the economy of the county or city.
- **Grazing Land** – Land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension (UCCE), and other groups interested in the extent of grazing activities.
- **Urban and Built-up Land** – Land occupied by structures with a building density of at least one unit to 1.5 acres or approximately six structures to a 10-acre parcel. This land is used for residential, industrial, commercial, institutional, and other developed purposes.
- **Other Land** – Land not included in any other mapping category. Common examples include low density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry or

aquaculture facilities; strip mines, borrow pits; and water bodies smaller than forty acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land.

- **Water** – Perennial water bodies with an extent of at least 40 acres.

As shown in Figure 3-1 the land in the project area is primarily classified as Important, Prime, or Farmland of Statewide Importance.

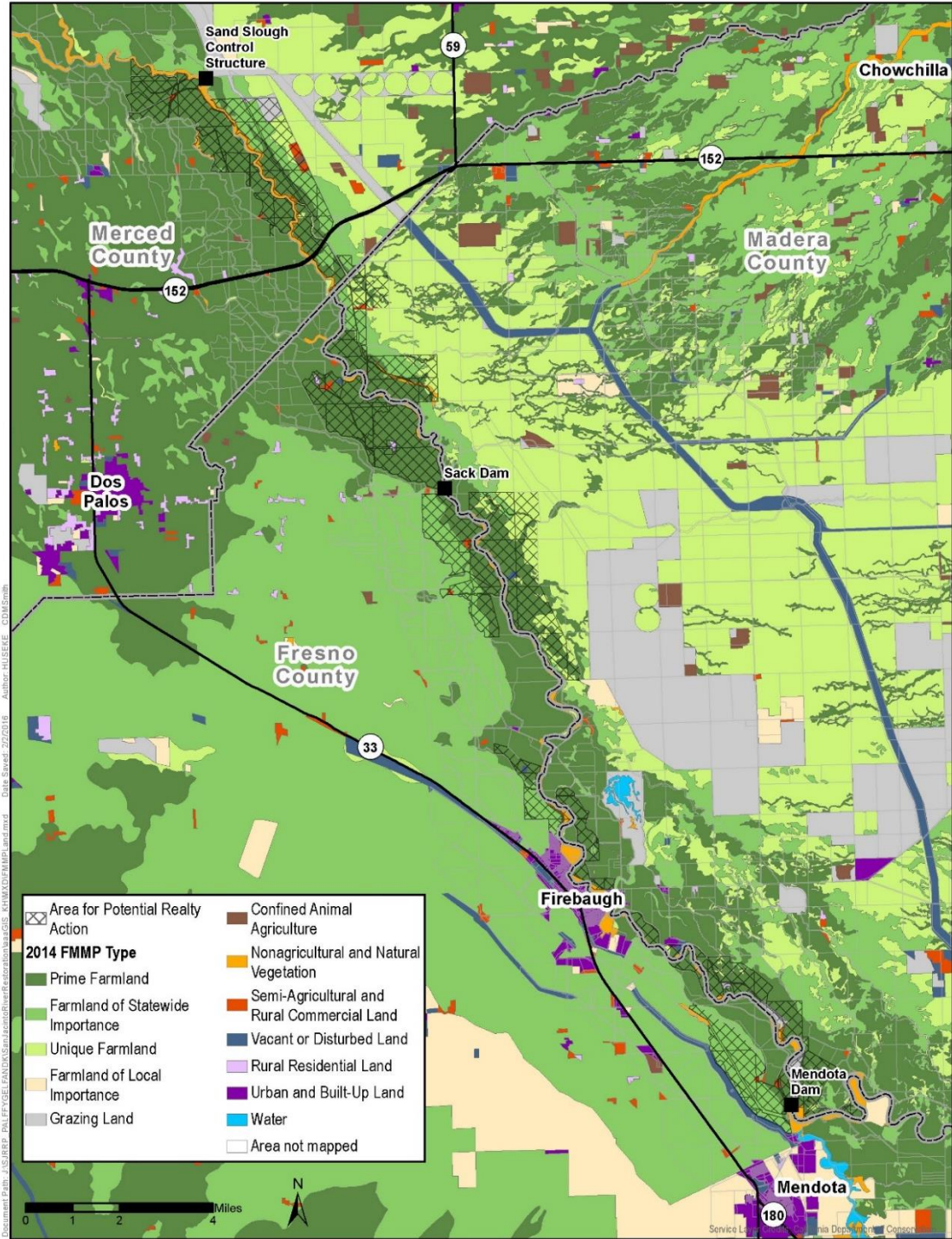


Figure 3-1.
Farmland Mapping and Monitoring Program Classification

3.1.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, further seepage management actions beyond those occurring under existing conditions, as described in Section 2.1, would not occur. Agricultural land use would continue on parcels within the project area similar to existing conditions. As land would remain in agricultural land uses, there would be no conflicts with Williamson Act contracts.

Water delivery uncertainties and other resource constraints have led to land idling and losses of irrigated land. As of the 2012 update, the FMMP identified nearly 150,000 acres in the San Joaquin Valley as being in dryland or fallow status for two update cycles (California Department of Conservation 2015a).

Restoration Flows would be constrained downstream of Sack Dam in order to avoid seepage impacts in the project area. Agricultural productivity for parcels within the project area would remain similar to existing conditions under the No Action Alternative.

Proposed Action

As stated in Section 2.2, Reclamation is changing the seepage root zone depth assumption for almonds. Root zone depth plus an allowance for the capillary fringe comprises the groundwater level threshold. The groundwater threshold helps determine the properties with almonds that could have seepage impacts and require a seepage management action with Restoration Flows. The change to the threshold could affect the size of the potential realty actions on lands planted with almonds, but would not affect the productivity of almond trees. Properties with almond trees where groundwater levels with Restoration Flows are not predicted to rise shallower than thresholds would have no change in almond production and thus no anticipated seepage management action, based on the best available science used to determine thresholds. Reclamation would pursue a seepage management action in coordination with landowners of properties with almonds where groundwater levels with Restoration Flows are predicted to rise higher than the thresholds.

With an easement, landowners or growers would continue to own the land and could continue to farm the land with the same crop, a new crop, or let the land go idle. Based on initial coordination with landowners, it is anticipated that property with a seepage easement would likely remain in agricultural production. Continued planting or temporary idling of the land under a seepage easement would not conflict with the requirements of or result in the cancellation of a Williamson Act contract (Figure 3-2).

With a fee title acquisition, Reclamation may choose to lease the property to the former landowner or another grower, if it is compatible with other SJRRP actions. Under the lease, the land may be planted with the same or a different crop. Under a fee title land acquisition, Reclamation would own the land and will notify the California Department of Conservation prior to a decision to acquire any lands enrolled in a Williamson Act contract (California Department of Conservation 2015b). If requirements for public acquisition of Williamson Act land are met, the contract may be terminated.

Reclamation's acquisition of land would result in cancellation of the Williamson Act contract, even if the land is leased to a grower and planted with a crop. Reclamation will consider leasing the land to the same grower as before, and will strive to uphold existing leases if lessees recognize the seepage impact risk and would like to continue farming and it is compatible with other SJRRP actions.

There would be no land use conversion to urban uses of properties under the Proposed Action. Continued irrigation would not affect the classification of Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. However, increased seepage that would occur on the property due to release of Restoration Flows could affect soil quality, which is also a criterion for Prime Farmland, Farmland of Statewide Importance, or Unique Farmland. To be classified as Prime Farmland, soils must meet specified criteria for soil temperature range, acid-alkali balance, water table, sodium content, flooding, erodibility, permeability, rock fragment content, and rooting depth. Farmland of Statewide Importance and Unique Farmland also have soil criteria. Seepage could affect soil properties that could result in reclassification of Prime Farmland, Farmland of Statewide Importance, or Unique Farmland.

Idling of land for four consecutive years or more could result in a conversion of Prime Farmland, Farmland of Statewide Importance, Unique Farmland to Grazing Land, or Farmland of Local Importance (California Department of Conservation 2015a). Both Grazing Land and Farmland of Local Importance continue to be agricultural uses. If land is irrigated during a subsequent mapping cycle, it would regain classification as Prime Farmland, Farmland of Statewide Importance or Unique Farmland.

In the event that permanent or long-term changes occur to agricultural land classification for parcels under the Proposed Action, Reclamation has included environmental commitments in the Proposed Action to protect agricultural land uses in the region. Reclamation will check land uses every five years to identify if a permanent or long-term change has occurred on a parcel. The environmental commitments are as follows:

1. Reclamation will, as necessary, either (1) acquire agricultural conservation easements at a 1:1 ratio (i.e., acquire easements on 1 acre for each acre of Important Farmland removed from agricultural use) to be held by land trusts or public agencies who are responsible for enforcement of the deed restrictions maintaining these lands in agricultural use, or (2) provide funds to a land trust or government program that conserves agricultural land sufficient to obtain easements on comparable land at a 1:1 ratio.
2. Reclamation will strive to uphold existing leases if lessees recognize the seepage impact risk and would like to continue farming; if compatible with other SJRRP actions.

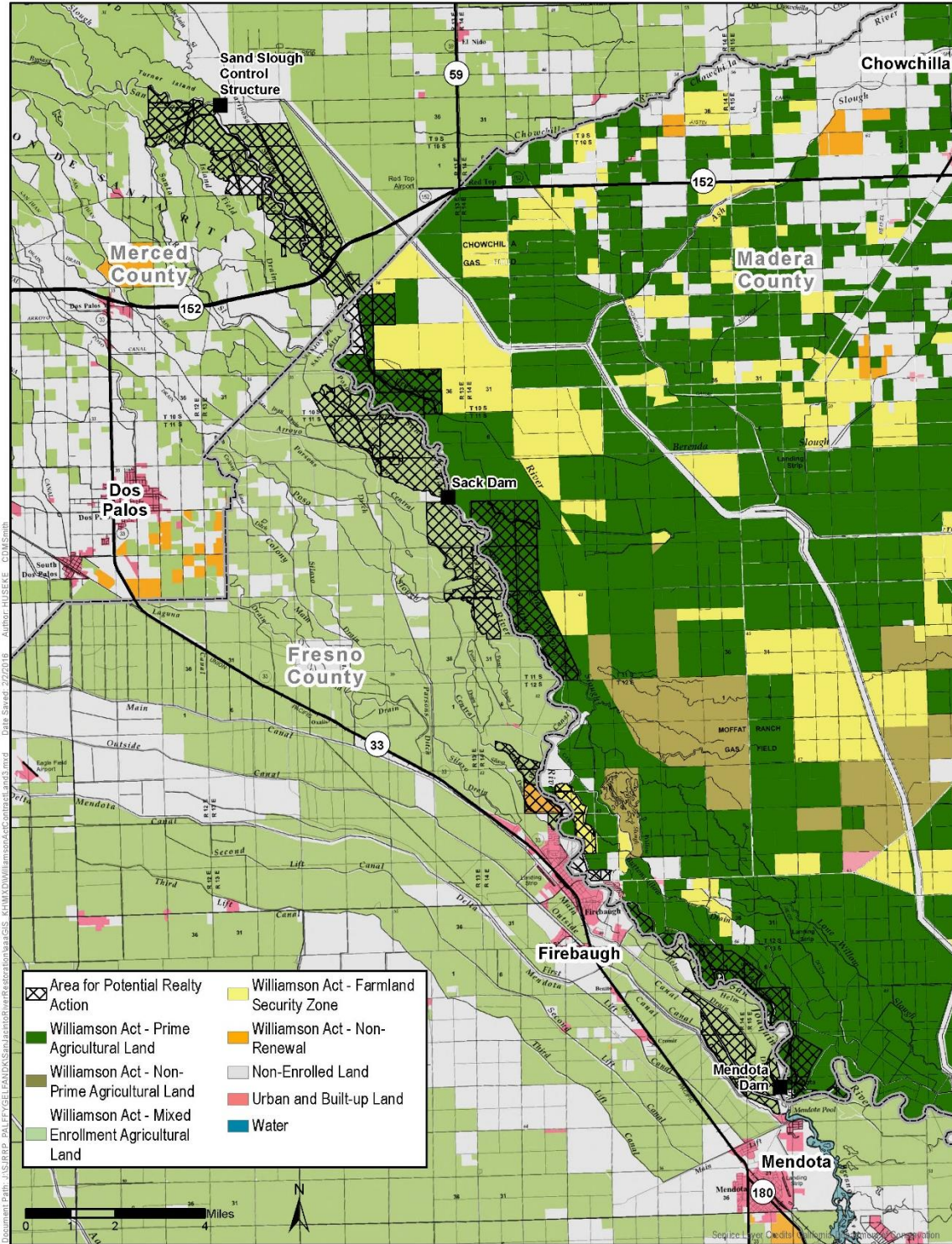


Figure 3-2.
Williamson Act Contract Lands

Groundwater seepage has the potential to cause waterlogging of crops and salt mobilization in the crop root zone, which could affect the productivity of crops. Under the Proposed Action, Reclamation would compensate landowners for the effects of increased seepage from release of Restoration Flows. Landowners or lessees that choose to continue to farm the land with a seepage easement or land acquisition would have agreed to allow seepage on the property. Increased seepage would have an adverse effect on agricultural productivity, as described at a programmatic level in the PEIS/R. Impacts GRW-2 GRW-3 described in the PEIS/R disclosed the potential impact of elevating groundwater levels and potential effects to groundwater quality from the mobilization of salts within the Restoration Area. Impact LUP-5 described in the PEIS/R disclosed the potentially significant impact of diminished quality and importance of agricultural land due to altered inundation and/or soil saturation, and the potential that agricultural land could be converted to non-agricultural use. The environmental commitments included in the proposed action are consistent with those included in the SJRRP Selected Alternative (Alternative C1), as described in the PEIS/R and ROD. Project specific effects of the proposed action are not anticipated to be beyond those analyzed and disclosed in the PEIS/R.

3.2 Biological Resources

3.2.1 Affected Environment

Vegetation

Vegetation communities within the project area are very limited due to the heavily managed nature of agricultural land use.

- **Reach 2B.** The lower few miles of Reach 2B support narrow, patchy, but nearly continuous vegetation, because this area is continuously watered by the backwater of the Mendota Pool affecting both surface and groundwater elevation. The riparian zone is very narrowly confined to a thin strip bordering the channel. The herbaceous understory, however, is very rich in native species and a high portion of the total vegetative cover is native plants. The margins of Mendota Pool support some areas of emergent vegetation dominated by cattails and tules; a few cottonwoods and willows grow above the waterline (Reclamation 2012).
- **Reach 3.** Nearly continuous riparian vegetation of various widths and cover types occurs on at least one side of the channel in this reach. In Reach 3, cottonwood riparian forest is the most abundant native vegetation type, followed by willow scrub, willow riparian forest, and riparian scrub (Reclamation 2012).
- **Reach 4A.** Reach 4A is sparsely vegetated, with a very thin band of vegetation along the channel margin (or none at all). Willow scrub and willow riparian forest occur in small to large stands, and ponds rimmed by small areas of marsh vegetation are present in the channel (Reclamation 2012).

Wildlife

Tall riparian trees in the vicinity of the project area provide high-quality nesting habitat for raptors, such as red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), Swainson's hawk (*Buteo swainsoni*), and white-tailed kite (*Elanus leucurus*). These trees also provide nesting habitat for cavity-nesting species, such as downy woodpecker (*Picoides pubescens*), wood duck (*Aix sponsa*), northern flicker (*Colaptes auratus*), ash-throated flycatcher (*Myiarchus cinerascens*), oak titmouse (*Baeolophus inornatus*), tree swallow (*Tachycineta bicolor*), and white-breasted nuthatch (*Sitta carolinensis*). The project area supports populations of insects that feed on foliage and stems during the growing season. These insects, in turn, are prey for migratory and resident birds, including Pacific-slope flycatcher (*Empidonax difficilis*), western wood-pewee (*Contopus sordidulus*), olive-sided flycatcher (*Contopus cooperi*), warbling vireo (*Vireo gilvus*), orange-crowned warbler (*Vermivora celata*), yellow warbler (*Dendroica petechia*), Bullock's oriole (*Icterus bullockii*), and spotted towhee (*Pipilo maculatus*). Mammal species potentially using the project area include coyote (*Canis latrans*), beaver (*Castor canadensis*), river otter (*Lontra canadensis*), raccoon (*Procyon lotor*), desert cottontail (*Sylvilagus audubonii*), and striped skunk (*Mephitis mephitis*) (Reclamation 2012).

Many wildlife species could be present in the vicinity of the project area, including song sparrow (*Melospiza melodia*), common yellowthroat (*Geothlypis trichas*), marsh wren (*Cistothorus palustris*), and red-winged blackbird (*Agelaius phoeniceus*). Mammal species that use this habitat include California vole (*Microtus californicus*), common muskrat (*Ondatra zibethicus*), and Norway rat (*Rattus norvegicus*). Pacific chorus frog (*Pseudacris regilla*) and western terrestrial garter snake (*Thamnophis elegans*) are commonly present in this habitat (Reclamation 2012).

The grassland and pasture vegetation type is composed of an assemblage of nonnative annual and perennial grasses and occasional nonnative and native forbs. The most abundant species are nonnative grasses, including ripgut brome (*Bromus diandrus*), foxtail fescue (*Vulpia myuros*), and foxtail barley (*Hordeum murinum* ssp. *leporinum*) and forbs including red-stemmed filaree (*Erodium cicutarium*) and horseweed (*Conyza canadensis*). Typical bird species associated with grasslands include northern harrier (*Circus cyaneus*), ring-necked pheasant (*Phasianus colchicus*), mourning dove (*Zenaidura macroura*), burrowing owl (*Athene cunicularia*), horned lark (*Eremophila alpestris*), loggerhead shrike (*Lanius ludovicianus*), and savannah sparrow (*Passerculus sandwichensis*). Mammal species that use grasslands include deer mouse (*Peromyscus maniculatus*), California vole, California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), American badger (*Taxidea taxus*), and coyote. Common amphibian and reptile species associated with grasslands in the San Joaquin Valley include western toad (*Bufo boreas*), western fence lizard (*Sceloporus occidentalis*), western racer (*Coluber constrictor mormon*), and gopher snake (*Pituophis catenifer*) (Reclamation 2012).

Cropland agricultural habitats can provide food and cover for wildlife species, but the value of the habitat varies greatly among crop type and agricultural practices. Grain crops provide forage for songbirds, small rodents, and waterfowl at certain times of year.

Pastures, alfalfa, and row crops, such as tomatoes, provide foraging opportunities for raptors because of the frequent flooding, mowing, or harvesting of fields, which make prey readily available. Orchards and vineyards have relatively low value for wildlife because understory vegetation growth that would provide food and cover typically are removed. Species that use orchards and vineyards, such as ground squirrel, American crow (*Corvus brachyrhynchos*), Brewer’s blackbird (*Euphagus cyanocephalus*), and European starling (*Sturnus vulgaris*), often are considered agricultural pests (Reclamation 2012).

Special Status Species

Table 3-2 lists special status species with the potential to occur in the action area. The species list was developed using the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) project planning tool to support the environmental review process (USFWS 2016). The species list in Table 3-2 was further developed based on the SJRRP Program EIS/R biological resources analysis in the Restoration Area (Reclamation 2012). Table 3-2 identifies the species with a potential to occur in the action area based on the habitat present. Each of these species with a medium to high potential to occur in the action area is further evaluated in Section 3.6.2.

**Table 3-2.
Special-Status Species Known to or with Potential to Occur in the Project Area**

Species	Federal Status	General Habitat	Potential to Occur in the Project Area
Invertebrates			
<i>Branchinecta conservatio</i> Conservancy fairy shrimp	FE	Found in ephemeral freshwater habitats including alkaline pools, clay flats, vernal pools, vernal lakes, vernal swales, and other types of seasonal wetlands.	Low. Vernal pool habitat is not present in the project area. The nearest vernal pool habitat is located within the Merced NWR. Designated critical habitat is not present within the project area.
<i>Branchinecta lynchi</i> vernal pool fairy shrimp	FT	Found in ephemeral freshwater habitats including alkaline pools, clay flats, vernal pools, vernal lakes, vernal swales, and other types of seasonal wetlands.	Low. Vernal pool habitat is not present in the project area. The nearest vernal pool habitat is located within the Merced NWR. Designated critical habitat is not present within the project area.
<i>Desmocerus californicus dimorphus</i> valley elderberry longhorn beetle	FT	Breeds and forages exclusively on elderberry shrubs (<i>Sambucus mexicana</i>) typically associated with riparian forests, riparian woodlands, elderberry savannas, and other Central Valley habitats. Occurs only in the Central Valley of California. Prefers to lay eggs in elderberries 2–8 inches in diameter; some preference shown for “stressed” elderberries.	Medium. Blue elderberry shrubs are known to occur within the limited riparian scrub habitat in Reach 2 in the project area.

**Table 3-2.
Special-Status Species Known to or with Potential to Occur in the Project Area**

Species	Federal Status	General Habitat	Potential to Occur in the Project Area
<i>Lepidurus packardii</i> vernal pool tadpole shrimp	FE	Found in ephemeral freshwater habitats including alkaline pools, clay flats, vernal pools, vernal lakes, vernal swales, and other types of seasonal wetlands which range in size from small, clear, well-vegetated vernal pools to highly turbid, alkali scald pools to large winter lakes.	Low. Vernal pool habitat is not present in the project area. The nearest vernal pool habitat is located within the Merced NWR. Designated critical habitat is not present within the project area.
Amphibians			
<i>Ambystoma californiense</i> California tiger salamander (central population)	FT, ST	Annual grassland and grassy understory of valley-foothill hardwood habitats in central and northern California. Needs underground refuges and vernal pools or other seasonal water sources.	Low. Suitable habitat is not present in the project area. The nearest vernal pool habitat is located within the Merced NWR.
<i>Rana draytonii</i> California red-legged frog	FT, SSC	Breeds in slow moving streams, ponds, and marshes with emergent vegetation; forages in nearby uplands within about 200 feet.	Unlikely to occur. No longer occurs on the floor of the Central Valley.
Reptiles			
<i>Gambelia sila</i> blunt-nosed leopard lizard	FE, SE	Found in semiarid grasslands, alkali flats, and washes. Prefers flat areas with open space for running, avoiding densely vegetated areas.	Low. Suitable habitat is very limited within the project area. Known to occur in Chowchilla Bypass and adjacent to Reach 3.
<i>Thamnophis gigas</i> giant garter snake	FT, ST	Found primarily in marshes, sloughs, drainage canals, and irrigation ditches, especially around rice fields, and occasionally in slow-moving creeks in California's interior.	Medium. Suitable habitat is present within the project area.
Mammals			
<i>Dipodomys nitradoides exilis</i> Fresno kangaroo rat	FE, SE	Restricted to native grasslands in Fresno County within the San Joaquin Valley; arid, often strongly alkaline, flat plains with sparse vegetation of grasses and alkali forbs.	Low. Suitable habitat is very limited within the project area. Populations may still occur at Alkali Sink Ecological Reserve and Mendota Wildlife Areas or other private lands where suitable habitat could exist.
<i>Dipodomys ingens</i> Giant kangaroo rat	FE, SE	Annual grasslands and shrubland habitats with sparse vegetative cover.	None. Although historically known from the region, giant kangaroo rat are at present considered extirpated from the Restoration Area.

**Table 3-2.
Special-Status Species Known to or with Potential to Occur in the Project Area**

Species	Federal Status	General Habitat	Potential to Occur in the Project Area
<i>Vulpes macrotis mutica</i> San Joaquin kit fox	FE, ST	Grassland or grassy open stages with scattered shrubby vegetation; requires loose textured sandy soils for burrowing; requires suitable prey base of small rodents.	Medium. Possible occurring near edges of active farmland or near drainage ditches.
Birds			
<i>Agelaius tricolor</i> tricolored blackbird	SCS	Largely endemic to California, most numerous in the Central Valley and nearby vicinity. Typically requires open water, protected nesting substrate, and foraging grounds within vicinity of the nesting colony. Nests in dense thickets of cattails, tules, willow, blackberry, wild rose, and other tall herbs near fresh water. Also nests in agricultural crops (e.g. silage), where colonies are threatened during harvest.	Medium. In-channel wetland and riparian vegetation within Reaches 2B and 4B1 provide suitable habitat.
<i>Asio Flammeus</i> Short-eared Owl	SSC	Tall (ungrazed) grasslands and marshes with dense vegetation	Low. Suitable habitat is limited in the project area.
<i>Athene cunicularia</i> burrowing owl	SSC	Found in open grasslands with low vegetation, agricultural fields, golf courses, and disturbed/ruderal habitat in urban areas.	Medium. Suitable habitat is present within the project area
<i>Buteo swainsonii</i> Swainson's hawk	ST	Forages in open and agricultural fields and nests in mature trees usually in riparian corridors.	High. Suitable foraging and nesting habitat is present within the project area.
<i>Charadrius montanus</i> Mountain Plover	SSC	Open plains or rolling hills with short grasses or sparse vegetation	Low. Suitable habitat is limited in the project area. Known to occur in winter in suitable habitat near Tranquility.
<i>Coccyzus americanus</i> Yellow-billed cuckoo	FT, SE	Inhabits wide, dense riparian forests with a thick understory of willows for nesting; prefers sites with a dominant cottonwood overstory for foraging	Medium. Suitable habitat is present within the project area.
<i>Falco peregrinus</i> Peregrine Falcon	SFP	Nests and roosts on protected ledges of high cliffs, usually adjacent to lakes, rivers, or marshes; permanent resident in the north and south Coast Ranges; winters in the Central Valley southward through the Transverse and Peninsular ranges; feeds almost exclusively on birds	Low. Suitable habitat is not present in the project area.

**Table 3-2.
Special-Status Species Known to or with Potential to Occur in the Project Area**

Species	Federal Status	General Habitat	Potential to Occur in the Project Area
<i>Haliaeetus leucocephalus</i> Bald Eagle	SE, SFP	Forages along inland waters; nests in adjacent large, old-growth trees or snags	Low. Suitable habitat is limited in the project area. Known to nest in suitable habitat on Lake Millerton and Chowchilla Bypass and occurs during winter and migration in the San Luis NWR complex.
<i>Lanius ludovicianus</i> loggerhead shrike	SSC	Inhabits a variety of woodland and open grassland habitats throughout California.	High. Suitable nesting habitat is present within the project area.
<i>Numenius americanus</i> Long-billed Curlew	SWL	Nests in open grassland in the prairie region and far northeastern California; winters in range of wetland habitats, foraging in pastures, agricultural fields, and tidal estuaries	High. Common winter resident in the Central Valley in wet habitats.
Plants			
<i>Cryptantha hooveri</i> Hoover's spurge	FT	Annual herb occurring in inland dune and sandy soils of valley and foothill grassland habitat. Blooms April-May. Elevation: 30 to 495 ft.	Low. Suitable habitat is very limited within the project area. Designated critical habitat is not present within the project area.
<i>Neostapfia colusana</i> Colusa grass	FT, SE	Annual herb found in large, deep vernal pools with adobe soil. Blooms May-Aug. Elevation: 16 to 656 feet.	Low. Vernal pool habitat is not present in the project area. Designated critical habitat is not present within the project area.
<i>Cordylanthus palmatus</i> Palmate-bracted Bird's Beak	FE, SE	Alkaline soils in chenopod scrub and valley and foothill grassland, 15-500 feet elevation	Low. Suitable habitat does not occur in the project area; species known to occur at the Alkali Sink Ecological Area and Mendota Wildlife Area (between Chowchilla Bypass and Reach 3).

**Table 3-2.
Special-Status Species Known to or with Potential to Occur in the Project Area**

Species	Federal Status	General Habitat	Potential to Occur in the Project Area
<i>Monolopia congdonii</i> San Joaquin Woolly-threads	FE	Alkaline sinks and valley and foothill grassland with sandy soils; 200-2,650 feet elevation	Low. Historic record shows species location several miles from the river and possible extirpated from area.

Source: USFWS 2016, Reclamation 2012

Key:

FE = Federal Endangered

FT = Federal Threatened

SE = State Endangered

SFP = State Fully Protected

SSC = State Species of Special Concern

ST = State Threatened

SWL = State Watch List

SCP = State Candidate Species

In March 2016, Reclamation received information from a USFWS biologist regarding potentially occupied kangaroo rat habitat in Reach 4A of the San Joaquin River channel. While on a site visit, several potential kangaroo rat burrows and signs were observed. Upon receipt of this information, Reclamation coordinated with the USFWS and California Department of Fish and Wildlife (DFW) to plan and implement a kangaroo rat survey and trapping effort for areas of potential habitat within the majority of Reach 4A and a limited area of the Eastside Bypass in anticipation of the release of Restoration Flows. In April 2016, Reclamation, in coordination with the USFWS, DFW and DWR, completed a reconnaissance survey of this area for kangaroo rat burrows and sign.

Seven sites were identified at which kangaroo rat burrows or sign were observed. These sites were then trapped consistent with protocols and a trapping plan approved by USFWS and DFW. Each of the seven sites was trapped for 5 consecutive nights, with efforts beginning in May 2016 and ending in July 2016. No Fresno Kangaroo Rat, or any other listed species were captured or detected during these trapping efforts (Reclamation 2016c). Reports on the trapping efforts were prepared in accordance with all applicable protocols and permits and provided to the Service and DFW.

Based on the results of the survey and trapping efforts described above, Reclamation's original determination, and concurrence by the FWS determined that the project level activities of the SJRRP, including the release of Restoration Flows, is not likely to adversely affect Fresno Kangaroo Rat, remains unchanged.

3.2.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, there would be limited releases of Restoration Flows. It is not likely there would be changes to natural communities within the project area. Riparian and scrub habitats would remain the same as existing conditions. Landowners would continue to grow crops similar to existing conditions. There may be some changes in crop types or some fields may be idled; however, this would be part of normal farming practices in the project area. Agriculture would provide forage areas for wildlife similar to existing conditions. Because habitat conditions would remain the same as existing conditions, there would be no impacts to special status species under the No Action Alternative.

Proposed Action

The Proposed Action includes land-based realty actions that would not directly affect aquatic resources. The Proposed Action would support release of Restoration Flows downstream of Sack Dam, which would benefit SJRRP fisheries restoration efforts for the San Joaquin River non-essential experimental population (NEP) of spring-run Chinook salmon, as well as other fish species potentially present in the Restoration Area.

Under the proposed action, Reclamation would not affect existing facilities or require new ones, and land uses would remain within historic ranges of use. As described in Section 2.2, it is anticipated that most land in the project area would continue to be farmed with the same crop or a new crop similar to the existing conditions. However, some land idling may occur, as analyzed and disclosed in the PEIS/R. LUP-5, as described in the PEIS/R, disclosed the potentially significant impact of diminished quality and importance of agricultural land due to altered inundation and/or soil saturation, and the potential that agricultural land could be converted to non-agricultural use.

As identified in Table 3-3, special status species with a medium to high potential to occur in the project area include valley elderberry longhorn beetle, giant garter snake, San Joaquin kit fox, tricolored blackbird, burrowing owl, Swainson's hawk, yellow-billed cuckoo, loggerhead shrike, and long-billed curlew. Valley elderberry longhorn beetle is dependent on its host plant, blue elderberry. Agricultural fields in the project area are heavily managed and do not have elderberry shrubs on them, and cropland idling would not affect adjacent riparian habitat where elderberry shrubs may occur. Therefore, idling of fields or changes in cropping patterns would not affect elderberry shrubs or the valley elderberry longhorn beetle.

Giant garter snakes use open water, emergent, and upland habitat, should they be present in the project vicinity. Giant garter snakes require aquatic habitat for breeding and foraging during the spring and summer and use upland habitat for refuge. Suitable habitat in the project area is mostly near the Mendota Pool. Land idling would not affect Mendota Pool. Agricultural canals and ditches can contain wetland vegetation such as cattails, which provide cover, and these canals and ditches provide forage, resting, nesting habitat and movement corridors for the giant garter snake. Idling fields under the

Proposed Action could reduce flows in agricultural canals; however, flows would still exist for irrigation of other fields adjacent to the project area. This would maintain habitat and a migratory corridor for giant garter snakes, should they be present.

Optimum habitat for San Joaquin kit fox consists of a variety of open, level areas with loose-textured soil for burrowing, scattered shrubby vegetation, suitable prey base of small rodents, and little human disturbance. The margins of agricultural areas within the project area may provide some foraging habitat for San Joaquin kit fox. The agricultural lands that make up the project area do not provide suitable denning habitat for San Joaquin kit fox. Land idling would not affect denning habitat for the San Joaquin kit fox but could modify some foraging habitat from crops to ruderal grassland. However, it is anticipated that idled land would continue to provide foraging habitat for San Joaquin kit fox. Reclamation has determined that the proposed action would be not likely to adversely affect federally listed species and has received the Service's concurrence with this determination in accordance with Section 7(a)(2) of the Endangered Species Act (ESA).

Actively managed croplands are not generally suitable nesting habitat for most bird species. Upland crops would continue to provide forage for wildlife and bird species. Land idling could modify foraging areas for certain species that use crops such as alfalfa for foraging habitat. However, it is anticipated that idled land would continue to provide foraging habitat for birds, and that birds could also respond by looking for forage on other parcels in the region.

3.3 Environmental Justice

3.3.1 Affected Environment

The 1994 Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires all Federal agencies to conduct “programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, or national origin.” The Interagency Federal Working Group on Environmental Justice guidance provides that a minority and/or low-income population may exist where the proportion of the population exceeds 50% of the total population, or if the proportion of the minority or low-income population is “meaningfully greater” than the minority or low-income population in the general population. The United States Census Bureau (U.S. Census Bureau) recognizes persons living with income below the poverty threshold as low-income.

The project area includes lands in Fresno, Madera, and Merced counties along Reaches 2B, 3, and 4A of the San Joaquin River. Table 3-3 shows 2010-2014 demographics and income in the counties within the project area. Comparable data for the cities of Dos Palos, Firebaugh, and Mendota are presented in Table 3-4. All counties

and cities had a Hispanic population greater than 50%. All counties and cities had a lower median household income than the state. Fresno and Merced counties had higher unemployment rates than the state, and all counties had higher poverty rates than the state. All cities had higher unemployment and poverty rates than the state.

Agriculture is a primary industry in the project area and provides farm worker employment to low income and minority populations. Table 3-5 shows 2004-2014 farm employment in the counties within the project area.

**Table 3-3.
2010-2014 Demographic and Income in Affected Counties**

	California	Fresno	Madera	Merced
Population	38,066,920	948,844	152,452	261,609
Ethnicity¹ (%)				
Hispanic or Latino	38.2%	51.2%	55.1%	56.3%
Race²				
White	62.1%	58.6%	82.5%	64.5%
African American	5.9%	5.1%	3.5%	3.5%
American Indian	0.8%	1.0%	1.5%	0.8%
Asian	13.5%	9.7%	2.2%	7.6%
Pacific Islander	0.4%	0.2%	0.2%	0.2%
Some Other Race	12.8%	21.2%	6.7%	19.5%
Multirace	4.5%	4.2%	3.4%	3.9%
Poverty Rate (2010-2014)³	12.3%	22.2%	24.2%	21.4%
Unemployment Rate	11.0%	14.3%	9.5%	17.5%
Median Household Income (2010-2014)⁴	\$61,489	\$45,201	\$45,490	\$43,066

Source: U.S. Census Bureau 2010-2014

Notes:

- ¹ The U.S. Census Bureau classifies Hispanic or Latino as an ethnicity, and surveys for this percentage across all races; therefore, the actual percentage of persons of only Hispanic or Latino origin could be smaller than the stated percentage (U.S. Census Bureau 2010-2014).
- ² A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic (U.S. Census Bureau 2010-2014).
- ³ The U.S. Census Bureau classifies families and persons as *below poverty* "if their total family income or unrelated individual income was less than the poverty threshold" as defined for all parts of the country by the federal government (U.S. Census Bureau 2010-2014).
- ⁴ Household income is defined by the U.S. Census Bureau as "the sum of money income received in the calendar year by all household members 15 years old and over" (U.S. Census Bureau 2010-2014).

**Table 3-4.
2010-2014 Demographic and Income in Potentially Affected Cities**

	California	Dos Palos	Firebaugh	Mendota
Population	38,066,920	7,598	7,631	11,385
Ethnicity¹ (%)				
Hispanic or Latino	38.2%	76.0%	91.3%	98.0%
Race²				
White	62.1%	81.2%	78.0%	86.3%
African American	5.9%	4.0%	0.7%	1.2%
American Indian	0.8%	1.4%	0.9%	0.1%
Asian	13.5%	0.0%	0.0%	0.6%
Pacific Islander	0.4%	0.0%	0.0%	0.0%
Some Other Race	12.8%	11.1%	15.8%	9.8%
Multirace	4.5%	2.3%	4.5%	2.0%
Poverty Rate (2010-2014)³	12.3%	30.1%	35.2%	44.2%
Unemployment Rate	11.0%	25.7%	13.8%	29.6%
Median Household Income (2010-2014)⁴	\$61,489	\$33,978	\$30,316	\$25,135

Source: U.S. Census Bureau 2010-2014

Notes:

- ¹ The U.S. Census Bureau classifies Hispanic or Latino as an ethnicity, and surveys for this percentage across all races; therefore, the actual percentage of persons of only Hispanic or Latino origin could be smaller than the stated percentage (U.S. Census Bureau 2010-2014).
- ² A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic (U.S. Census Bureau 2010-2014).
- ³ The U.S. Census Bureau classifies families and persons as *below poverty* "if their total family income or unrelated individual income was less than the poverty threshold" as defined for all parts of the country by the federal government (U.S. Census Bureau 2010-2014).
- ⁴ Household income is defined by the U.S. Census Bureau as "the sum of money income received in the calendar year by all household members 15 years old and over" (U.S. Census Bureau 2010-2014).

**Table 3-5.
Farm Employment 2004-2014**

	Fresno, Madera, and Merced Counties	Annual Percent Change
2004	65,700	--
2005	67,400	2.6%
2006	67,900	0.7%
2007	69,600	2.5%
2008	70,200	0.9%
2009	66,600	-5.1%
2010	67,000	0.6%
2011	70,100	4.6%
2012	72,900	4.0%
2013	74,900	2.7%
2014	75,200	0.4%

Source: Employment Development Department 2015

3.3.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, seepage management actions would not occur beyond those described in Section 2.1, and existing agricultural operations would continue. There would be no changes in farm employment from existing conditions, causing no adverse or disproportionate effects to minorities or low-income workers in the project area.

Proposed Action

Under the Proposed Action, it is anticipated that most land in the project area would continue to be farmed with the same crop or a new crop similar to existing conditions. Reclamation has included an environmental commitment in the Proposed Action to promote continued farming on land that is acquired in fee title. However, some land idling may occur in Fresno, Madera, and Merced counties as a result of the Proposed Action. Land idling would reduce the amount of agricultural land in production and the number of farm laborers needed to work. Section 9.3.3 of the PEIS/R disclosed that the potential impact of conversion of Important Farmland to Nonagricultural Uses and cancellation of Williamson Act Contracts under the SJRRP Selected Alternative had the potential to have disproportionately high and adverse effects on minority and low-income populations at a program level. Potential changes to agricultural operations under the proposed action would be within those analyzed and disclosed in the PEIS/R, and would not result in a substantial reduction in employment for farmworkers beyond what was analyzed and disclosed in the PEIS/R. Also, implementation of the proposed environmental commitments, as described in Section 2.2, would avoid and minimize the potential effects of the proposed action on agricultural land use and farm employment to the extent feasible.

3.4 Greenhouse Gases and Climate Change

3.4.1 Affected Environment

This section primarily focuses on the contribution of the proposed action to climate change via greenhouse gas (GHG emissions). The analysis focuses on the following three pollutants: carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The other two pollutant groups commonly evaluated in various GHG reporting protocols, hydrofluorocarbons and perfluorocarbons, are not expected to be emitted in large quantities as a result of the alternatives and are not discussed further in this section.

California is the second highest emitter of GHG emissions in the United States; however, from a per capita standpoint, California has the 45th lowest GHG emissions among the states. Worldwide, California is the 20th largest emitter of CO₂; if it were a country, on a per capita basis, California would be ranked 38th in the world (CARB 2014).

Agricultural emissions represented approximately eight percent of California's GHG emissions in 2012. Agricultural emissions represent the sum of emissions from agricultural energy use (from pumping and farm equipment), agricultural residue burning, agricultural soil management (the practice of using fertilizers, soil amendments, and

irrigation to optimize crop yield), enteric fermentation (fermentation that takes place in the digestive system of animals), histosols (soils that are composed mainly of organic matter) cultivation, and manure management.

3.4.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, Reclamation would not implement seepage management actions beyond those occurring under existing conditions, as described in Section 2.1. Therefore GHG emissions under the no action alternative would be the same as existing conditions. Future climate change impacts on crop yield and agricultural water deliveries have been analyzed in the Agricultural Resources section. Changes in temperature, amount of atmospheric CO₂, and the frequency and intensity of extreme weather is expected to (1) significantly impact crop yields; and (2) potentially increase water demand (USEPA 2009).

Proposed Action

Under the Proposed Action, it is anticipated that most land in the project area would continue to be farmed with the same crop or a new crop similar to the existing conditions. However, some land idling may occur, as previously described. Because regional agricultural operations are anticipated to be similar to those under the no action alternative, GHG impacts and climate change impacts under the Proposed Action are anticipated to be similar to the No Action Alternative.

3.5 Water Resources

3.5.1 Affected Environment

Surface Water

The San Joaquin River begins in the Sierra Range on the east side of the Central Valley and is impounded beyond Friant Dam in Millerton Lake. The river then flows towards the center of the valley and turns and flows northward near Mendota. At Mendota Dam, water is mixed with water from the Delta-Mendota Canal (DMC) before flowing north towards the Sacramento-San Joaquin Delta (Delta).

Several bypasses exist roughly parallel to the river to accommodate flood flows and allow for diversions for irrigation. Irrigation diversions are also made off the river at Mendota Dam and at Sack Dam near Dos Palos.

Figure 3-3 shows the measured flow in the San Joaquin River in the project area. Data from three locations, Mendota Dam (upstream end of Reach 3); Dos Palos (Reach 4A), and at Washington Road (downstream end of Reach 4A) since October 2011. Reach 3, in the project area (from Mendota Dam to Sack Dam), typically has water in it due to water supply for San Luis Canal Company. The Reaches downstream of Sack Dam typically do not have limited flows in them, outside of flood flow conditions.

Surface Water Quality

San Joaquin River water that flows out of Millerton Lake is of good quality. As the river flows west and north, the quality of the water can be degraded due to inflow from tributaries and discharge from agricultural areas. Because the water in the DMC is predominately sourced in the Delta, the quality of the San Joaquin River water is poorer below Mendota Dam after the river and DMC have been mixed in Mendota Pool. The quality of the river water is generally still adequate for agricultural use within the project area (Reclamation 2013a, 2013b, 2015c, 2016a).

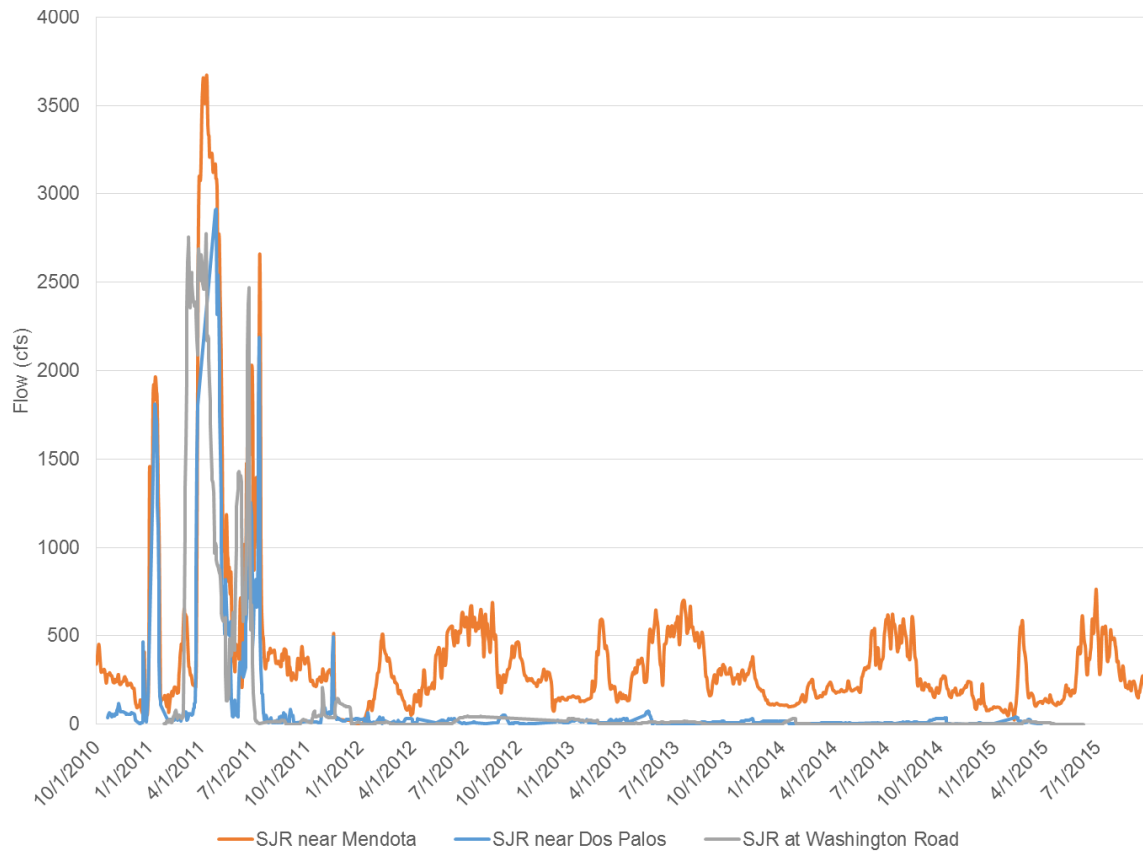


Figure 3-3.
Average Daily Flow along San Joaquin River

Groundwater

The project area is located within or along the edge of several groundwater subbasins as defined by DWR: Kings, Madera, Delta-Mendota, Chowchilla, and Merced subbasins (Figure 3-4). DWR has prioritized each of these subbasins as “critically overdrafted.” (DWR 2016). Within the project area, shallow groundwater levels are typically within five to 15 feet of the ground surface (Reclamation 2016b; Reclamation unpublished).

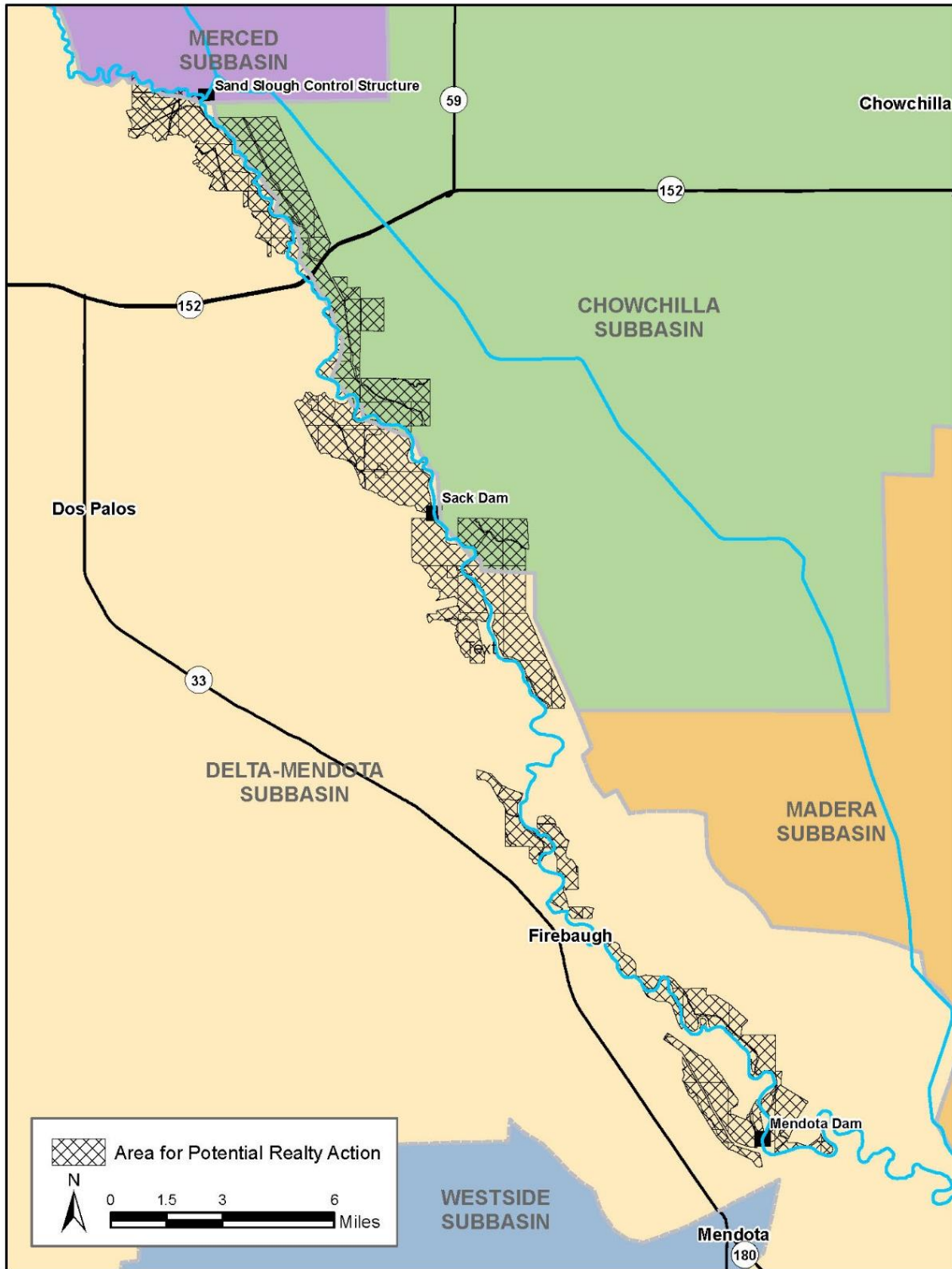


Figure 3-4.
Groundwater Subbasins

The depth to groundwater varies with location along the river, distance from the river, and time of year. Groundwater levels are typically higher on the west side of the river as compared to the east side. Groundwater levels also typically rise during the winter and decline in the spring and summer. These seasonal variations are primarily due to precipitation patterns and the use of groundwater pumping to supply irrigation water during the agricultural growing season. The shallow groundwater system is also influenced by the amount of flow in the San Joaquin River and its tributaries. Near the river groundwater levels can rise as flow is increased in the river and recede with river flow.

Shallow groundwater is typically of suitable quality for agricultural use. Groundwater quality in various areas along the river have degraded water quality, likely due to agricultural practices in the overlying land.

Groundwater also exists in the project area in a deeper aquifer below the Corcoran Clay confining unit. This deep aquifer is used for water supply and is not directly connected to the surface water conditions in the San Joaquin River.

Subsidence

Subsidence is a recent and continuing concern within the project area. Subsidence in the area appears to be centered in an area to the east of the project area along the Chowchilla and Eastside bypasses. Subsidence rates in that area have been estimated to be up to 0.9 feet per year over the past four years (Reclamation 2015d). In the project area, subsidence rates have been reported up to approximately 0.5 feet per year within the past year (Reclamation 2015d). Subsidence appears to be primarily caused by groundwater extraction in the deep aquifer, below the Corcoran Clay unit.

3.5.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, Restoration Flows would be released from Friant Dam only through Reach 3. Only limited Restoration Flow up to approximately 300 cfs would be conveyed in Reach 4A due to seepage concerns at the downstream end of Reach 4A. The presence of Restoration Flows under the No Action Alternative would be similar to current conditions and would have no adverse impacts to hydrology.

Proposed Action

Under the Proposed Action, landowners would likely continue agricultural uses, although there is a potential for changes to agricultural operations, including land idling as previously described in Section 2.2.

Surface Water

Under the Proposed Action, the volume of surface water in the San Joaquin River downstream from Sack Dam would be increased due to the presence of increased Restoration Flows. The SJRRP would ensure that Restoration Flows are released only up to the capacity of the river channel at the time of release. Channel capacity constraints are based both on levee stability and groundwater seepage issues in properties that have not yet had realty actions or physical projects.

Surface water quality in the river is expected to improve due to the release of good quality Restoration Flows downstream from Sack Dam.

Groundwater

The Proposed Action would provide for additional flow in the San Joaquin River downstream from Sack Dam, and groundwater levels immediately adjacent to the river are expected to rise. Groundwater levels would rise due to either seepage of water from the river into the adjacent shallow groundwater system or by reducing the amount of drainage back to the river from shallow groundwater. The seepage of river water to the groundwater system has the potential to improve the shallow groundwater quality immediately adjacent to the river due to dilution with higher-quality river water. As described in Section 3.1, Impacts GRW-2 and GRW-3 described in the PEIS/R, disclosed these potential impacts at a programmatic level for implementation of the SJRRP Selected Alternative. The impacts of the Proposed Action would be within those analyzed and disclosed in the PEIS/R.

Groundwater changes because of seepage of Restoration Flows to and from the river would be localized to the area immediately adjacent to the river. The exact distance of potential change in groundwater levels is not known. This distance varies along the project area due to differing subsurface soil conditions. Some areas contain soils that are more conducive to the flow of water while other areas have soils that are more restrictive. The deep groundwater aquifer system (below the Corcoran clay) would not be impacted by additional seepage to or from the river system because this aquifer system is substantially deeper than the river. Because deep groundwater levels would not be affected, there would be no additional effect on subsidence due to the Proposed Action.

Under the Proposed Action the threshold groundwater depth for determining seepage impacts to properties growing almonds would be reduced from a range of 9.5 to 10 feet to a range of 6.5 to 9 feet. By allowing for shallower groundwater conditions, groundwater levels in the project area may be slightly higher on almond-growing properties than under the No Action Alternative. This slight increase in groundwater levels would not have an adverse impact on groundwater conditions.

3.6 Socioeconomics

3.6.1 Affected Environment

In 2014, the combined population of Fresno, Madera, and Merced counties was approximately 1.4 million people. Table 3-6 shows the total populations from 2005 to

2014 in the counties within the project area based on the American Community Survey One-Year Estimates.

**Table 3-6.
2005-2014 Population Trends**

Year	Fresno, Madera, and Merced Counties	Annual Percent Change
2005	1,230,385	--
2006	1,283,759	4.2%
2007	1,291,375	0.6%
2008	1,303,603	0.9%
2009	1,309,220	0.4%
2010	1,341,434	2.4%
2011	1,355,727	1.1%
2012	1,362,418	0.5%
2013	1,370,889	0.6%
2014	1,386,875	1.2%

Source: U.S. Census Bureau 2005-2014

Agriculture is a primary industry in Fresno, Madera, and Merced counties (the counties where land idling could occur). In 2014, the combined value of agricultural production in the three counties was approximately \$13.7 billion. Fresno County had a gross value of agricultural production at \$7.037 billion; followed by Merced County at \$4.430 billion, and Madera County at \$2.266 billion (California Department of Food and Agriculture 2015). Table 3-7 summarizes the regional economy in 2014 for Fresno, Madera, and Merced counties. Fresno County represents a significant portion of the employment, labor income, and output for the three counties. Farm employment represents from 4% to 9% of total employment in each county.

**Table 3-7.
Summary of 2014 Regional Economy in Fresno, Madera, and Merced Counties**

	Fresno Employment	Fresno Earnings ¹	Madera Employment	Madera Earnings ¹	Merced Employment	Merced Earnings ¹
Total	468,804	\$23,409,531	63,296	\$3,555,534	100,466	\$5,526,434
Farm	20,202	\$1,562,746	5,766	\$770,259	9,326	\$1,250,133
Nonfarm	448,602	\$21,846,785	57,530	\$2,785,275	91,140	\$4,276,301
Private nonfarm	380,856	\$16,556,796	47,339	\$2,009,985	73,184	\$2,924,495
Forestry, fishing, and related activities	33,105	\$1,131,640	(D)	(D)	(D)	(D)
Mining	748	\$51,907	(D)	(D)	(D)	(D)
Utilities	2,218	\$33,751	285	\$40,594	(D)	(D)
Construction	19,570	\$1,142,283	2,271	\$120,030	3,351	\$187,522
Manufacturing	25,483	\$1,441,143	4,781	\$352,601	10,249	\$600,261
Wholesale trade	16,717	\$1,139,414	1,068	\$69,409	(D)	(D)
Retail trade	45,806	\$1,524,820	4,869	\$168,026	10,045	\$310,009

**Table 3-7.
Summary of 2014 Regional Economy in Fresno, Madera, and Merced Counties**

	Fresno Employment	Fresno Earnings¹	Madera Employment	Madera Earnings¹	Merced Employment	Merced Earnings¹
Transportation and warehousing	15,670	\$862,495	1,409	\$64,567	3,910	\$201,136
Information	4,748	\$433,021	474	\$45,752	498	\$24,043
Finance and insurance	18,631	\$837,767	1,152	\$32,602	2,483	\$74,874
Real estate and rental and leasing	19,484	\$656,523	2,354	\$34,562	3,776	\$69,728
Professional, scientific, and technical services	18,884	\$1,004,298	1,440	\$50,958	2,745	\$97,170
Management of companies and enterprises	2,323	\$191,538	783	\$27,673	890	\$77,771
Administrative and waste management services	26,931	\$754,062	3,145	\$84,283	3,601	\$84,257
Educational services	6,101	\$173,251	343	\$7,885	503	\$8,836
Health care and social assistance	61,063	\$3,191,323	8,451	\$472,029	10,014	\$461,418
Arts, entertainment, and recreation	6,069	\$110,360	775	\$10,834	1,079	\$20,062
Accommodation and food services	29,473	\$622,646	2,997	\$64,077	5,469	\$106,243
Other services, except public administration	27,832	\$954,554	3,236	\$120,606	5,405	\$189,286
Government and government enterprises	67,746	\$5,289,989	10,191	\$775,290	17,956	\$1,351,806

Source: U.S. Bureau of Economic Analysis 2015

¹ Thousands of dollars

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals

Table 3-8 shows employment by industry for cities near the project area from 2010-2014 American Community Survey data. The agricultural, forestry, fishing, hunting, and mining industry ranges from 7% to 59% of total employment in the cities.

**Table 3-8.
Employment by Industry near Project Area (2010-2014)**

	Firebaugh	Mendota	Chowchilla	Madera	Dos Palos	Los Banos
Civilian employed population 16 years and over	3,239	3,764	3,935	23,711	1,358	12,866
Agriculture, forestry, fishing and hunting, and mining	1,248	2,233	561	7,146	322	839
Construction	85	57	137	1,019	195	1,323
Manufacturing	190	227	292	2,040	140	1,500
Wholesale trade	192	198	169	396	90	572
Retail trade	213	245	374	2,655	138	1,487
Transportation and warehousing, and utilities	201	202	236	940	96	906
Information	0	23	37	236	0	170
Finance and insurance, and real estate and rental and leasing	158	13	33	461	21	357
Professional, scientific, and management, and administrative and waste management services	170	29	477	1,030	19	1,117
Educational services, and health care and social assistance	445	358	858	4,231	266	2,328
Arts, entertainment, and recreation, and accommodation and food services	174	53	240	1,495	56	1,290
Other services, except public administration	97	33	202	948	15	535
Public administration	66	93	319	1,114	0	442

3.6.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, seepage management activities beyond those described in Section 2.1 would not occur and existing agricultural operations would continue. There would be no changes in agricultural production or population from current conditions.

Proposed Action

As described in Section 2.2, it is anticipated that landowners would continue to produce a crop on properties with seepage easements, and lessees could continue agricultural operations on lands acquired in fee title by Reclamation. The grower would receive income from the crop and would also continue to purchase farm inputs and labor. There would be no effects to the regional economy if landowners continued to farm. However, some land idling may occur. If crops are idled, growers would lose annual revenues; however, growers would be compensated for land sold to Reclamation or placed under a seepage easement. The value of the fee title land acquisition or seepage easement would

be negotiated with landowners on a case-by case basis. Revenues received from the realty action would be an economic benefit to growers.

Land idling could adversely affect the regional economy in Fresno, Madera, and Merced counties by reducing employment, output, and labor income. Adverse regional economic effects would occur to businesses and individuals who support farming activities, such as farm laborers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing. Land idling would reduce a grower's demand for these inputs, including labor, causing sales and salaries to decrease for these agricultural support businesses. Further, households would spend less money in the regional economy because of decreased wages and salaries. As previously described, the potential effects of land idling related to SJRRP actions, including seepage management actions such as those described in this proposed action, were analyzed and disclosed at a programmatic level in the PEIS/R. Impacts SOC-2 and SOC-3 disclosed the potential for impacts on the regional economy and changes in regional population levels from implementation of the SJRRP Selected Alternative, and the resulting potential changes to agricultural land use, at a programmatic level. The effects of the proposed action are not anticipated to be beyond what was analyzed and disclosed in the PEIS/R.

3.7 Cultural Resources

Under Section 106 of the National Historic Preservation Act, the Proposed Action is an undertaking that has no potential to cause effects on historic properties pursuant to 36 Code of Federal Regulations (CFR) Part 800.3(a)(1). The Proposed Action only consists of the compensation to landowners through either seepage easements, fee-title land acquisitions along Reaches 2B, 3, 4A, and 4B of the San Joaquin River, or minor changes to the SMP and would not include any construction, staging, or excavation activities, or any actions that may affect historic properties if they are present. As a result, there would be no substantial impacts to historic properties from the Proposed Action. Therefore, cultural resources are not further discussed in this EA.

3.8 Indian Trust Assets and Indian Sacred Sites

Indian Trust Assets (ITAs) are defined as legal interests in property held in trust by the U.S. government for Indian tribes or individuals, or property protected under U.S. law for federally recognized Indian tribes or individuals. ITAs can include land, minerals, federally-reserved hunting and fishing rights, federally-reserved water rights, and in-stream flows associated with a reservation or Rancheria. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the U.S. government. There are no ITAs within the project area, and no ITAs would be affected by the Proposed Action.

As defined by Executive Order 13007: Indian Sacred Sites, a sacred site “means any specific, discrete, narrowly delineated location on Federal land that is identified by an

Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site”. The project area for the Proposed Action does not include Federal land; therefore, there is no potential for Indian Sacred Sites to be affected by the Proposed Action.

3.9 Cumulative Impacts

This cumulative impacts analysis identifies past, present, and reasonably foreseeable future projects with the potential to contribute to cumulative effects, when combined with the Proposed Action. Cumulative projects considered in this analysis include projects under the SJRRP that would occur in the project area and could have similar effects to resources of the Proposed Action. The cumulative analysis also considers projects that could be implemented by other entities in the project area, including landowners.

The SJRRP projects considered in this cumulative analysis include Mendota Pool Bypass and Reach 2B Improvements Project (Reach 2B Project); Reach 4B, Eastside Bypass, and Mariposa Bypass Channel and Structural Improvements Project (Reach 4B Project); and future specific seepage management actions for parcels beyond those considered in the Proposed Action. As described in Chapter 2, implementation of the Proposed Action would allow Restoration Flows up to around 1,300 cfs. Future potential seepage management actions considered in this cumulative effects analysis would allow the release of full Restoration Flows in accordance with Settlement Exhibit B throughout the Restoration Area. For this cumulative analysis, it is assumed that future seepage management actions would be based on landowner input and could involve easements, fee title land acquisitions, and/or physical projects to manage groundwater, as described at a programmatic level in the PEIS/R. SJRRP actions assisting in the planning and construction of groundwater banking facilities could also remove agricultural land from production, but locations for groundwater banks are far outside the project area, located in Tulare, Porterville, Shafter-Wasco, and Pixley Irrigation Districts.

With increased groundwater seepage occurring with Restoration Flows, agricultural productivity would likely decline due to increased (i.e., shallower) groundwater levels. Landowners and growers that continue to produce a crop on the property may take actions to improve productivity, such as installation of infrastructure to manage groundwater levels. At this time, it is unknown which, if any, landowners/growers would take actions and what activities the landowners/growers may conduct to improve productivity, as the specific options are highly dependent on local conditions and landowner preferences. Reclamation would have no discretion over and would not be involved in individual landowners’ decisions regarding planning, design, environmental compliance, or construction of landowner infrastructure improvements. Landowners would need to comply with all applicable Federal, State, and local regulations related to any activities they decide to implement, including potential infrastructure improvements to manage groundwater.

One example of potential infrastructure that landowners could decide to install are interceptor lines and lift pumps within agricultural fields. Interceptor lines are perforated pipelines installed in gravel to intercept sub-surface water that could enter the crop root zone. Collected seepage water would be discharged to the river, canals, and/or on-site drainage ditches, depending on the site-specific conditions and landowner discretion. Construction of interceptor lines would not change the classification of farmland under FMMP or Williamson Act contracts. Construction activities could temporarily take portions of land out of production during the construction period, but land would return to agricultural production after construction is complete. Installation of interceptor lines would help continue long-term agricultural use of the land and maintain FMMP classifications.

Under the cumulative condition, the Reach 2B Project, Reach 4B Project, and groundwater banks would result in a reduction of land in agricultural production. There would be losses in Prime Farmland, Farmland of Statewide Significance, and Unique Farmlands, as analyzed and disclosed at a programmatic level in the PEIS/R in impact LUP-5. Only fee-title land acquisition under the Proposed Action would result in cancellation of Williamson Act contracts because landowners with seepage easements would continue to own the land and would likely stay in the program. Under the Proposed Action, it is anticipated that the majority of land in the project area would continue to be farmed; however, there is the potential that land would be idled, as described in Section 3.1 of this EA and in Impact LUP-5 as described in the PEIS/R.

Section 26.6.12 of the PEIS/R disclosed potential significant and unavoidable cumulatively considerable impacts to agricultural land use and crop production at a programmatic level for implementation of the SJRRP Selected Alternative. The Proposed Action's potential contribution to cumulative impacts to agricultural, biological, and water resources, environmental justice, greenhouse gases and climate change, and socioeconomics would be reduced by the environmental commitments to protect agricultural resources included in the Proposed Action and would be within those analyzed and disclosed in the PEIS/R.

4.0 Consultation and Coordination

This EA has been prepared pursuant to the National Environmental Policy Act (NEPA), which was signed into law in 1969 (42 U.S. Code [USC] Section 4321 et seq.). In addition, it was prepared in accordance with Council on Environmental Quality (CEQ) regulations for implementing NEPA, and 40 CFR Parts 1500- 1508. This EA was circulated for 45 days for public review and comment. The information and analysis in this EA incorporates coordination of potential seepage management actions with stakeholders, including:

- Landowners
- San Joaquin River Exchange Contractors Water Authority
- Parties to the Settlement
 - Natural Resources Defense Council
 - Friant Water Authority
 - Friant North Authority
 - South Valley Water Association
- SJRRP Implementing Agencies
 - USFWS
 - National Marine Fisheries Service
 - State of California Department of Fish and Wildlife
 - State of California Department of Water Resources
- SJRRP Restoration Administrator

4.1 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires Federal agencies to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species.

Reclamation completed informal consultation in accordance with Section 7(a)(2) of the ESA with the Service on potential impacts to the giant garter snake and San Joaquin kit fox. Reclamation has determined the proposed action is not likely to adversely affect these species and has received concurrence from the Service with this determination. The Proposed Action would have no effect on fish species, beyond supporting the release of Restoration Flows, which was analyzed at a project-specific level in the 2012 SJRRP formal consultation with NMFS.

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