Chapter 18
OTHER STATUTORY CONSIDERATIONS

18.1 Introduction

This chapter presents discussions of significant and unavoidable impacts, growth-inducing impacts, and cumulative impacts as required by the CEQA Guidelines.

18.2 Significant and Unavoidable Impacts

Section 15126.2(b) requires an EIR to describe any significant impacts that cannot be mitigated to a less-than-significant level. All of the impacts associated with the Proposed Project would be reduced to a less-than-significant level through the implementation of identified mitigation measures, with the exception of the impacts discussed below. The following impacts have been identified as significant and unavoidable:

- Impact Fish-REINTRO-1: Disturbance to Suitable Spawning and Rearing Habitat, Damage to Existing Redds, and Overharvest of Eggs and Juveniles during Broodstock Collection
- Impact FISH-RECREATION-4: Riparian or Instream Habitat Degradation or Spread of Invasive Species or Pathogens from Recreational Fishing Enhancements
- Impact GHG-MANAGEMENT-1: Potential for Construction of Fish Segregation Weirs to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs
- Impact GHG-RECREATION-1: Potential for Construction Activities Related to Enhancing Recreational Fishing Opportunities to Generate Substantial GHG Emissions or Conflict with the CARB's Applicable Plans, Policies, or Regulations Adopted for the Purpose of Reducing the Emissions of GHGs
- Impact CUM-4. Effects of Wild Broodstock Collection
- Impact CUM-6. Effects on the Generation of Greenhouse Gas Emissions

18.3 Growth Inducement

Section 15126.2(d) of the CEQA Guidelines requires an EIR to include a detailed statement of a proposed project's anticipated growth-inducing impacts. The analysis of growth-inducing impacts must discuss the ways in which a proposed project could foster economic or population growth or the construction of additional housing in the surrounding environment. The analysis must also address project-related actions that would remove existing obstacles to population growth, tax existing community service facilities and

require construction of new facilities that cause significant environmental effects, or encourage or facilitate other activities that could, individually or cumulatively, significantly affect the environment. A project would be considered growth inducing if it induces growth directly (through the construction of new housing or increasing population) or indirectly (increasing employment opportunities or eliminating existing constraints on development). Under CEQA, growth is not assumed to be either beneficial or detrimental.

The Proposed Project would not involve new development or infrastructure installation that could directly induce significant population growth in the Project Area. Construction-related jobs would be short-term and would be anticipated to draw from the existing work force. The Project would involve construction of up to two new housing units for staff, and up to four full-time and two part-time staff would be required to operate SCARF. The Proposed Project would not displace any existing housing units or persons. The small amount of job growth is not anticipated to generate sufficient economic activity such that it would result in substantial population growth.

Therefore, the Proposed Project would not be growth inducing.

18.4 Cumulative Impacts

A cumulative impact refers to the combined effect of "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines § 15355). Cumulative impacts reflect "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor, but collectively significant projects taking place over a period of time" (CEQA Guidelines §15355(b)).

CEQA Guidelines section 15130, subd. (a), requires that an EIR address the cumulative impacts of a proposed project when:

- the cumulative impacts are expected to be significant; and
- the project's incremental effect is expected to be cumulatively considerable, or significant, when viewed in combination with the effects of past, current, and probable future projects.

An EIR does not need to discuss cumulative impacts that do not result in part from the project evaluated in the EIR.

Section 15130 requires an analysis of cumulative impacts to contain the following elements:

- Either a list of past, present, and probable future projects producing related cumulative impacts, or a summary of projections contained in an adopted local, regional or statewide plan that describes or evaluates conditions contributing to the cumulative effect.
- A definition of the geographic scope of the area affected by the cumulative effect, and a reasonable explanation for the geographic limitation used.

- A summary of the environmental effects expected to result from those projects with specific reference to additional information stating where that information is available.
- A reasonable analysis of the combined (cumulative) impacts of the relevant projects.

It must also evaluate a proposed project's potential to contribute to the significant cumulative impacts identified, and discuss feasible options for mitigating or avoiding any contributions assessed as cumulatively considerable.

The discussion of cumulative impacts is not required to provide as much detail as the discussion of the effects attributable to the project alone. Rather, the level of detail should be guided by what is practical and reasonable.

18.4.1 Methods Used in this Analysis

As mentioned above, section 15130 of the CEQA Guidelines provides two recommended approaches for analyzing and preparing an adequate discussion of significant cumulative impacts. The approaches as defined in section 15130 of the CEQA Guidelines are either:

- the *list approach*, which would involve listing past, present, and probable future projects producing related or cumulative impacts, including those projects outside the control of the lead agency; or
- the *projection approach*, which utilizes a summary of projections contained in an adopted general plan, a related planning document, or an adopted environmental document that evaluated regional or area-wide conditions contributing to the cumulative impact.

This discussion utilizes the list approach for the cumulative impact analysis. The level of detail of a cumulative impact analysis should consider a proposed project's geographic scope and other factors (e.g., a project's construction or operation activities, the nature of the environmental resource being examined) to ensure that the level of detail is practical and reasonable. Because of the broad geographic range of several of the Proposed Project activities, this section provides a discussion of the geographic extent of possible cumulative impacts by subject area. The discussion focuses on the potential cumulative impacts of the Proposed Project for environmental issues that could be expected to be cumulatively impacted by the Proposed Project in conjunction with other past, present, and reasonably foreseeable future projects. The specific geographic scope for each environmental resource topic analyzed in this DEIR for cumulative impacts is provided below.

Table 18-1 defines the geographic scope that will be used in the impact analysis for each of the resource areas to which the Proposed Project could contribute to cumulative impacts.

Table 18-1. Geographic Scope for Resources with Cumulative Impacts Relevant to the Proposed Project

Resource	Geographic Scope	Explanation for the Geographic Scope
Air Quality	Project Area	This area covers the air basins where construction would occur and where SCARF operations and other physical actions of the Proposed Project could involve the release of air pollutants.
Biological Resources – Fisheries	Potentially Affected Area	This area covers the geographic scope where salmon collected or released as part of the Proposed Project could be found, and these could affect fisheries.
Biological Resources – Vegetation and Wildlife	Project Area	This includes areas that may be disturbed during construction activities, and where salmon maybe collected or released as part of the Proposed Project.
Greenhouse Gas Emissions	Global	GHG emissions at any location affect the global climate.
Hydrology, Geomorphology, and Water Quality	Project Area	Areas that may be disturbed during construction activities, operations of the SCARF, and where collection or release of salmon could cause discharges to, or modifications of, water bodies.
Land Use and Planning	Restoration Area	The Proposed Project would not have any potential to impact land use and planning beyond the SCARF site, the fish segregation weirs, and reintroduction locations.
Recreation	Restoration Area	This is the area where relevant Proposed Project activities (construction and operation of the SCARF and fish segregation weirs, and research and monitoring activities) with potential to affect these resources would take place.
Utilities and Service Systems	Restoration Area	This is the area where relevant Proposed Project activities (construction and operation of the SCARF and fish segregation weirs, and research and monitoring activities) with potential to affect these resources would take place.

Notes:

Potentially Affected Area: Includes the portions of the San Joaquin River watershed, Sacramento River watershed, Sacramento-San Joaquin River Delta (Delta), San Francisco Bay, and Pacific Ocean that are accessible to salmon released under the Proposed Project.

Restoration Area: Includes the San Joaquin River below Friant Dam to the confluence of the Merced River.

Project Area: Includes areas in which physical actions that are part of the Proposed Project would take place. This includes broodstock collection sites, quarantine sites, Chinook salmon production and reintroduction sites, and fisheries management and research areas.

Existing information on current and historical conditions was used to evaluate the combined effects of past actions on each resource topic that was evaluated. For present and

probable future projects and activities, a list of related actions was compiled. The effects of these past, present, and probable future actions were then evaluated in combination with those of the Proposed Project. The combined effects of past actions and the list of related present and probable future projects are described further below.

This analysis does not evaluate cumulative impacts separately between project- and program-level actions. By definition, cumulative impacts must consider the Proposed Project's project and program-level actions together with other past, present, and probable future actions. Consequently, no distinction is made in this chapter with respect to project- and program-level actions; the cumulative analysis is the same for both.

Note that the SJRRP EIS/R (Reclamation and DWR 2012) included a cumulative impact analysis of the SJRRP as a whole, of which the Proposed Project is a part. The SJRRP EIS/R's cumulative impact analysis was reviewed and considered in the preparation of the cumulative impact analysis in this document. However, the evaluation in this document differs somewhat, due to the fact that only a subset of the SJRRP actions are being contemplated as part of the Proposed Project. As a result, several aspects of this analysis do not precisely correspond to those of the SJRRP EIS/R analysis, such as the resource topics with cumulative impacts considered relevant to the Proposed Project, the geographic scope of the cumulative impact analysis, and the conclusions relative to cumulative impacts. In addition, to ensure that this document's cumulative impact analysis did not fail to consider the collective impacts of the Proposed Project in combination with other SJRRP actions (as well as other past, present and probable future projects), the SJRRP has been included as one of the past, present and probable future projects in the list of projects below.

18.4.2 Cumulative Impact Analysis

Cumulative Setting

Projects and activities described in this analysis include those that occur in the same geographic area and produce similar impacts on resources as those of the Proposed Project. The broad geographic range of the Project Area and Potentially Affected Area requires an analysis of a number of past, present, and probable future activities that have affected California's resources. The effects of past and present actions have strongly influenced existing conditions, and some past actions created legacies that are still affecting resources (e.g., pits from gravel/aggregate extraction activities along the San Joaquin River in the Restoration Area). The following are the most important of these past and present actions:

- Population growth and associated development;
- Conversion of natural vegetation to agricultural and developed land uses;
- Introduction of nonnative plant and animal species;
- Resource extraction (e.g., mining and timber harvest); and
- Regional and local water development actions.

A more complete list of past, present, and probable future activities that could cumulatively affect the environment in the study area, and the cumulative resource topics they affect and to which the Proposed Project could contribute to cumulative impacts, is presented in Table 18-2 and discussed further below. Note that the specificity of the list corresponds to the geographic scope of the cumulative resource topics. For instance, it would not be practical to list every single past, present or probable future project contributing to global climate change. In these cases, a more general description of these projects is provided.

The Proposed Project would involve construction only at the SCARF site, the locations for fish segregation weirs, and potential sites for enhanced recreational fishing ponds. Outside of construction activities, the potential for cumulative impacts would largely be limited to Proposed Project operational issues such as water use, discharge of hatchery return flows, and other emissions (e.g., GHGs) or wastes generated by the SCARF operations, and the effects of the collection of broodstock, fish reintroduction, and research and monitoring.

Table 18-2. List of Other Projects and Activities (Past, Present, and Probable Future) that May Cumulatively Affect Resources of Concern for the Project

Past, Present or Probable Future Activity	Resource Topics with Potential for Cumulative Impacts							
	Air Quality	Biology-Fisheries	Biology-Vegetation and Wildlife	Greenhouse Gas Emissions	Hydrology, Geomorphology, and Water Quality	Land Use and Planning	Recreation	Utilities and Service Systems
Agriculture	X	X	X	X	X		X	X
Aquaculture (i.e., hatcheries)	X	X	X	X	X		X	X
Dams	X	X	X	X	X		X	
Fish Harvesting	X	X	X	X			X	
Habitat Restoration and Conservation		X	X		X		X	
Infrastructure Development	X	X	X	X	X	X	X	X
Introductions of nonnative species		X	X		X		X	
Mining	X	X	X	X	X	X	X	
Recreational Activities (i.e., camping, boating, and trail construction or use)	X	X	X	X	X		X	
SJRRP	X	X	X	X	X	X	X	X
Timber Harvest		X	X	X	X		X	
Urbanization	X	X	X	X	X	X	X	X
Water Diversions	X	X	X		X	X	X	X
Water Pollution		X	X		X		X	
Wildfire, fire suppression, and fuels management	X	X	X	X	X			

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Agriculture

Ongoing agricultural activities in the San Joaquin Valley and especially in the areas around and adjacent to the Restoration Area, including farming and livestock grazing, may cumulatively affect biological resources and water quality through runoff and transport of pollutants, removal of streambank vegetation, straightening of natural streams, removal of woody debris, water diversions, and excessive irrigation (SWRCB 2000). Agricultural activities also may contribute air pollutants and GHG emissions from use of farm equipment, decomposition of organic materials, etc. Typical potential pollutants resulting from agricultural operations include sediment, animal wastes, salts, pesticides, herbicides, and fertilizers (SWRCB 2000). The removal of streambank vegetation or woody debris and the straightening of natural streams may affect the aquatic habitat complexity (e.g.., depth of pools) and stream water temperatures (Knight and Boyer 2007). Grazing also may affect surface water quality and aquatic biota through direct loadings of animal wastes, reductions of streamside vegetation, increasing temperatures, siltation of spawning habitat, and erosion of streambanks.

Aquaculture

The operation of aquaculture facilities, including hatcheries, may contribute pollutants via direct discharges from the facilities to waters potentially affected by the Proposed Project. As discussed in Chapter 15, *Recreation*, of this DEIR, CDFW and its precursors have operated artificial propagation and rearing programs for trout and other fish species for more than 100 years. Trout have been artificially stocked to provide recreational opportunities and steelhead and salmon have often been stocked as mitigation for the building of dams (ICF Jones & Stokes 2010). CDFW's hatcheries in the Potentially Affected Area include the SJFH, Merced River Fish Hatchery, Mokelumne River Fish Hatchery, Nimbus Fish Hatchery, and FRFH. The USFWS' Coleman National Fish Hatchery releases into Battle Creek, a tributary of the Sacramento River. CDFW issues licenses for every aquaculture operation that is involved in the controlled growing and harvesting of fish, shellfish and plants in marine, brackish and fresh water for human consumption or bait purposes. Potential pollutants of aquaculture facilities include, but are not limited to, sediment, nutrients, and solids. In addition, aquaculture facilities may require water diversions that have the potential to affect aquatic biological resources through entrainment and/or reduced downstream flows.

Aquaculture facilities also may impact native fish species through potential loss of genetic diversity and structure of naturally spawning populations, and predation or competition between the native and hatchery-reared (i.e., stocked) fish (for more detail see discussions for *Fish Reintroduction* in Section 6.5.3, *Environmental Impacts* of Chapter 6, *Biological Resources – Fisheries*). As an example, although many of CDFW's salmonid hatcheries have beneficial or less than significant impacts on native fish species populations, the release of hatchery-reared Chinook salmon and steelhead potentially cause substantial competition and predation impacts on the San Joaquin River and its tributaries' natural fall-run Chinook salmon populations (ICF Jones & Stokes 2010). Thus, aquaculture may be a significant contributor to cumulative impacts on fish or aquatic species in the Potentially Affected Area.

Dams

Dams are generally constructed and operated for flood control, recreation, water supply, and/or hydroelectric generation purposes. The implementation and operation of dams has multiple effects on the downstream biological resources, particularly to fish habitats, and water quality. Effects of dams typically include:

- creating migration barriers;
- blocking/reducing spawning and rearing habitat;
- reducing gravel transport downstream;
- altering the downstream hydrologic regime (e.g., flow quantities, flood pulse flows);
- creating slow water habitat unsuitable for native stream/river species; and/or
- altering downstream water temperatures (Knight and Boyer 2007).

Almost every major stream in the western Sierra Nevada has at least one dam or diversion to capture the water supplies from the Sierra Nevada snowpack (Moyle et al. 1996). These dams have blocked approximately 95% of the spawning and holding habitats for spring-run Chinook salmon and substantially reduced access to habitats for other runs of salmon, steelhead, and Pacific lamprey (Moyle et al. 1996). Additionally, alterations to a stream or lake by dams commonly allows for the presence or invasion of non-native species (Moyle et al. 1996).

Three dams (Friant, Mendota, and Sack) and several smaller diversion structures are located in the Restoration Area (FWUA and NRDC 2002). The construction and operation of Friant Dam impacted the San Joaquin River in significant ways. Reduced flows, combined with downstream riparian diversions, dewatered much of the San Joaquin River within the Restoration Area, preventing fish use and passage in most years. The recently implemented SJRRP has begun to restore flows and habitat in these areas; however, Friant Dam remains a barrier for upstream fish migration, and thus the farthest upstream boundary for salmonid migration.

Mendota Dam is located at the confluence of the San Joaquin River and Fresno Slough, downstream of the SCARF site. The pool behind the dam has been used for irrigation since the late 1800s. After the completion of the Friant Dam in 1948, flows to Mendota Pool from the San Joaquin River decreased. Since 1951, the Delta-Mendota Canal has delivered water to the Mendota Pool from the Delta. Although Mendota Dam is orders of magnitude smaller than Friant Dam, it is a substantial barrier to the migration of salmonids. Even if the existing fish ladder is reconstructed, the Mendota Dam would remain problematic for migrating salmonids due to higher levels of Total Dissolved Solids and more salinity than flows passing through the Friant Dam. In addition, downstream migrating juvenile fish would likely incur high entrainment losses through the unscreened diversions and canals (FWUA and NRDC 2002). Reclamation is currently evaluating alternatives to improve fish passage at Mendota Pool.

Sack Dam, which located about 7 miles southeast of the City of Dos Palos in Merced County, just north of Arroyo Canal, presents impacts similar to Mendota Dam. However, Sack Dam is much smaller and its fish ladder is more operational and would not constrain adult fish passage. Similar to Mendota Dam, juvenile fish migration would likely result in entrainment until diversions are screened or otherwise reconstructed to alleviate juvenile entrainment into the canal (FWUA and NRDC 2002). Reclamation is planning to construct fish passage improvements at Sack Dam.

Additionally, Reclamation and DWR are currently conducting the Upper San Joaquin River Basin Storage Investigation, a feasibility study to determine the type and extent of federal, state, and regional interests in a potential project(s) in the upper San Joaquin River watershed to expand water storage capacity, improve water supply reliability and flexibility, and enhance San Joaquin River water temperature and flow conditions to support anadromous fish restoration efforts. This feasibility study includes the evaluation of building of a dam in the upstream portion of Millerton Lake to create the proposed Temperance Flat Reservoir (Reclamation and DWR 2008).

Fish Harvesting

Cumulative impacts may occur as the result of fish harvesting, which may be from recreational, commercial, subsistence, or illegal fishing (poaching). Fish harvesting may be another past, present, and/or future contributing factor to the cumulative effects on California's anadromous fish populations (e.g., Chinook salmon). NMFS regulates commercial, recreational, and tribal fishing of anadromous fish populations native to California, Oregon, and Washington through its Pacific Coast Salmon Fishery Management Plan (SFMP). The goals of the SFMP are to achieve optimum yield, prevent overfishing, and ensure rebuilding of salmon stocks to harvestable levels (NMFS and PFMC 1977). The commercial fishery provides relatively high-priced fresh, frozen, and cured salmon. Ocean salmon fisheries off the California coast extending up to Washington are important for their direct economic value and indirectly for their ecological effects. In 2011, about one million pounds of Chinook salmon valued at more than $5 million were landed at California ports (CDFG 2012). The recreational fishery provides valuable recreational benefits.

Every year, the Pacific Fishery Management Council (PFMC) follows a preseason process to develop recommendations for management of salmon fisheries. The PFMC sets the regulations for commercial and recreational fishing in federal waters. The Commission considers the PFMC recommendations in its development of seasonal regulations in state waters, including rivers and the ocean within the 3-nautical mile limit. By establishing an annual goal for the number of spawners of the major salmon stocks ("spawner escapement goals") and allocating the harvest among different groups of fishermen (commercial, recreational, tribal, various ports, ocean, and inland), the SFMP manages the fishing of Chinook salmon. Annual goals are based on the geographic range and specific stocks (e.g., winter, fall, or spring runs). Fish harvesting is managed to help minimize adverse effects on anadromous fish populations.

Habitat Restoration and Conservation

Restoration and conservation programs and plans may have the potential to affect the same resources and fall within the geographic scope designated for cumulative assessment of those resources. Actions resulting from these efforts include habitat restoration/creation, removal of barriers to fish migration, enhancement of stream flows, screening of water diversions, eradication of non-native species, reductions in pollutants, research and monitoring of important aquatic organisms, and sustainable management. Although the ultimate result of these activities is generally beneficial, alterations to baseline conditions can potentially adversely impact biological resources, water quality, other environmental variables depending on the activity and location.

There are several such plans currently being developed or implemented in the Restoration Area and Potentially Affected Area. One plan, the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP), was developed in 2000 by the San Joaquin Council of Governments. It is a 50-year plan that provides a strategy for balancing the need to conserve open space and the need to convert open space to other uses while protecting the region's agricultural economy; preserving landowner property rights; providing for the long-term management of plant, fish and wildlife species, especially those that are currently listed, or may be listed in the future, under the ESA or CESA; providing and maintaining multiple-use open spaces which contribute to the quality of life of the residents of San Joaquin County; and accommodating a growing population while minimizing costs to project proponents and society at large. The goal of the SJMSCP is to provide 100,841 acres of preserves based on an estimated conversion acreage of 109,302 acres. The SJMSCP intends to protect 97 special-status plant, fish and wildlife species in 52 vegetative communities scattered throughout San Joaquin County by acquiring land primarily through conservation easements and fee title at a ratio of approximately 90% easements to 10% fee title acquisition. Establishment and/or use of mitigation banks, and in-lieu land dedications also will play a role in preserving habitats under the SJMSCP (SJCOG 2000).

The Bay Delta Conservation Plan (BDCP) is an HCP and NCCP intended to be implemented over a 50-year period to improve the condition of habitat and species in the Delta, reduce adverse effects of water diversions, and provide a reliable water supply (see the *Water Diversions* section below for more details).

Additionally, the Proposed Project is a part of the SJRRP. As described in Chapter 1, *Introduction*, and elsewhere in this DEIR, the SJRRP consists of two major goals: 1) a Restoration Goal and 2) a Water Management Goal. The SJRRP is also discussed in more detail below.

Infrastructure Development

Alterations to streambeds, including modifications resulting from the construction of levees, road crossings, bridges, and railways, have been numerous historically, and it is reasonable to assume that many will occur in the future, potentially affecting habitat for fish, other aquatic organisms, and terrestrial plants and wildlife. Throughout the Central Valley, levees have been constructed to provide flood protection for both urban and rural lands. In 2006,

following sustained heavy rainfall and runoff, Governor Arnold Schwarzenegger declared a State of Emergency for California's levee system, commissioning up to $500 million of state funds (AB 142) to repair and evaluate State/federal project levees. Nearly 300 levee repair sites have been identified, and more than 100 of the most critical sites having already been completed with AB 142 funds. Repairs to other sites are either in progress or scheduled to be completed in the near future, and still more repair sites are in the process of being identified, planned, and prioritized (DWR 2013). These activities, as well as future maintenance to existing infrastructure and planned construction of high-speed rail, may cumulatively affect fish and/or terrestrial biological resources through numerous mechanisms such that result in loss or degradation of aquatic and terrestrial habitats. Depending on infrastructure designs, the cumulative effects may be reduced by improving instream habitats, replanting vegetation, and creating off-site mitigation areas.

Introductions of Non-Native Species

Introductions of non-native fish species and other aquatic organisms are a cumulatively contributing factor to the decline of native aquatic fauna throughout California. Non-native species may have been introduced to the Potentially Affected Area through various vectors such as ballast water and gear on ships entering the Bay-Delta from foreign waters; from recreational boats, gear, and bait; from use as biological controls (e.g., mosquitofish); and from intentional aquarium releases. Non-native species may adversely affect native species through predation, competition, food web dynamics, and habitat destruction or modifications.. Non-native species have been shown to have strong negative effects on the recovery of native species in decline including salmonids (Moyle et al. 1996). In addition to the direct effects on native species from the introduced species, efforts to remove introduced species may also cumulatively affect native species.

Two species that have previously affected hatchery operations within the U.S. are the NZMS and the quagga mussel. These species colonize hard surfaces within the hatcheries, clogging water intake structures, aeration devices, pipes, and screens. Once established within hatcheries, these species may be released downstream with effluent waters. In addition to the NZMS and the quagga mussel, fish hatchery activities present numerous potential opportunities for accelerating the spread of zebra mussels to new locations. Although the zebra mussel has not successfully infested any known U.S. hatcheries to date, its presence has been confirmed within several California water bodies. Zebra mussels, like the closely related and ecologically similar quagga mussels, are voracious filter-feeding organisms. Within new environments, these invasive mollusks have the potential to colonize with extraordinary population densities.

Mining

Sand and gravel mining currently occurs from Friant Dam downstream to the Chowchilla Bifurcation Structure. Mining in Reach 1 is predominately for gravel and sand, while Reach 2 is exclusively sand mining. Current mining operations occur primarily in off-channel locations including floodplains and terrace features. Off-channel mining, primarily in Reach 1, has degraded floodplain habitat and left gravel pits that harbor predators and may interfere with movement of migrating salmon. Historical instream mining has legacy

impacts in Reach 1, including alteration of the sediment transport regime, loss of gravel bars and riffles, and gravel pits. These alterations, coupled with the reduction in sediment supply gravel supply by Friant Dam, has likely greatly reduced the historical quantity of spawning habitat on the San Joaquin River (FWUA and NRDC 2002)

Recreational Activities

Recreational activities may result in numerous potential cumulative impacts on resources in the Potentially Affected Area, including potential impacts on air quality, biological resources, climate change, hydrology, and water quality. Types of recreational activities may include but not be limited to: camping, boating, hunting, fishing, and the construction and/or use of trails. Travel to and from recreational areas and the use of off-road vehicles may cumulatively contribute to air quality impacts. The recreational activities could result in the disturbance or displacement of biological species (including nesting raptors) and loss of riparian habitat. In addition, according to Moyle et al. (1996) the success of fish spawning may be reduced by heavy use of streams by boaters or anglers and disturbances to fish that are holding or spawning.

Restoration of perennial flow through all reaches of the San Joaquin River under the SJRRP should greatly increase the recreational opportunities of all reaches (FWUA and NRDC 2002). Although the region will likely benefit economically from the increase in recreational opportunities, increased public use often results in impacts to the river such as damage to streambanks and vegetation.

State Park's Central Valley Vision Plan endeavors to create new recreational facilities as well as improve existing facilities within the Central Valley. As described in Section 15.2.2, *State Laws, Regulations, and Policies*, in Chapter 15, *Recreation*, the Central Valley Vision Plan proposes 11 new parks, five of which would be located in the San Joaquin Valley and Tulare Basin. There would be a significant increase in facilities for camping, picnicking, hiking, and boating throughout the region. The plan includes facilities to support picnicking, camping, hiking, and canoeing in the San Joaquin River Parkway, and effort led by the SJRC along 22 miles of the San Joaquin River from Friant Dam to SR 99.

San Joaquin River Restoration Program

The SJRRP is a long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of Merced River and restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply impacts from restoration flows. It is a direct result of a Settlement reached in September 2006 by the U.S. Departments of the Interior and Commerce, NRDC, and FWUA. The Settlement received Federal court approval in October 2006. Federal legislation was passed in March 2009 authorizing Federal agencies to implement the Settlement. The Settlement is based on two goals:

- Restoration Goal: To restore and maintain fish populations in "good condition" in the main stem of the 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 to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

To achieve the Restoration Goal, the Settlement calls for release of water from Friant Dam to the confluence of the Merced River (referred to as Interim and Restoration flows), a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon. Restoration Flows are specific volumes of water to be released from Friant Dam during different year types, according to Exhibit B of the Settlement. Interim Flows are experimental flows that began in 2009 and will continue until full Restoration Flows are initiated, with the purpose of collecting relevant data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture, and reuse. To achieve the Water Management Goal, the Settlement calls for recirculation, recapture, reuse, exchange, or transfer of the Interim and Restoration flows to reduce or avoid impacts to water deliveries to all of the Friant Division long-term contractors caused by the Interim and Restoration flows (Reclamation and DWR 2012).

Timber Harvest

Timber harvesting has affected fish and other aquatic organisms in California since the mid-19th century. Loss of shade can increase stream temperatures, while removal of trees may accelerate erosion of sediments into streams (filling in cool refuge pools) and reduce the amount of large woody debris that can enter streams to form habitat for fish and other aquatic life (Moyle et al. 2008). Associated infrastructure, such as roads, may cumulatively increase the initial effects. Some industrial timberland owners participate in HCPs for listed species. Modern forest practice regulatory programs generally have high compliance and effectiveness and, together with voluntary programs, such as forest certification, provide benefits to biodiversity (California State Board of Forestry and Fire Protection Monitoring Study Group 2006). Timber harvest has historically occurred in various locations throughout the Potentially Affected Area.

Urbanization

Continued population growth in California and the increasing conversion of lands to urbanized uses may contribute to cumulative impacts on agricultural land, air quality, GHGs, water quality, biological resources, public services and utilities. Table 18-3 provides the projected population changes in California counties from 2010 to 2060 (DOF 2013). Nearly all counties would experience population growth and some counties would experience greater than 100% growth. Increasing populations in California may lead to additional impacts on climate change, aquatic resources, and water quality through:

- Increased impermeable surfaces and greater or more polluted runoff loadings;
- Increased water demands and usage;
- Increased energy needs and consumption, including vehicle fuel usage; and
- Increased recreational use.

The primary pollutants found in runoff from urban areas include sediment, nutrients, oxygen-demanding substances, road salts, heavy metals, petroleum hydrocarbons, pathogenic bacteria, and viruses (SWRCB 2000). Construction areas are a major source of suspended sediments, which contribute the largest mass of pollutant loadings to receiving waters from urban areas (SWRCB 2000).

Increased water demands and usage could result in greater water diversions and the resulting impacts on aquatic biological resources, and greater energy usage to transport waters to urban areas. Energy use increases would result in the release of additional GHGs and cumulatively contribute to climate change. An increased population may lead to an increase in recreational activities and the subsequent disturbances to aquatic or terrestrial habitats or water quality impacts.

There are a number of planned developments, primarily residential, near the SCARF site in Fresno County; if implemented, these plans would greatly increase the local population. The Friant Ranch Specific Plan (Friant Ranch) is a planned adult retirement community on approximately 900 acres east of Friant Road. The planned development consists of a mixed use community with 2,683 single-family age-restricted units, 83 multiple-family age-restricted units, 180 non-age-restricted multi-family units, and 250,000 square feet of commercial space within a Village Core that also provides for up to 50 residential units. Wellington Ranch and Mira Bella are two other residential developments planned in the vicinity of the SCARF site. Wellington Ranch would consist of the development of almost 3,000 acres south of Friant Ranch. Mira Bella is a proposed site for up to 180 residential units east of Friant Road between the Community of Friant and Millerton Lake SRA. There are several other projects planned further north and east of the SCARF site.

On the Madera County side of the San Joaquin River, there are also a number of planned developments, primarily residential. River Ranch Estates, an approved development of 900 residential units, is directly across the river from the SCARF site. North Fork Village, consisting of 1,000 planned residential units and some commercial units, is south of Millerton Lake SRA on the Madera County side. Tesoro Viejo, an approved development of 5,000 residential units, is directly to the southwest of the planned River Ranch Estates. Further downstream along the San Joaquin River, across the river from the City of Fresno, are two more large residential developments, Gunner Ranch West, which has proposed 1,500 residential units, and Gateway Village, which has been approved for the development of 6,578 residential units.

Table 18-3. Projected California Population Changes by County, 2010 to 2060

County	2010	2060	Change	County	2010	2060	Change
Alameda	1,513,236	1,675,011	10.7%	Orange	3,017,327	3,331,595	10.4%
Alpine	1,163	1,147	-1.4%	Placer	350,275	579,729	65.5%
Amador	37,853	45,116	19.2%	Plumas	19,911	19,471	-2.2%
Butte	219,990	341,850	55.4%	Riverside	2,191,886	4,216,816	92.4%
Calaveras	45,462	63,025	38.6%	Sacramento	1,420,434	2,191,508	54.3%
Colusa	21,478	40,179	87.1%	San Benito	55,350	86,939	57.1%
Contra Costa	1,052,211	1,585,244	50.7%	San Bernardino	2,038,523	3,433,047	68.4%
Del Norte	28,544	32,159	12.7%	San Diego	3,102,745	4,152,763	33.8%
El Dorado	180,921	297,972	64.7%	San Francisco	806,254	926,555	14.9%
Fresno	932,377	1,615,401	73.3%	San Joaquin	686,588	1,538,313	124.1%
Glenn	28,143	40,040	42.3%	San Luis Obispo	269,713	353,190	31.0%
Humboldt	134,663	147,377	9.4%	San Mateo	719,729	928,706	29.0%
Imperial	175,389	355,022	102.4%	Santa Barbara	424,050	519,034	22.4%
Inyo	18,528	23,921	29.1%	Santa Clara	1,786,429	2,198,503	23.1%
Kern	841,146	2,055,622	144.4%	Santa Cruz	263,260	309,474	17.6%
Kings	152,656	282,305	84.9%	Shasta	177,472	265,246	49.5%
Lake	64,599	110,055	70.4%	Sierra	3,230	3,876	20.0%
Lassen	35,136	41,961	19.4%	Siskiyou	44,893	52,646	17.3%
Los Angeles	9,824,906	11,562,720	17.7%	Solano	413,117	634,852	53.7%
Madera	151,328	373,929	147.1%	Sonoma	484,084	616,340	27.3%
Marin	252,731	272,275	7.7%	Stanislaus	515,205	953,580	85.1%
Mariposa	18,193	23,308	28.1%	Sutter	94,669	254,783	169.1%
Mendocino	87,924	102,106	16.1%	Tehama	63,487	109,201	72.0%
Merced	255,937	553,114	116.1%	Trinity	13,713	19,381	41.3%
Modoc	9,648	10,321	7.0%	Tulare	443,066	836,850	88.9%
Mono	14,240	20,755	45.8%	Tuolumne	55,144	63,947	16.0%
Monterey	416,259	569,459	36.8%	Ventura	825,077	1,034,651	25.4%
Napa	136,811	196,243	43.4%	Yolo	201,311	305,711	51.9%
Nevada	98,639	150,550	52.6%	Yuba	72,329	168,685	133.2%
Total (State)	37,309,382	52,693,583	41.2%				

Source: DOF 2013

Water Diversions

Surface water bodies provide a substantial portion of California's water supply and can be potentially impacted by numerous water diversions on each water body. The multiple purposes of water diversions may include serving as a water supply for municipal, industrial or agricultural irrigation uses, electricity generation, and other uses. Water diversions state-wide can cumulatively affect the biological resources and water quality of diverted or downstream water bodies of the Potentially Affected Area of the Proposed Project. Water diversions can impact biological resources through entrainment, impingement on fish screens that result in death or injury, dewatering of stream reaches, reduced or altered hydrologic flow patterns, and/or effects on water quality, especially water temperature. Similar to dams, water diversions may also contribute to biological resource impacts by blocking movements and migrations, isolating populations, and causing increased human use of the watersheds (Moyle et al. 1996). In addition, alterations to the water quality of diverted water bodies may affect aquatic resources by changing the concentration of pollutants and impacting the potential toxicity or accumulation in food webs (Monsen et al. 2007). As an example, the estimated mortality rate for entrained fish at the SWP and CVP pumping facilities, two of the largest water diversions in the world, is approximately 65 to 84% (NMFS 2009).

Water diversions also impact the water quality of diverted water bodies. Diversions can reduce downstream flows, which can lead to increased downstream water temperatures. Large water diversions at the pumping facilities of the SWP and CVP can alter water circulation patterns. Subsequent impacts of these water diversions include alterations to the source mixture of water (i.e., fresh waters from the San Joaquin River and Sacramento River or estuarine waters from tidal exchange with the San Francisco Bay), and the flushing time to carry nutrients or pollutants downstream (Monsen et al. 2007).

The BDCP is a plan under development that endeavors to restore and protect ecosystem health, water supplies provided by the SWP and CVP and water quality while preserving, restoring and enhancing aquatic, riparian and associated terrestrial natural communities in the plan area. As part of the BDCP, several alternative Delta conveyance facilities are being considered, including: new north Delta diversions that would use a tunnel or canal to transport water south and be operated in conjunction with existing pumping operations (dual conveyance); an isolated facility that would consist only of the north Delta diversion facilities and water transport via tunnel or canal; or a through-Delta conveyance that would continue to convey water through the Delta, using existing and new Delta corridors by developing new operable barriers, canals, and screened intakes at the Delta Cross Channel and Georgiana Slough. Establishing new intake facilities on the north side of the Delta would attempt to reduce or eliminate fish losses associated with the existing Delta export pumps, and return a normal flow pattern to the Delta by eliminating reverse flows caused by the existing pumps and water conveyance to the south Delta. This change would influence hydrologic and water quality conditions in the Delta. The BDCP also proposes to convert substantial tracts of land currently protected by levees to tidal and intertidal wetlands and other habitat types to support 57 aquatic and terrestrial covered species, including spring-

run, fall-run, late-fall-run and winter-run Chinook salmon. Other conservation measures in the proposed BDCP include programs intended to improve water quality; reduce production of methylmercury; and control invasive species and non-native predators.

Water Pollution

A variety of nonpoint and point sources may contribute pollutants to the water bodies that constitute the Project Area and the Potentially Affected Area. Point sources are defined as "any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, and well" (SWRCB 2010). Types of point sources may include discharges from wastewater treatment plants and industrial or commercial uses. Nonpoint sources are diverse and widespread and commonly include agriculture, construction activities, forestry, mining, and urbanized areas. Rainfall and snowmelt runoff transport pollutants from nonpoint sources to surface waters as the runoff travels over and through the ground surface (U.S. EPA 1994).

Water quality impairments in California's surface waters have been identified and categorized on the SWRCB's 303(d) list. Types of pollutant impairments include: mercury, other metals, nutrients, other inorganics, other organics, pathogens, pesticides, salinity, sediment, and toxicity. These pollutants can affect aquatic species directly (e.g., diseases or bioaccumulation) or indirectly (i.e., alteration of habitat type/quality due to altered sediment loads).

As described in Chapter 12, *Hydrology, Geomorphology, and Water Quality*, TMDLs for listed pollutants and water bodies, are an estimate of the total load of pollutants from point, nonpoint, and natural sources that a water body may receive without exceeding applicable water quality standards (with a "factor of safety" included). In the Restoration Area, the SWRCB has identified 43 water bodies that require the development of TMDLs, and 12 water bodies that are currently being addressed by TMDLs. Thus, there are a number of water bodies that still require the implementation of TMDLs. Once established, the TMDL allocates the permissible contaminant loading among current and future pollutant sources to the water body to ensure that water bodies maintain compliance with the established water quality standards. When implemented, TMDLs can improve water quality and reduce existing water quality impairments.

Wildfire, Fire Suppression, and Fuels Management

Wildfires may contribute to numerous cumulative effects on the biological resources (e.g., riparian species, amphibians, and fish) and water quality in the Project Area and Potentially Affected Area. Additionally, wildfires may contribute cumulatively to climate change. Specific impacts that could affect biological resources and water quality include:

- Channel scour or sedimentation,
- Combustion,
- Debris flow and woody debris inputs,
- Decreased cover,

- Hydroperiod (increased surface water),
- Increased nutrients,
- Increased temperature,
- Ash and fine silt in runoff from burned area (Pilliod et al. 2003).

Wildfire fuel management and/or suppression efforts include prescription burning; mechanical fuel reduction, thinning, and logging; construction of fire roads and firebreaks; and chemical applications. Many of the impacts described above relating to biological resources or water quality may occur as a result of the fuel management or suppression efforts. Fire management practices (e.g., use of fire roads and chemical flame retardants) could contribute pollutants (e.g., sediment, ammonia-based fire retardants, surfactant-based foams, etc.) to local water bodies. The chemical retardants can be slightly to moderately toxic to algae and invertebrates and moderately to highly toxic to fish (Pilliod et al. 2003). In addition, management of post-wildfire areas via timber harvesting may contribute to erosion depending on the extent of ground disturbance by equipment, road use, and the size of the area to be harvested (Peterson 2009). Wildfires and fuel management efforts (e.g.,, prescription burning, thinning) may contribute to climate change through the removal of vegetation, which absorbs the greenhouse gas carbon dioxide, and through the emission of carbon dioxide as the vegetation is burned.

18.5.3 Cumulative Impacts

Table 18-4 presents a summary of cumulatively significant impacts for all resource topics and the topics for which the Proposed Project would potentially make a cumulatively considerable incremental contribution to an overall significant cumulative impact.

The Proposed Project has been evaluated to determine whether it would make a cumulatively considerable incremental contribution to any of these significant cumulative impacts. Because no significant cumulative impacts have been identified related to aesthetics, cultural resources, geology, soils, and seismicity, hazards and hazardous materials, land use and planning, mineral resources, noise, population and housing, and/or transportation and traffic, the Proposed Project does not have the potential to result in a considerable contribution to a significant cumulative impact relative to these topics. Therefore these topical areas are not discussed further, and the reason for this conclusion has been provided in Table 18-4. As shown in Table 18-4, several impacts were determined to have the potential to result in a cumulatively considerable incremental contribution to a significant cumulative impact. These impacts are described below.

1 **Table 18-4.** Summary of Cumulative Significant Impacts and Proposed Project's Contribution

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Aesthetics	While the Proposed Project may result in aesthetic effects in the specific locations where it would result in physical changes (e.g., construction of the SCARF), when considering the other past, present and probable future projects in the vicinity of these Proposed Project actions, either no significant cumulative impact was found, and/or the incremental contribution of the Proposed Project would not be considerable. For instance, at the SCARF site, the area is already generally developed and the SCARF would not be visually inconsistent with the surrounding features, resulting in a less than considerable contribution to any possibly significant cumulative aesthetic impacts. In other less developed locations for Proposed Actions (e.g. locations for rotary screw traps), aesthetic resources were determined to not be significantly cumulatively degraded.	No further analysis required.
Agricultural Resources	While the general plans of Fresno County and various other jurisdictions contain policies addressing protection of agricultural land, ongoing development in the county and the Central Valley region is anticipated to result in the incremental conversion of farmland for residential and commercial uses. These impacts would be considered cumulatively significant.	The Proposed Project would involve the construction of a fish hatchery on previously disturbed land that is not currently zoned for agricultural use. Fish segregation weirs would be constructed within the riverbed, and would not convert farmland. However, the Proposed Project is part of the larger SJRRP, which could result in cumulative impacts to agricultural resources. *Further analysis provided below.*

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Air Quality	The Project Area is located in Fresno County, in the SJVAB, which is currently designated as a nonattainment area for federal and state ozone and $PM_{2.5}$ standards, and state PM_{10} standards. The SJVAPCD has adopted a cumulative threshold of significance of 10 tons per year for ozone precursors (ROG and NOx). These impacts would be considered cumulatively significant.	Construction and operational activities of the Proposed Project would temporarily increase emissions of particulate matter and exhaust gases. *Further analysis provided below.*
Biological Resources - Fisheries	Past and present actions have significantly impacted anadromous salmonids and their habitat in the Potentially Affected Area. Incremental development could further decrease water quality, introduce non-native species, alter genetic fitness, increase ecological risks, and impede migration. These impacts would be considered cumulatively significant.	The Proposed Project as a whole is anticipated to beneficially impact fisheries throughout the Potentially Affected Area. However, release of hatchery stock has potential to compromise genetic integrity and fitness of wild stocks and potentially spread disease. The Proposed Project also has potential to incrementally decrease water quality, introduce non-native species, and/or impede migration. *Further analysis provided below.*
Biological Resources – Vegetation and Wildlife	While the General Plans of the counties and various jurisdictions contain policies addressing conservation and preservation of open space, ongoing development in the Central Valley region is anticipated to result in the incremental loss of riparian habitat, wetlands, and oak woodlands and other sensitive natural communities. These outcomes likely will lead to direct take or loss of habitat for both common and special-status species. These impacts would be considered cumulatively significant.	Construction activities have the potential to impact special-status species, and would likely result in temporary and minor permanent impacts to sensitive natural communities. *Further analysis provided below.*

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Cultural Resources	No information has been found during the preparation of this DEIR to suggest that a widespread loss or degradation of significant historic resources has occurred or will occur in the future in the geographic vicinity of the Proposed Project. Rather, impacts to significant historic resources from other past, present and probable future projects are believed to be highly localized and only affecting the immediate resources in question. For this reason, it has been concluded that no significant cumulative impact exists related to cultural resources.	No further analysis required.
Geology and Soils	No information has been found during the preparation of this DEIR to suggest that geologic resources in the Potentially Affected Area are cumulatively degraded. While loss of soil is a cumulative issue in the San Joaquin Valley, particularly with respect to agricultural soils, the ground disturbance associated with the Proposed Project is anticipated to be minimal and would not contribute to this cumulative impact.	No further analysis required.
Greenhouse Gas Emissions	Anthropogenic emissions of GHGs are widely accepted in the scientific community as contributing to global warming. Because of the nature of climate change, local impacts must be considered on a statewide and even global scale. This impact would be considered cumulatively significant.	Truck trips necessary for fish reintroduction, construction of fish segregation weirs, research and monitoring, and recreation management would generate GHGs. *Further analysis provided below.*
Hazards and Hazardous Materials	No information has been found during the preparation of this DEIR to suggest that cumulative impacts related to hazards and hazardous materials exist in proximity to the locations where hazards or hazardous materials conditions could affect, or be affected by, the Proposed Project.	No further analysis required.

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Hydrology, Geomorphology, and Water Quality	Increased development in the region may lead to a variety of impacts on water resources, including increased demand for water supplies, new sources of point source and nonpoint source pollution, increased area of impervious surface and volume of stormwater runoff, and potential flooding impacts. This impact would be considered cumulatively significant.	Construction activities of the Proposed Project could potentially impair water quality from ground disturbances resulting in discharges of sediment to streams, and heavy equipment use resulting in release of hazardous materials into streams. Operation of the SCARF would discharge hatchery effluent into the secondary channel of the San Joaquin River. *Further analysis provided below.*
Land Use and Planning	As the region develops, land use conflicts or incompatibilities, such as between agriculture and urban development at the urban/rural interface, could intensify. This impact would be considered cumulatively significant.	The Proposed Project would not involve any activities that could cause land use incompatibilities or conflicts with adopted plans or policies. As such, the Project would not make any contribution to cumulative impacts related to land use. No analysis required.
Mineral Resources	No information has been found during the preparation of this DEIR to suggest that mineral resources in the Potentially Affected Area are cumulatively degraded.	No further analysis required.
Noise	Noise is a localized impact which attenuates rapidly with distance. No information has been found during the preparation of this DEIR to suggest that noise conditions are cumulatively degraded in the locations where the Proposed Project may generate noise. While future development in proximity to the SCARF has been identified, it would be far enough away that the same sensitive receptors would be unlikely to be substantially affected.	No further analysis required.

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Population and Housing	Planned residential development in the vicinity will induce population growth. Restoration activities of the SJRRP could potentially create over 10,000 short-term jobs and approximately 500 recreation-oriented jobs over the long-term (Kantor 2012). This impact would be considered cumulatively significant.	The Proposed Project would possibly include the construction of two homes for SCARF staff, and operation of the SCARF would provide employment for up to six workers and would not generally be open to the public. Although the broader SJRRP would potentially contribute to increases in population and housing, the Proposed Project would not make a cumulatively considerable incremental contribution to the significant cumulative impact related to population and housing. No further analysis is required.
Public Services and Utilities	Planned development in Friant and the region will generate additional cumulative demand for water, wastewater treatment, stormwater drainage, solid waste disposal, and electricity. This impact would be considered cumulatively significant.	Construction and operation of the SCARF would require relatively minor amounts of water for controlling dust and other construction activities, would minimally alter existing stormwater drainage, and would create a minimal amount of solid waste. However, operation of the SCARF would utilize flows that could be used for future hydropower generation. *Further analysis provided below.*
Recreation	Anticipated population increases over the coming decades would result in increased demand for recreational opportunities, of particular relevance, recreational fishing. In addition, the Fish and Game Commission is anticipated to enact regulations which would limit recreational fishing in the Restoration Area. Any regulations proposed by the Commission would be subject to public review and comment pursuant to the Administrative Procedure Act. This would be considered cumulatively significant.	The Proposed Project would involve activities that could affect river-based recreational activities. *Further analysis provided below.*

Resource Topic	Cumulatively Significant Impacts	Proposed Project's Contribution
Transportation and Traffic	Regional traffic conditions may worsen over time as population grows, and roadway infrastructure struggles to keep pace. This would be considered cumulatively significant.	The Proposed Project's effects on traffic would be localized to discrete isolated locations that do not have impaired traffic conditions (e.g., the community of Friant). Because of this, when considering overall traffic conditions in the region, it has been determined that the Proposed Project would not have the potential to make a cumulatively considerable incremental contribution to traffic impacts. No further analysis required.

Impact CUM-1. Effects on Agricultural Resources (No Impact)

The SJRRP, as a whole, would involve activities that would affect agriculture. This impact was previously addressed in the SJRRP PEIS/R. Restoration activities of the SJRRP would convert important farmland along the river's edge to nonagricultural uses and necessitate the cancellation of Williamson Act contracts. The SJRRP would substantially diminish agricultural land resource quality and importance because of altered inundation and/or soil saturation and water deliveries. These actions would affect cropping patterns, idling of farmland, and productivity, and would combine with other significant cumulative effects on agricultural productivity. Overall, the SJRRP PEIS/R concluded that the SJRRP would cause a significant and unavoidable cumulatively considerable incremental contribution to a significant cumulative impact on agricultural resources and productivity, Important Farmland, and Williamson Act contracts.

That said, the Proposed Project itself would have no incremental contribution to this significant cumulative impact. The Proposed Project would not alter land-use designations or farmland/timberland classifications at either the local or state level, nor would it create pressure for future land conversions. Furthermore, no Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, forest lands, or lands under a Williamson Act contract would be converted by, or conflict with, the Proposed Project.

Impact CUM-2. Contributions to Non-Attainment Status of Criteria Air Pollutants (Less than Significant with Mitigation)

The SJVAB is currently designated as a nonattainment area for federal and state ozone and PM2.5 standards, and state PM10 standards. Past, present, and probable future projects would have a significant cumulative impact on air quality in the project area.

The SJVAPCD has adopted a cumulative threshold of significance of 10 tons per year for ozone precursors (ROG and NOX). Operation of the Proposed Project would result in emissions of particulate matter and exhaust gases that would not exceed these criteria. However, it is possible that construction activities associated with the Proposed Project would exceed the criteria. Implementation of **Mitigation Measure AQ-MANAGEMENT-1** would reduce construction air emissions to levels below SJVAPCD's construction significance thresholds. Therefore, with implementation of Mitigation Measure AQ-MANAGEMENT-1, the incremental contribution of the Proposed Project would not be cumulatively considerable.

Impact CUM-3. Effects on Fish Species and Their Habitats (Beneficial)

Dam construction, conversion to farmland, timber harvesting, water diversions, and the introduction of nonnative plant and animal species have substantially changed aquatic habitat in the Restoration Area and throughout the Potentially Affected Area. Most notably, wild Chinook salmon and steelhead have experienced a significant cumulative impact from past and present anthropogenic actions. Restoration of flow under the SJRRP and improvement of fish habitat has made it possible for salmon, including wild stocks found in the major San Joaquin River tributaries (the Merced, Tuolumne, and Stanislaus rivers), to swim up the San Joaquin River once again, although substantial barriers exist which prevent

salmon from reaching the upper reaches of the Restoration Area. That said, the Proposed Project could have several potentially adverse effects. Release of translocated fish and conservation stock has potential to compromise genetic integrity and fitness of wild stocks and potentially spread disease. The Proposed Project also has potential to incrementally decrease water quality, introduce non-native species, and/or impede migration. These impacts could potentially be considered cumulatively significant.

Additionally, disease organisms could also be carried by broodstock from sources in the Sacramento River basin or by translocated released in the Restoration Area. Such a disease outbreak could lead to direct mortality or reduced fecundity among wild fall-run Chinook salmon in the major San Joaquin River tributaries. Direct mortality or reduced fecundity resulting from such an outbreak would be considered a potentially cumulatively considerable incremental contribution to this overall significant cumulative impact on wild fall-run Chinook salmon in the San Joaquin River tributaries. The operations component of the Proposed Project would include management measures to reduce the potential of disease and the monitoring component would further ensure a reduction of this potential (see Chapter 2, *Project Description*, for complete details). As described in Impact FISH-OP-4, before entering the SCARF, all fish would be quarantined and required to pass a health assessment. Once in the hatchery, they would be monitored for pathogens. The SCARF operations would adhere to biosecurity protocols to reduce the possibility of propagating and spreading fish pathogens.

Hatchery facilities provide suitable habitat for various forms of AIS (see Chapter 6, *Biological Resources – Fisheries*, for more details). AIS such as the NZMS, quagga and zebra mussels, and *didymosphenia geminata* (freshwater microscopic diatom) are present in portions of California. These three species are known to dramatically alter aquatic communities in which they establish themselves. Infestations by these species and other AIS could cause considerable damage to aquatic habitat and species in the Restoration Area. As described in Impacts FISH-OP-5 and FISH-REINTRO-2, the HACCP for the SCARF would include protocols to prevent the introduction of AIS into the SCARF, and operational practices that prevent the spread of AIS within and outside of the facility, such that the Proposed Project would not result in a cumulatively considerable contribution to this impact.

The reintroduction of conservation stock is potentially problematic due to concerns related to the genetic integrity of naturally spawning fish populations. This would be considered a potentially cumulatively considerable incremental contribution on wild Chinook salmon in the San Joaquin River tributaries. As discussed in Impact FISH-REINTRO-3, adhering to the SCARF's HGMP would minimize the potential for undesirable genetic traits to develop in the conservation stock, and the proposed reintroduction strategy would reduce the potential for straying. With these measures in place, reductions in genetic fitness or population viability of Sacramento River basin spring-run Chinook or San Joaquin River basin fall-run Chinook would be sufficiently minimized; therefore, the Proposed Project would not result in a cumulatively considerable contribution to this impact.

Release of hatchery-produced fish can trigger ecological risks to other fishes. Some potential risks include competition for food and territory, predation by hatchery fish due to their larger size, negative social interactions, and carrying capacity issues. This would be considered a potentially cumulatively considerable incremental contribution on wild fish populations in the San Joaquin River tributaries. As discussed in Impact FISH-REINTRO-5, the SCARF would base goals for growth patterns of hatchery fish and size at emigration on natural population parameters to reduce the risk that hatchery fish would outcompete or prey on naturally produced juveniles. Therefore, the Proposed Project would not make a cumulatively considerable contribution to this impact.

SCARF operations may affect aquatic food webs by inputting marine-derived nutrients to the San Joaquin River. As discussed in Impact FISH-OP-6, this impact would be beneficial.

While various aspects of fish reintroduction could contribute to adverse cumulative impacts, on the whole, the Proposed Project's reintroduction activities are expected to benefit salmon populations, in particular within the Restoration Area where no established salmon runs currently exist. Accordingly, the Proposed Project would not make a cumulatively considerable incremental contribution to the decline of aquatic habitat, wild fall-run Chinook salmon, or other aquatic species in the San Joaquin River and its tributaries. The overall contribution of the Proposed Project would be beneficial.

Impact CUM-4. Effects of Wild Broodstock Collection (Significant and Unavoidable)

Broodstock collection would have the potential to adversely affect wild spring-run Chinook populations in the collection areas, which are considered to already be subject to cumulatively significant impacts based on their endangered status. As described in Impact FISH-REINTRO-1, Mitigation Measure FISH-REINTRO-1 would be taken such that wild broodstock collection would only occur when such adverse effects would not be possible. This mitigation measure will allow CDFW to address impacts and develop take totals. However, because sufficient details or specific take totals do not currently exist, specific mitigation measures or performance standards cannot be identified at this time. CEQA requires that specific mitigation and/or performance standards be provided to avoid improper mitigation deferral. It is the intent of CDFW to not have significant adverse impacts on donor stock populations. However, because full compliance with CEQA's standards for mitigation is not possible at this time, CDFW is conservatively finding that this activity would have a considerable contribution to this cumulative impact, and impacts are therefore considered significant and unavoidable. Future, more detailed analysis will be conducted as necessary through tiered CEQA documentation prior to broodstock collection from naturally spawning spring-run donor stock.

Impact CUM-5. Effects on Terrestrial Vegetation, Wildlife, and Sensitive Communities (Less than Significant with Mitigation)

Fresno and Madera counties east of SR 99 historically contained vast areas of grassland and vernal pool habitat. Past anthropogenic activity, especially conversion to farmland and developed land use, has substantially changed wildlife populations and vegetation at the SCARF site, in the Project Area, and throughout the Potentially Affected Area. Additionally,

the CVP, the SWP, and the introduction of nonnative plant and animal species have resulted in overall significant adverse effects on the extent, species composition, and functioning of wetlands, riparian habitats, and other sensitive natural communities and the distribution and abundance of wildlife species. The threatened and endangered status of numerous plant and animal species, and the dramatic reductions in the extent of wetland and riparian vegetation are evidence of these overall significant cumulative impacts.

Wildlife species include non-riverine aquatic invertebrates, reptiles, birds and mammals. Tables 7-1 and 7-2 list the wildlife and plant species considered in this DEIR at the SCARF site, and Appendix J, *Supporting Documentation Related to Biological Resources - Vegetation and Wildlife*, lists these species considered in the Restoration Area. Non-Project related activities that may impact terrestrial wildlife or plant species either through direct disturbance or habitat alteration include: agriculture, climate change, introductions of nonnative species, recreational activities, streambed alteration, urbanization, and wildfire, fire suppression, and fuels management.

Species listed in Tables 7-1, 7-2, and in Appendix J have been designated as special-status by the CDFW or USFWS, or are considered by CDFW to meet the criteria for "rare" as defined under CEQA Guidelines section 15380. The population status and/or viability vary for each of these species. Similar to fish species, declines in wildlife and plant species populations are largely due to long-term degradation of environmental conditions. With few exceptions, the declines in the population of a species are the result of the synergistic effects of anthropogenic activities, and not a single causative agent or project. Thus, by definition, it is cumulative impacts that threaten the viability of these species.

Potential adverse effects of the Proposed Project on these species may include: direct physical disturbance; indirect stress-inducing disturbances such as noise; creation of barriers to movement, migration or dispersal; and degradation of habitat (see Chapter 7, *Biological Resources – Vegetation and Wildlife,* for complete description of impacts).

As explained in Impact BIO-CONSTRUCT-1, five special-status plant species have potential to occur at the SCARF site because suitable habitat is present, or in the case of Sanford's arrowhead, the species was observed at the site in 2012. It is not likely that the Proposed Project would contribute substantially to any foreseeable decline of any special-status plants with implementation of Mitigation Measures BIO-CONSTRUCT-1a and -1b. Therefore, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in BIO-CONSTRUCT-2, the SCARF site provides marginally suitable habitat for special-status branchiopods such as vernal pool fairy shrimp. Mitigation Measures BIO_CONSTRUCT-2a through -2c would reduce potential impacts to less than significant. With mitigation, it is not likely that the Proposed Project would contribute substantially to any foreseeable decline in the range or population viability of special-status branchiopods. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As explained in BIO-CONSTRUCT-3, CTS and western spadefoot species are known to breed in close proximity to the SCARF site and may use burrows throughout the site as upland habitat. It is not likely that the Proposed Project would contribute substantially to any foreseeable decline of CTS or western spadefoot with implementation of Mitigation Measures BIO-CONSTRUCT-3a through -3d. Therefore, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in Impact BIO-CONSTRUCT-4, the western pond turtle is the only reptile species for which the Proposed Project poses a significant threat. **Mitigation Measure BIO-CONSTRUCT-4** would minimize impacts to the western pond turtle. With mitigation, it is not likely that the Proposed Project would contribute substantially to any foreseeable decline in the range or population viability of the western pond turtle. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in Impacts BIO-CONSTRUCT-5 through -10, the SCARF site is known to provide habitat for several special-status avian species (burrowing owl, Swainson's hawk, white-tailed kite, willow flycatcher, and others), several special-status bat species, and two special-status mammals (American badger and San Joaquin kit fox). The Proposed Project may adversely impact these species if they are present during construction. **Mitigation Measures BIO-CONSTRUCT-5 through -10** would reduce these impacts to less than significant. The incremental effects of the Proposed Project on avian and mammal Species of Concern would not be cumulatively considerable because the magnitude of impact that may occur is not likely to contribute substantially to any foreseeable decline in the range or population viability. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in Impact BIO-TER-CONSTRUCT-11, the Proposed Project would result in a permanent loss of sensitive natural communities: about 5,000 square feet of riparian habitat and 3,000 square feet of Fremont Cottonwood woodland. **Mitigation Measures BIO-TER-CONSTRUCT-11a and -11b** would ensure that the impacts are minimized and revegetation plans are implemented that result in no net effect. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

As described in Impact BIO-CONSTRUCT-12, the Proposed Project would result in the fill of a small amount of federally protected wetlands. **Mitigation Measures BIO-CONSTRUCT-12a and -12b** would minimize the impact to wetlands and result in no net effect. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable, and is considered less than significant.

The Proposed Project is not likely to result in substantial loss or degradation of habitats that support the species and communities described above, and direct impacts to individuals are unlikely. This conclusion is based on field surveys on the SCARF site and the known distribution of these organisms and their habitats in relationship to anticipated actions

under the Proposed Project. Thus, the incremental contribution of the Proposed Project would not be cumulatively considerable.

Impact CUM-6. Effects on the Generation of Greenhouse Gas Emissions (Significant and Unavoidable)

As described above, anthropogenic emissions of GHGs are widely accepted in the scientific community as contributing to global warming, a significant cumulative impact.

Any measurable contribution by the Proposed Project would be cumulatively considerable. **Mitigation Measure GHG-MANAGEMENT-1** has been identified to reduce emissions. However, it may not eliminate emissions, and in addition, it may not be feasible to implement (for instance, if inadequate funding were available to purchase emissions offsets). As a result, the Proposed Project's contribution to GHG emissions would be a significant and unavoidable cumulatively considerable incremental contribution to a significant cumulative impact on generation of GHG emissions.

Impact CUM-7. Effects on Hydrology and Water Quality (Less than Significant)

TMDL impairments in the Project Area are all the result of agricultural practices and urban discharges, including legacy pesticides, salinity, and E. coli. These pollutants represent a significant cumulative impact on water quality in the Project Area.

The Proposed Project would not contribute to any of these pollutants. Construction of the SCARF could result in temporary water quality impacts; however, construction BMPs would minimize this impact. The operation of the SCARF would discharge treated effluent into a secondary channel of the San Joaquin River; however, such discharges would be regulated under permits to ensure protection of beneficial uses of the river and would not make a cumulatively considerable incremental contribution to this significant cumulative impact.

Impact CUM-8. Effects on Hydropower Operations Upstream of the SCARF Site (Less than Significant)

Population growth in the state will result in an increase in the demand for electricity. This would be a significant cumulative impact on hydropower operations and demands.

As described in Chapter 2, *Project Description*, Reclamation currently diverts a continuous flow to the existing SJFH from the Friant Dam via the Fishwater Release Powerplant owned by Orange Cove Irrigation District, generating hydropower in the process. Reclamation has prepared plans for water supply infrastructure improvements so that a continuous flow would be available for the SCARF. Under the Proposed Project, CDFW would complete all necessary actions to convey 20 cfs from the federal property boundary to the SCARF. The supply for the SCARF would exceed the capacity of, and therefore bypass, the power plant.

Comment letters received during the EIR scoping period suggested that the 20 cfs to be used by the SCARF could be used for future hydropower generation as it is released from the reservoir. However, no specific plans are in place to expand the hydropower facility, and

so this is not a reasonably foreseeable future action. In addition, the Proposed Project would not preclude the future alteration of the water delivery system such that the SCARF process water supply could effectively generate hydroelectric power. For these reasons, the Proposed Project would not make a cumulatively considerable incremental contribution to significant cumulative impacts on electricity generation, specifically on hydropower operations immediately downstream of Friant Dam.

Impact CUM-9. Effects on Recreational Fishing (Less than Significant)

Past and present actions have significantly impacted anadromous salmonids and their habitat in the San Joaquin River and its tributaries. Consequently, there is a significant cumulative impact on fisheries resources and related recreational fishing opportunities.

The Proposed Project would involve reintroduction of Chinook salmon to the Restoration Area, an activity that is anticipated to result in the Fish and Game Commission updating fishing regulations in the Restoration Area, such that recreational fishing would be restricted to protect the reintroduced fish. Any regulations proposed by the Commission would be subject to public review and comment pursuant to the Administrative Procedure Act. The Proposed Project may also include enhanced enforcement by CDFW of such fishing regulations. These activities have potential to contribute to significant cumulative impacts related to recreational fishing. However, the Proposed Project would also enhance fishing opportunities in other locations outside of the Restoration Area, where fishing regulations are not anticipated to change due to the Proposed Project's reintroduction activities. In addition, the Proposed Project includes recreational fishing enhancements in the Restoration Area that are specifically intended to offset recreational impacts of the overall SJRRP. Considering all of these factors as a whole, the Proposed Project is not expected to make a cumulatively considerable incremental contribution to significant cumulative impacts related to recreational fishing.

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