Revised
BIOLOGICAL ASSESSMENT
of the
Effects of the
Pure Water Monterey Groundwater Replenishment Project on South-Central California Coast Steelhead Distinct Population Segment

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SUMMARY AND CONCLUSIONS

The purpose of this Biological Assessment (BA) is to address the effects of Federal actions proposed to fund and permit the Pure Water Monterey Groundwater Replenishment Project (GWR Project) on species listed as endangered or threatened under the Endangered Species Act (ESA), or their designated critical habitat under the jurisdiction of the National Oceanic and Atmospheric Administration National Marine Fisheries Services (herein referred to as NMFS). The GWR Project involves alterations in water quality and surface flows and construction in the northern Salinas Valley watersheds and has the potential to affect South Central California Coast Steelhead Distinct Population Segment (S-CCC steelhead) (*Oncorhynchus mykiss*) and its designated critical habitat.

The GWR Project is being proposed by Monterey Regional Water Pollution Control Agency (MRWPCA) in partnership with the Monterey Peninsula Water Management District (Water Management District) in order to create a reliable source of water supply to offset existing water supply sources for northern Monterey County. The purpose of the GWR Project is two-fold: (1) to create 3,500 AFY of purified recycled water for recharge of the Seaside Groundwater Basin (Seaside Basin) to create a new replacement water supply and allow California American Water Company (Cal-Am) to reduce diversions from the Carmel River by the same amount, and (2) to provide additional recycled water to growers in the northern Salinas Valley for crop irrigation to reduce pumping from the Salinas Groundwater Basin. In addition, the Proposed Action would reduce pollutant loads to the surface waters, would improve water quality in the Seaside Basin, and would assist in diversifying Monterey County's water supply portfolio. The project is also consistent with California's recycled water goals and would assist the region in mitigating for and adapting to the impacts of climate change.

The Action Area for this BA includes Reclamation Ditch and a portion of Tembladero Slough downstream of the proposed diversion point approximately 6.5 miles upstream of the Elkhorn Slough Complex, Salinas River from near Davis Road [River Mile (RM) 11.6], downstream to and including Salinas River Lagoon, and the Old Salinas River Channel.

The GWR Project would be located within northern Monterey County and would include new facilities located within unincorporated areas of the Salinas Valley and within the cities of Salinas, Marina, and Seaside. The project will collect new raw waters from a variety of sources (agricultural wash water, urban stormwater runoff, and surface waters) and combine it with existing raw wastewater inflows to MRWPCA's Regional Wastewater Treatment Plant (RTP). Some of the secondary treated effluent that is not further treated to tertiary levels for agricultural irrigation will be conveyed to a new Advanced Water Treatment Facility (AWTF). The highly-treated recycled water produced at the AWTF will be used for replenishment of the Seaside Basin through the injection of the water into a series of shallow and deep injection wells. Once injected, this purified recycled water is mixed with other water in the basin, stored, and available for future extraction by Cal-Am for delivery to its customers, replacing existing sources of water supply.

The project would recycle and reuse municipal wastewater, agricultural wash water (Salinas industrial wastewater), urban stormwater runoff, and surface waters. The projected influent flowrate from this source would be 7.2 cubic foot per second (cfs) including the recovery of stored winter flows at the Salinas Treatment Facility for summer use. Surface water diversions would supplement the water from municipal and industrial wastewater and stormwater runoff sources. The Reclamation Ditch would provide an average of 2 cfs up to a maximum of 6 cfs and the Blanco Drain diversion may capture an average of 4.6 cfs, up to a peak rate of 6 cfs. During October to March, the project's primary source of water would be the excess secondary treated municipal effluent that is not used by the Castroville Seawater Intrusion Project (CSIP) irrigation system.

Analysis of effects of the diversions from the surface water sources in Reclamation Ditch and Salinas River watersheds finds the GWR Project may affect, but is not likely to adversely affect, S-CCC steelhead Distinct Population Segment (DPS) or its critical habitat in these two watersheds[1].

Through the State Water Resources Control Board (SWRCB) water right permits process for the Reclamation Ditch and the Blanco Drain diversion components (Application Nos. 32263A and 32263B), the National Marine Fisheries Service (NMFS) and the California Department of Fish and Wildlife (CDFW) identified that would have the potential to adversely affect S-CCC steelhead and filed protests with the SWRCB. NMFS and CDFW, working collaboratively with the local agencies implementing the GWR Project, agreed to proposed terms and conditions to be included in the water right permits to avoid adverse effects of the GWR Project on migration and habitat at and downstream of the points of diversion in the Reclamation Ditch and within the Salinas River downstream of the Blanco Drain. In addition, the proposed terms and conditions for the Reclamation Ditch water right permit would avoid diversion that would cause flow in Reclamation Ditch to decline below passage thresholds and would maintain minimum flows for downstream habitat throughout the year.

The diversions from the Salinas River watershed include removing very low quality water from Blanco Drain before it enters the Salinas River at approximately RM 5. Water quality in Blanco Drain is extremely poor and contains contaminants that are known to be harmful to fish and wildlife (NMFS 2007, 2015[1]). The GWR Project will substantially reduce the discharge of this poor quality water to the Salinas River and will improve water quality conditions for S-CCC steelhead habitat. The Salinas River Lagoon, a potentially significant habitat for recovery of S-CCC steelhead in the Salinas River watershed, will be improved by reducing pollutant levels a major portion of which is derived from Blanco Drain, especially during low flow, summer conditions. The diversion rate from the Salinas River was found to be consistent with

[1] Although not a factor in the determination of the effects on the Reclamation Ditch and Salinas River watersheds, the GWR Project would also, indirectly, contribute toward reducing diversions from the Carmel River alluvial aquifer resulting in beneficial effects on S-CCC steelhead in the Carmel River.

maintaining the flows prescribed by NMFS (2007) for the Lower Salinas River as well as reducing discharge of the poor quality water to the Salinas River.

As part of the SWRCB process for the water rights permits for the Blanco Drain and Reclamation Ditch, the local agencies, NMFS, and CDFW have agreed upon terms and conditions to be included in the permits to further reduce any impacts to the S-CCC steelhead, which are provided in Appendix M. Pursuant to these terms and conditions, the GWR Project would include operational requirements for diverting water from Blanco Drain and from the Reclamation Ditch. For the Blanco Drain diversion, the water right permit will include a requirement to bypass 2 cfs of flows from the Blanco Drain to the Salinas River Lagoon between April 1 and October 31, under specific conditions. This continued inflow of water to the river will be provided to ensure that lagoon levels do not decline substantially and that periodic flushing flows will continue in the Old Salinas River which currently receives flow from the lagoon on a regular basis. In most conditions, the diversions of water that currently flow to the Salinas River were determined to likely improve aquatic habitat conditions in the Lower Salinas River by reducing pollutant loads.

Additionally, design features of the Proposed Action from the avoidance and minimization measures included in the approved Mitigation, Monitoring, and Reporting Plan (MMRP) have been incorporated into the Project which will further reduce the effects of the Proposed Action to the S-CCC steelhead. See Appendix C. In addition, the proposed design of the Reclamation Ditch diversion has been reviewed and approved by the fish passage engineer at NMFS and determined to be protective of fish passage conditions. See Appendix N.

An assessment of the GWR Project effects on essential fish habitat (EFH) within the Action Area showed that starry flounder (*Platichthys stellatus*) EFH would not be adversely affected.

In conclusion, the GWR Project may affect, but is not likely to adversely affect, S-CCC steelhead or its designated critical habitat in the Reclamation Ditch and the Salinas River watersheds.[2]

[2] While outside the scope of this consultation, the GWR Project will also result in indirect beneficial effects on S-CCC steelhead and its designated critical habitat in the Carmel River and on the DPS by improving habitat conditions within the Carmel River, one of only four sub-populations in the S-CCC steelhead DPS that NMFS's considers recoverable to viable populations. These potential beneficial effects are briefly discussed in greater detail below.

TABLE OF CONTENTS

Contents

Appendix A. Clean Water State Revolving Fund Application

Appendix B. Clean Water Act Section 404 Permit Application and Amendment to Application

Appendix C. Resolution No. 2015-24 – A Resolution of the Board of Directors of the Monterey Regional Water Pollution Control Agency to (1) Certify the Final EIR for the Pure Water Monterey Groundwater Replenishment Project, (2) Adopt California Environmental Quality Act Findings, (3) Approve Mitigation Measures and the Mitigation Monitoring and Reporting Program, (4) Adopt a Statement of Overriding Considerations, and (5) Approve the Project as Modified

Appendix D. Documents related to Previous Consultation with National Marine Fisheries Staff

D-1 *Email message NOAA Official Species List for GWR Project on November 19, 2016*

D-2 *GWR Project Presentation and Meeting Notes to National Marine Fisheries Staff on December 14, 2015*

D-3 *Email message U.S. Army Corps of Engineers Lead Federal Agency Delegation to USEPA for Monterey GWR Project on January 20, 2016*

D-4 *Response to Protests from NMFS against Monterey County Water Resources' Water Right Application Numbers A032263A, A032263B, A032263C on March 18, 2016*

D-5 *Status Update Memoranda from MCWRA to SWRCB documenting progress on Water Rights Protest Resolution (March through July 2016)*

D-6 *USEPA Letter dated July 21, 2016 to NMFS Requesting Informal Consultation Under The Endangered Species Act (ESA) Section 7 and Essential Fish Habitat (EFH) Determination Under the Magnuson-Stevens Fishery Conservation and Management Act (MSA) for Clean Water State Revolving Fund (CWSRF) Financing Application (without Enclosures)*

D-7 *Meeting Notes from July 29, 2016 Consultation Kick-Off Meeting*

D-8 *Map book, conceptual site plans from September 22, 2016 SWRCB and NMFS site visit*

Appendix E. Evaluation of Inflow to Salinas River Downstream of Blanco Drain

Appendix F. Fish Passage Analysis, Reclamation Ditch at San Jon Road and Gabilan Creek at Laurel Road

Appendix G. Salinity Impacts to Elkhorn Slough Resulting from Surface Water Diversion for the Pure Water Monterey Groundwater Replenishment Project

Appendix H. Clean Water Act Section 401 Water Quality Certification Application for the Pure Water Monterey Groundwater Replenishment Project (excluding Biological Assessment for USFWS that was submitted separately)

Appendix I. Consolidated Final EIR for the Pure Water Monterey Groundwater Replenishment Project, certified October 8, 2015 *(*Prepared by Denise Duffy & Associates, Inc. for MRWPCA)

Appendix J. NMFS Biological Opinion for the Salinas Valley Water Project, June 21, 2007

Appendix K. National Marine Fisheries Service. 2013. South-Central California Coast Steelhead Recovery Plan. West Coast Region, California Coastal Area Office, Long Beach, California

Appendix L. Pure Water Monterey Groundwater Replenishment (GWR) Project – Likelihood of Steelhead presence in the Salinas River Lagoon and Old Salinas River Channel (prepared by HES Environmental, July 19, 2016)

Appendix M. National Marine Fisheries Service's Dismissal of Protest to Water Rights Applications 32263A, Blanco Drain, and 32263B, Reclamation Ditch, Monterey County, with Final Protest Dismissal Terms, August 23, 2016

Appendix N. NMFS' confirmation of acceptance of Conceptual Design Plan for the Reclamation Ditch Diversion Design (September 30, 2016)

List of Figures

List of Tables

Table i-1 List of Acronyms

Acronym	Description
ac-ft.	Acre-feet
AFY, ac-ft./yr.	Acre-feet/year
AWTF	Advanced Water Treatment Facility
CCRWQCB	Central Coast Regional Water Quality Control Board
cfs	Cubic foot per second
gpd	Gallons per day
mgd	Million gallons per day
mg/l	Milligrams per liter
ug/L	Micrograms per liter
MPN	Most Probable Number
ASR	Aquifer Storage and Recovery
BA	Biological Assessment
BMP	Best management practice
CAW, Cal-Am	California American Water Company
CCAMP	Central Coast Ambient Monitoring Program
CCoWS	Central Coast Wetland Studies
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
Corps	United States Army Corps of Engineers
CSIP	Castroville Seawater Intrusion Project
CWC	California Water Code
DPS	Distinct Population Segment
DWR	California Department of Water Resources
EIR	Environmental Impact Report
ESA	Federal Endangered Species Act of 1973
GWR Project	Pure Water Monterey Groundwater Replenishment Project
MCWRA	Monterey County Water Resources Agency
MRSWMP	Monterey Regional Stormwater Management Program
MRWPCA	Monterey Regional Water Pollution Control Agency
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	USDA Natural Resources Conservation Service
RM	River Mile
RTP	Regional Treatment Plant
RWQCB	Regional Water Quality Control Board (in this case, the Central Coast RWQCB)
SB	California Senate Bill
S-CCC	South-Central California Coast Steelhead Distinct Population Segment
SIWTF	Salinas Industrial Wastewater Treatment Facility
SRDF	Salinas River Diversion Facility
SVRP	Salinas Valley Reclamation Plant
SVWP	Salinas Valley Water Project

SVGB	Salinas Valley Groundwater Basin
SWRCB	California State Water Resources Control Board
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geologic Survey
Water Management District	Monterey Peninsula Water Management District

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1.0 INTRODUCTION

1.1 Purpose of the Biological Assessment

The purpose of this Biological Assessment (BA) is to address the effects of federal actions proposed to fund and permit the Pure Water Monterey Groundwater Replenishment Project (GWR Project) on species listed as endangered or threatened under the Endangered Species Act (ESA), or their designated critical habitat. Two Federal action agencies are participant in the Federal action that is the subject of this BA. The State Water Resources Control Board (SWRCB), as the designated representative of the United States Environmental Protection Agency (USEPA) (SWRCB_USEPA 2012)[3], intends to fund the GWR Project using the Clean Water State Revolving Fund (CWSRF), a federal-state shared fund, (See 33 U.S.C. §§ 1381 – 1386).[4] See Appendix A. The United States Army Corps of Engineers (Corps) intends to issue a Clean Water Act (CWA) section 404 permit pursuant to the provisions of Section 404 of the Clean Water Act of 1972, as amended (33 U.S.C. § 1344 *et seq*.) to construct portions of the GWR Project (see Appendix B). Namely, the diversion structures within the Reclamation Ditch and Blanco Drain are located within waters of the U.S., triggering the requirements of CWA Section 404. The Corps has identified that the Reclamation Ditch and Blanco Drain diversion components qualify for one or more Nationwide Permits due to the construction disturbance area and permanent facility size resulting in fill of less than 0.5 acre (specifically, 0.02 acres for each diversion structure) and thus minor effects on waters of the U.S. (Leeson, Janelle, personal communication, August 28, 2016). In addition, compliance with Section 10 of the Rivers and Harbors Act may be required due to the installation of the Blanco Drain diversion pipeline under the Salinas River.

The GWR Project involves alterations in water quality and surface flows and construction in the Salinas watersheds and in the Reclamation Ditch watershed and has the potential to affect only South-Central California Coast Steelhead Distinct Population Segment (S-CCC steelhead) (*Oncorhynchus mykiss*) and/or its designated critical habitat.

This BA is prepared by the USEPA to fulfill requirements of Section 7(c) of the Endangered Species Act (ESA) (16 U.S. C. § 1536) and the applicable regulation (50 C.F.R. § 402.12). Section 7 assures that, through consultation (or conferencing for proposed species) with the Services, federal actions do not jeopardize the continued existence of any threatened, endangered or proposed species, or result in the destruction or adverse modification of critical habitat. This BA describes the relationship between the proposed Federal action and S-CCC steelhead in the Action Area of the GWR Project, and it evaluates the potential effects of this Proposed Action on

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[3] http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/docs/policy0513/oa_revised_2012.pdf.

[4] The USEPA designated the SWRCB as their non-Federal representative for purposes of conducting informal consultation and preparing a biological assessment or biological evaluation, if necessary, under Section 7 of ESA for certain projects. See also letter from USEPA to USFWS, "SUBJECT: Designation of Non-Federal Representation under Section 7 of the Federal Endangered Species Act" dated 15 December 15, 2008.

this species and its designated critical habitats. This BA assists in determining whether the proposed Federal action will require formal consultation or a conference and provide the basis upon which consultation may be conducted between the Federal action agencies and the United States Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Services (NMFS) pursuant to Section 7(a) of the ESA.

When two or more Federal agencies are involved in an activity affecting listed species or critical habitat, one agency is designated as the lead (50 CFR § 402.07), often based on which agency has the principal responsibility for the project. Although one agency has the lead, the other still has to provide data for effects analyses and development of reasonable and prudent alternatives and measures if its activities may affect listed species or critical habitat. The SWRCB, on behalf of the USEPA, is the lead action agency for preparation of this BA. The Monterey Regional Water Pollution Control Agency (MRWPCA) is the applicant for the funding and permitting of the GWR Project.

1.2 Proposed Action

The Proposed Action for this BA and consultation is the funding of the GWR Project by the SWRCB/USEPA and the issuance of a Clean Water Act Section 404 permit by the Corps to construct project facilities in waters under the jurisdiction of the Corps within the Salinas River and Reclamation Ditch watersheds.[5]

The Monterey Peninsula Water Management District and MRWPCA are jointly sponsoring the GWR Project, a water supply project that will serve northern Monterey County (**Figure 1-1**). The GWR Project would provide a reliable source of water supply by collecting poor quality water (i.e., stormwater runoff, industrial wastewater and agriculture drain water) to combine with existing raw wastewater inflows to MRWPCA's Regional Wastewater Treatment Plant (RTP). The Regional Treatment Plant effluent that is not further treated to tertiary levels and used for agricultural irrigation in northern Salinas Valley would be conveyed to a new Advanced Water Treatment Facility (AWTF) that would produce highly-treated purified recycled water (purified recycled water). The purified recycled water would be used to replenish the Seaside Groundwater Basin (Seaside Basin) by injecting this high quality water into a series of shallow and deep injection wells. Once injected into the Seaside Basin, the purified recycled water would mix with the groundwater present in the aquifers and be stored for future extraction from existing potable water supply wells.

The primary objective of the GWR Project is to replenish the Seaside Basin with 3,500AFY of purified recycled water to replace a portion of California American Water Company's (Cal-Am) water supply as required by SWRCB orders. The purified recycled water would be produced at the AWTF located at the existing MRWPCA Regional Treatment Plant and would be conveyed to and injected into the Seaside Basin via a new pipeline and new well facilities. The injected

[5] The GWR Project (namely the Blanco Drain Diversion pipeline crossing under the Salinas River) potentially requires an authorization under Section 10 of the Rivers and Harbors Act.

water would then mix with the existing groundwater and be stored for future urban use by Cal-Am, thus enabling a reduction in Carmel River system diversions by the same amount. Cal-Am is constructing the facilities needed to extract and transport the water within its system; those upgrades are outside the scope of this consultation as they have independent utility from the GWR Project and are not part of the project proposed for funding.

Additional recycled water for agricultural irrigation in northern Salinas Valley would be provided by augmenting inflows to an existing water recycling facility at the Regional Treatment Plant (the Salinas Valley Reclamation Plant or SVRP). The GWR Project would provide additional source waters in order to provide additional recycled water for use in the Castroville Seawater Intrusion Project's agricultural irrigation system. It is anticipated that in normal and wet years approximately 4,500 to 4,750 AFY of additional recycled water supply could be created for agricultural irrigation purposes. In drought conditions, the project could provide up to 5,900 AFY for crop irrigation.

The project would also include a drought reserve component to support use of the new supply for crop irrigation during dry years. The project would provide additional 200 AFY of purified recycled water that would be injected in the Seaside Basin in wet normal years for up to five consecutive years. This would result in a "banked" drought reserve totaling up to 1,000 ac-ft. During dry years, the project would provide less than 3,500 ac-ft. of water to the Seaside Basin; however, Cal-Am would be able to extract the banked water to make up the difference to its supplies, such that its extractions and deliveries would not fall below 3,500 AFY. The source waters that are not sent to the advanced treatment facility during dry years would be sent to the Salinas Valley Reclamation Plant to increase supplies for the Castroville Seawater Intrusion Project.

The new source waters would supplement the existing incoming wastewater flows, and would include the following: 1) water from the City of Salinas agricultural wash water system, 2) stormwater flows from the southern part of Salinas, 3) surface water and agricultural tile drain water that is captured in the Reclamation Ditch, and 4) surface water and agricultural tile drain water that flows in the Blanco Drain. These new source waters would be combined within the existing wastewater collection system before arriving at the Regional Treatment Plant.[6]

[6] Although Tembladero Slough and Lake El Estero source water diversions were included as a component of the Project in the Environmental Impact Report for the GWR Project, the MRWPCA and their partner agency are not including these facilities in the initial phase of the Project, in particular are not be included in permit applications, loan applications, and/or grant applications. There would be no effect on Project yields due to elimination of the Lake El Estero source water diversion due to the amount and timing of water available from this source. The effect of not implementing the Tembladero Slough diversion would be a reduction in the crop irrigation water yield for the Castroville Seawater Intrusion Project (CSIP) of approximately 500 to 750 acre feet per year (AFY) within some drought years.

1.2.1 SWRCB Action

The SWRCB Action is the funding of the GWR Project, including modifications to existing facilities and construction of new physical facilities, as briefly described below. The Action involves allocation of Clean Water State Revolving Fund (CWSRF) as prescribed in 33 U.S.C. §§ 1381 - 1386, a federal-state shared fund, to build the following project components:

- Source water diversion and storage. New facilities would be required to divert and convey the new source waters through the existing municipal wastewater collection system and to the Regional Treatment Plant.
- Treatment facilities at the Regional Treatment Plant. The new AWTF would be constructed at the Regional Treatment Plant site. This facility would include a state-of-the-art treatment system that uses multiple membrane barriers to purify the water, product water stabilization to prevent pipe corrosion due to water purity, a pump station, and a brine and wastewater mixing facility. There would also be modifications to the existing Salinas Valley Reclamation Plant to optimize and enhance the delivery of recycled water to growers.
- Product water conveyance. A new pipeline, a pump station and appurtenant facilities would be constructed to transport the purified recycled (product) water from the Regional Treatment Plant to the Seaside Basin for injection.
- Injection well facilities. The injection facilities would include new wells (in the shallow and deep aquifers), back-flush facilities, pipelines, electricity/power distribution facilities, and electrical/motor control buildings.

1.2.2 Corps Action

Corps-permitted activities include construction of source water diversion facilities within Blanco Drain and Reclamation Ditch. The diversion structures within the Reclamation Ditch and Blanco Drain are located within waters of the U.S., subject to CWA Section 404. Due to the construction disturbance area and permanent facility size being well under 0.5 acre, and resulting minor effects on waters of the U.S., the Corps has identified that the Reclamation Ditch and Blanco Drain diversion components qualify for a Nationwide Permit (Leeson 2016). Appendix B contains the application and a letter documenting the applicability of Nationwide Permit 12 and/or 13 for the diversion structures.[7]

1.2.2.1 Reclamation Ditch

A new diversion structure would be installed in the Reclamation Ditch at Davis Road (RM 6.5) to divert flows, when available, into an existing sanitary sewer gravity main, which conveys wastewater to the MRWPCA Salinas Pump Station. A water rights application submitted by

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[7] In addition, an authorization by the Corps under Section 10 Rivers and Harbors Appropriation Act is potentially required due to the pipeline crossing (via horizontal directional drilling) under the Salinas River. The project would have no effects to the profile of the Salinas River, including bed and banks, of the river.

MCWRA for this diversion (Water Right Application #32263B) had an estimated average yield of 1,522 AFY. NMFS and CDFW filed protests on this water right application, and resolution of those protests in 2016 resulted in development of terms and conditions to be included in the water rights permit setting the operational and flow bypass requirements. Projected source water requirements associated with initial operations show that diversions from Reclamation Ditch would typically occur between April and September (March through October during drought year scenarios) and monthly diversion rate would range between 0.3 and 4.6 cfs and annual yield would range from 720 to 1,000 ac-ft. A detailed description of the facility is provided in Section 3.1 and estimated monthly yields in ac-ft. are presented below.

1.2.2.2 Blanco Drain

A new Blanco Drain Diversion pump station would be located adjacent to an existing seasonal pump station and would include a new intake structure on the channel bottom, connecting to a new wet well on the channel bank via a new gravity pipeline. The new pump station would discharge through a new 18-inch force main running from the pump station to a connection in an interceptor that connects with the Regional Treatment Plant. A segment of the new pipeline crosses the Salinas River and would be installed using trenchless methods.

This source would yield an average 2,620 AFY based on the application for a 6 cfs year-round water right permit[8]. Projected source water requirements associated with operation through under current demand show that diversions from Blanco Drain would typically occur between April and September (March through September during drought year scenarios) and monthly average diversion rate would range between 0.1 and 6.0 cfs and annual yield would range from 1,400 to over 2,600 ac-ft. A detailed description of the facility including estimated monthly yields presented below in Section 3.

The GWR Project includes mitigation measures to avoid adverse effects to S-CCC steelhead. The MRWPCA committed to implementation of the Mitigation Monitoring and Reporting Program (MMRP) in its approval of the GWR Project on October 8, 2015 (See MMRP in Appendix C). The GWR Project will therefore operate to avoid modifying flows in Reclamation Ditch when diversions would encroach upon flows required for upstream and downstream migration. Alternative mitigation was considered as part of the GWR Project Environmental Impact Report (EIR) for modification of the San Jon Road structure; however, the BA and Federal Action include provision of adequate bypass for migration downstream of the diversion. The alternative structural modification of the fish passage impediment associated with the San Jon Weir is not subject to the action.

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[8] This availability/yield information represents a conservative estimation of the amount of water available for diversion overall from the Blanco Drain. With additional flow measurements and new treatment, conveyance, and/or storage facilities beyond those facilities proposed for the GWR Project, the yield from the Blanco Drain at this site or others is expected to be higher.

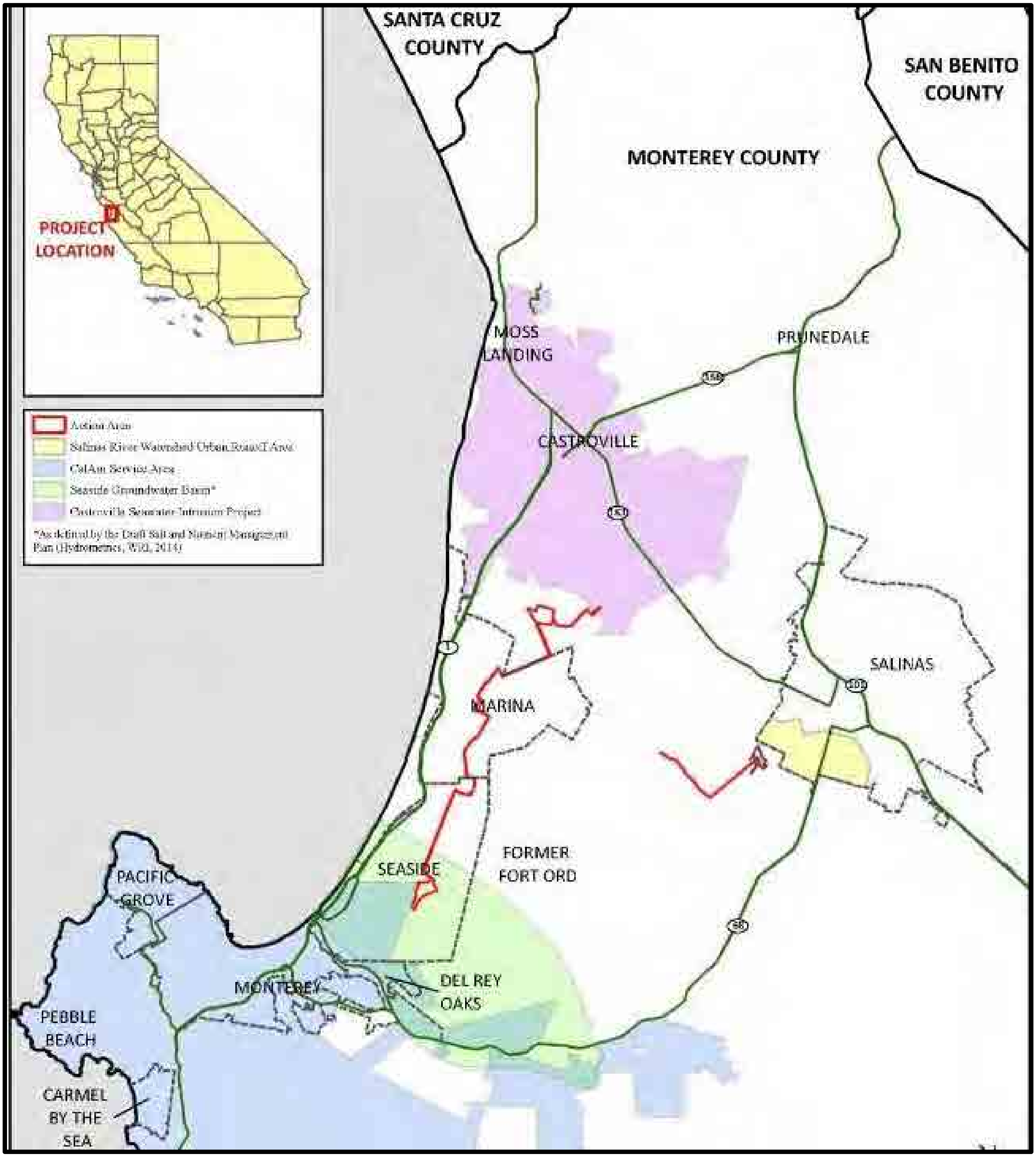

Figure 1-1. Project location and facilities.

1.3 Regulatory Framework

1.3.1 Endangered Species Act

Under of section 7(a)(2) of the ESA (16 U.S.C. § 1536(a)(2)), a federal action agency that authorizes, permits, licenses, funds, or carries out an activity must consult with United States Department of Interior, Fish and Wildlife Service (USFWS) or NMFS, as appropriate, to ensure that the action agency's proposed action is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of the critical habitat of any such species. A federal agency is required to conduct such consultation if its Proposed Action "may affect" any such listed species or its designated critical habitat (50 C.F.R. § 402.14(a)).

For such actions, the federal action agency prepares a BA for the ESA Section 7 consultation process to describe the proposed action and to determine whether the proposed action is likely to adversely affect any listed species, species proposed for listing, designated critical habitat or proposed critical habitat (50 C.F.R. § 402.12(a)). The BA may include the following information: 1) the results of an on-site inspection of the area affected by the proposed action to determine if listed or proposed species are present or occur seasonably; 2) the views of recognized experts on the species at issue; 3) a review of the literature and other information; 4) an analysis of the effects of the action on the species and habitat, including consideration of cumulative effects, and the results of any related studies; and 5) an analysis of alternate actions considered by the federal agency for the proposed action (50 C.F.R. § 402.12(f)). The federal action agency then uses the BA to determine whether formal ESA consultation under ESA Section 7(a) is required (50 C.F.R. § 402.12(k)).

When a federal action agency determines, through its BA or other review, that its proposed action is "*may affect*" a listed species or critical habitat, then the agency must submit a request for formal consultation to USFWS or NMFS, as appropriate (50 C.F.R. § 402.14(a)). This BA documents how the Proposed Action would not likely adversely affect the listed species; therefore, the EPA and the SWRCB are not requesting formal consultation.

This BA has been prepared in accordance with ESA regulations and the NMFS and the USFWS ESA Consultation Handbook titled *Procedures for Conducting Consultation and Conference Activities under Section 7 of the Endangered Species Act* (USFWS and NMFS 1998).

1.3.2 Magnuson-Stevens Fishery Conservation and Management Act

Besides complying with ESA Section 7, the Federal action agency also must comply with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. §§ 1801-1891d; see 50 C.F.R. pt. 600). The primary purposes of the MSFCMA are: 1) to take immediate action to conserve and manage fishery resources off the coasts of the United States; 2) to support the implementation and enforcement of international fishery agreements for the conservation and management of highly migratory species; 3) to promote domestic commercial and recreational fishing under sound conservation and management principles; 4) to provide for preparation and implementation of fishery management plans to achieve and maintain the optimum yield of each fishery on a continuing basis; 5) to establish Regional Fishery Management Councils to protect fishery resources through preparation, monitoring, and revision of plans that allow for the participation of states, tribes, the fishing industry, and consumer and environmental organizations; 6) to encourage the development of underutilized United States fisheries; and 7) to promote the protection of Essential Fish Habitat (EFH) (16 U.S.C. § 1801(b)). Consultation with NMFS is required when any action authorized, funded, undertaken, or proposed to be authorized, funded, or undertaken may adversely affect any EFH (16 U.S.C. § 1855(b)(2)).

1.3.3 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC 651 Et Seq.) requires all federal agencies to consult with and give strong consideration to the views of the USFWS, NOAA NMFS, and state wildlife agencies regarding the fish and wildlife impacts of projects that propose to impound, divert, channel, or otherwise alter a body of water.

1.3.4 Clean Water Act 404 Permit

The Corps administers compliance with Section 404 of the Clean Water Act. Section 404 regulates activities that involve dredging and/or filling of waters deemed under federal jurisdiction, or as "Waters of the United States." The two types of permits issued by the Corps under Section 404 are Nationwide Permits and Individual Permits. If impacts to wetlands are relatively small and a project falls into a specific category of uses already permitted, project proponents may apply for a Nationwide Permit, which is easier to obtain than an Individual Permit.

1.4 Interrelated and Interdependent Actions

Interrelated actions are those actions that are part of a larger action and depend on the larger action for their justification (50 CFR § 402.02), while interdependent actions are those actions having no independent utility apart from the proposed action (50 CFR § 402.02). If a particular private activity would not occur "*but for*" the occurrence of the proposed federal action, the effects of that private action are interdependent and interrelated to the federal action, and the effects of that private action are attributable to the federal action for consultation purposes. To the contrary, activities that would occur anyway, with or without the occurrence of the federal action at issue, are not interdependent or interrelated to the proposed federal action. USFWS and NMFS (1998) further clarify that if a project would exist independent of a proposed action, it cannot be considered "*interrelated*" or "*interdependent,*" even if the proposed action is required to bring the existing facility into compliance with federal law.

There are no interrelated or interdependent actions associated with the Proposed Action described in this BA.

1.5 Species Evaluated

On September 2, 2015, the SWRCB used the USFWS Information for Planning and Conservation project planning tool [IPAC (https://ecos.fws.gov/ipac/)] online service to identify federally listed threatened and endangered species and critical habitat that may be affected by the Proposed Action by generating an official list of threatened and endangered species and critical habitat that occur, or are suspected to occur, within the Action area. Because IPAC does not include listed species that are regulated by NMFS, a request was made to NMFS on November 19, 2016 to identify NMFS-regulated, federally listed species that are likely to occur within the Action Area. Based on the lists acquired from NMFS and via IPAC, the NMFS-regulated, federally-listed fish species identified as having the potential to occur within the Action Area and potentially affected by the Proposed Action is the South-central California Coast steelhead DPS (S-CCC steelhead) and its Critical Habitat. Accordingly, only this species and its designated critical habitats are addressed in this BA.

2.0 BACKGROUND

2.1 Consultation History for the Proposed Action

Early coordination and pre-consultation with the Service was conducted during preparation of the GWR Project Draft EIR (MRWPCA 2015) and a series of site visits, meetings, and phone conversation during the water rights protest process, including:

April 2014 - NMFS was sent a Notice of Preparation (NOP) for GWR Project Draft EIR.

December 2014 –NMFS was sent a Supplemental NOP for GWR Project Draft EIR.

June 3, 2015 - NMFS provided comments on the Draft EIR for the GWR Project regarding the assessment of S-CCC steelhead habitat and related project effects. Comments state NMFS' primary concerns are impacts that may affect the S-CCC steelhead DPS and their designated critical habitat including decreased flows in the Salinas River. Comments also state NMFS support for proposed removal of agricultural runoff carrying high levels of pesticides and nutrients that would otherwise enter the Salinas River, and support for use of recycled water to reduce Carmel River diversions.

June 17, 2015 - Joyce Ambrosius of NMFS and William Snider of HDR, Inc., fishery consultant to the GWR Project, discussed the NMFS' comments on the Draft EIR; Mr. Snider requested technical advice in revising the Draft EIR as appropriate.

September 25 and 28, 2015 – MRWPCA and Denise Duffy, DD&A, sent the Notice of Availability of Final EIR with URL link to Final EIR (and responses to NMFS comments) and notice of October 8, 2015 public hearing on the Project and EIR to Joyce Ambrosius and Alecia Van Atta.

September 29, 2015 – William Snider, fishery consultant to the GWR Project contacted Joyce Ambrosius concerning technical support for GWR Project. Joyce Ambrosius stated that Jacqueline Pearson-Meyer would be the contact person for the GWR Project.

November 2, 2015 - Jacqueline Pearson-Meyer and William Stevens of NMFS and William Snider discussed NMFS providing the GWR Project with technical assistance and identified the desire to conduct an onsite visit of the project sites to become familiar with the project.

November 9, 2015 - William Stevens and Joel Casagrande of NMFS met with members of the GWR Project environmental team including HDR Fishery Biologist Adrian Pitts for a field visit to the Project site and discuss project description, related project components and questions from NMFS on the GWR Project.

November 19, 2015 – Joel Casagrande of NMFS provided information that the only NMFS-regulated, federally listed fish species identified as having the potential to occur within the

Action Area and potentially affected by the Proposed Action is the South-central California Coast steelhead DPS (S-CCC steelhead) and its critical habitat.

December 10 and 11, 2015 – Alison Imamura, DD&A provided Joel Casagrande and William Stevens with files containing specified components of the GWR Project EIR that addressed NMFS Draft EIR comment letter as well as a copy of the presentation to be presented at the December 14th meeting. The presentation was designed to help address questions on the project raised during the field trip.

December 14, 2015 – The GWR Project team conducted an on-line conference call with NMFS staff (Joel Casagrande and Bill Stevens) to provide an overview of the GWR Project, to describe the proposed action for federal consultation, to discuss roles and responsibilities, and to explain the fisheries analysis conducted for the EIR and the approach to this BA. Meeting summary notes and the PowerPoint presentation are provided in Appendix D.

December 21, 2015 – Alison Imamura, DD&A transmitted draft meeting notes from the Dec. 14th Pure Water Monterey Groundwater Replenishment Project call related to the fisheries issues to NMFS (Joel Casagrande, Bill Stevens and Joyce Ambrosius).

January 15, 2016– The GWR Project team conducted a conference call with NMFS staff (Joel Casagrande and Bill Stevens) to address additional questions on specific project components, the proposed action for federal consultation, the fisheries analysis and the approach and timing to this BA.

February 4, 2016 - The GWR Project team conducted a conference call with NMFS staff (Bill Stevens) to address additional questions on the Blanco Drain Diversion component.

February 11, 2016 - The GWR Project team sent a memorandum (by Schaaf & Wheeler Consulting Engineers) to Bill Stevens responding to questions received during the February 4, 2016 conference call. Appendix D also contains this memorandum.

March 14, 2016- William Snider, fisheries biologist of HDR, Inc., contacted William Stevens of NMFS by phone. The subject of the call was to exchange information about the key issues underlying the protests and the preferred method of working together and the intention of the local agencies to resolve the protest issues.

March 14, 2016- Shaunna Juarez, MCWRA was contacted William Stevens of NMFS by phone. The subject of the call was to understand the relationship between the local agencies involved in the project and the content of the meeting the following day.

March 15, 2016- A meeting was conducted at the offices of NMFS in Santa Rosa, CA that included staff of NMFS, CDFW, SWRCB, MRWPCA, Monterey Peninsula Water Management District (Water Management District), Monterey County Water Resources Agency (MCWRA), and the local agencies' consultants (HDR, DD&A, and Schaaf & Wheeler). The purpose of the meeting was to discuss the project and the critical project timeframe and process of working with NMFS and CDFW toward expeditious completion of a water rights permits and Section 7 consultation to enable implementation of the GWR Project for replacement water supply needs of the region.

March 18, 2016- MCWRA provided responses to NMFS's and CDFW's protests, specifically addressing the key concerns raised and provided additional supporting information regarding the agencies' concerns and dismissal terms.

April 5, 2016- A meeting was conducted at the MCWRA office in Salinas, CA that included staff of NMFS, MRWPCA, Water Management District, MCWRA, and the local agencies' consultants (HDR, DD&A, and Schaaf & Wheeler). The meeting reviewed relevant background information as well as NMFS recommendations.

April 11, 2016- A meeting was conducted at the MCWRA office in Salinas, CA that included staff of CDFW, MRWPCA, Water Management District, MCWRA, and the local agencies' consultants (DD&A, and Schaaf & Wheeler). During the meeting, the agencies discussed relevant background information as well as CDFW's issues and considerations.

April 21, 2016- A meeting was conducted at the Schaaf & Wheeler offices in Santa Clara, CA that included staff from the Central Coast Regional Water Quality Control Board (RWQCB)(by conference call), SWRCB (by conference call), NMFS (by conference call), MRWPCA, Water Management District, MCWRA, and the local agencies' consultants (HDR, DD&A, and Schaaf & Wheeler). CDFW was also invited to this meeting but was unavailable. During this meeting, the discussion focused on the available technical information and potential data gaps.

May 5, 2016 - A meeting was conducted at the MRWPCA offices in Monterey, CA that included staff from NMFS, MRWPCA, Water Management District, MCWRA, and the local agencies' consultants (HDR, DD&A, and Schaaf & Wheeler) focusing primarily on the Reclamation Ditch Water Right Application. The agencies discussed multiple bypass scenarios and NMFS's recommendations.

May 9, 2016 - A meeting was conducted at the MCWRA office in Salinas, CA that included staff of CDFW, MRWPCA, Water Management District, MCWRA, and the local agencies' consultants (HDR, DD&A, and Schaaf & Wheeler). The meeting reviewed discussions that have occurred over the last month between the agencies regarding each of CDFW's proposed terms to dismiss its protest of the SWRCB permit applications, focusing primarily on the Reclamation Ditch. A follow-up response was provided on May 10, 2016, to summarize the existing information related to each dismissal term and provide the supporting tabular data as requested.

May 19, 2016 - A meeting was conducted at the MRWPCA office in Monterey, CA that included staff from NMFS, CDFW, RWQCB, SWRCB, MRWPCA, Water Management District, MCWRA, and the local agencies' consultants (DD&A, and Schaaf & Wheeler). The agencies discussed the water rights applications for the Blanco Drain and the Reclamation Ditch diversions. A conceptual plan on how to determine when 2 cfs may need to go to the Salinas River Lagoon was discussed based on outflow to the Old Salinas River Channel (Old Salinas River) and elevation of the lagoon. Water sampling and treatment options were discussed in relation to the lack of adverse water quality impacts of the diversions. Reclamation Ditch fish passage and downstream flows were discussed relative to when the diversion would be turned on and off as well as minimum bypass flows. Numerous scenario tables demonstrating how project yield and instream flows are affected by the different Reclamation Ditch Diversion operational protocols were analyzed and participants shared their opinions on preferred scenarios.

May 20 through June 2, 2016 - The MRWPCA contacted CDFW and NMFS various times by phone and email to understand concerns and develop next steps to obtain dismissal of the agencies' protest of the SWRCB water rights permits.

June 3, 2016 - A Memorandum presenting Proposed Protest Dismissal Terms from the General Managers of all three local agencies (David Chardavoyne, MCWRA; Paul Sciuto, MRWPCA, and Dave Stoldt, Water Management District) was sent to NMFS and CDFW, which included specific commitments if the regulatory agencies agree to resolve the protest swiftly.

June 6 to 17, 2016 - Phone calls and emails resulted from the memo between local agency staff and NMFS staff in order to clarify and discuss the proposed terms.

June 20-21, 2016 - A revised Memorandum on the Proposed Protest Dismissal Terms from the General Managers of all three local agencies (David Chardavoyne, MCWRA; Paul Sciuto, MRWPCA, and Dave Stoldt, Water Management District) was provided to NMFS and CDFW, emails from NMFS and CDFW confirmed the acceptance of the terms, and the Water Management District approved the terms.

June 20, 2016- Water Management District Board approved the terms, subject to minor modifications to the Salinas River Lagoon elevation portion of the memorandum.

June 27, 2016 - MRWPCA's and MCWRA's Boards approved the proposed terms and conditions for the SWRCB water rights permits.

June 28, 2016 – The MCWRA Board of Supervisors approved the proposed terms and conditions, and CDFW submitted a letter conditionally accepting the proposed terms for the SWRCB permits.

August 2, 2016 – CDFW sent a draft Settlement Agreement to MCWRA, MRWPCA, and Water Management District related to their desire for a formal agreement to dismiss protests on Water Rights Applications #32263A and #32263B.

August 12, 2016 - SWRCB sent a draft Water Rights Permit to MCWRA, Water Management District, MRWPCA, CDFW, and NMFS for review and comment.

August 19, 2016 – MCWRA, MRWPCA, and Water Management District sent joint comments on the draft Water Rights Permits to SWRCB.

August 22, 2016 – MCWRA, MRWPCA, and Water Management District sent joint comments on the draft Settlement Agreement to CDFW.

Week of August 22, 2016 – CDFW and NMFS sent comments on the draft Water Rights Permits to SWRCB.

August 23, 2016 – NMFS sent a letter formally dismissing their protests on Water Rights Applications #32263A and #32263B.

September 20, 2016 – CDFW submits revised draft Settlement Agreement to MRWPCA, Water Management District, and MCWRA.

September 22, 2016 – MRWPCA, MCWRA, and Water Management District host a meeting and site visit with NMFS and SWRCB- Division of Financial Assistance to discuss the project status, requirements to receive a concurrence letter from NMFS on USEPA's determination, and to see the diversion sites for the purpose of providing David White, NMFS' fish passage engineer the opportunity to comment specifically on the engineering design for the Reclamation Ditch diversion.

September 25, 2016 – Local agencies provide comments to CDFW on revised draft Settlement Agreement.

September 29, 2016 – NMFS/NOAA, MRWPCA, MCWRA, EPA and SWRCB hold a conference call to confirm understanding of the Proposed Action for funding the GWR Project water supply project and confirm that Cal-Am's facilities to extract and deliver the water that was injected by the GWR Project are not part of the Action at issue in this consultation.

2.2 Key Consultation Considerations

2.2.1 NMFS 2007 Biological Opinion SVWP

The Salinas Valley Water Project (SVWP) Biological Opinion (BO)was issued to the Corps on July 21, 2007. The Corps Section 404 permit for the SVWP allowed MCWRA to construct a seasonal river diversion facility with a small dam and diversion structure to impound and distribute increased spring, summer, and early fall reservoir releases (aquifer conservation releases) to provide surface water deliveries for irrigation. The diversion facility and dam include a surface water diversion facility with a small dam and intake structure, fish bypass facilities, a pump station, and a pipeline connection to the Castroville Seawater Intrusion Project (CSIP) system, collectively called the Salinas River Diversion Facility (SRDF). The SRDF is located at RM 4.8.

The Biological Opinion (BO) includes the Salinas Valley Water Project Flow Prescription for Steelhead Trout which is intended to meet project goals and minimize impacts to ESA-listed steelhead and designated critical habitat. The flow prescription relies on triggers based on a combination of reservoir conditions and stream flow to initiate fish passage flows (MCWRA 2005a, MCWRA 2005c, MCWRA 2005d, and MCWRA 2006a). The prescription includes monitoring activities and will be an adaptively managed action, which may be modified upon mutual agreement of MCWRA and NMFS.

2.2.2 NMFS Recovery Planning

Section 4(f) of the ESA (16 U.S.C. § 1533(f)) directs NMFS to develop and implement recovery plans for the conservation and survival of ESA-listed species under NMFS' authority. On December 23, 2013, NMFS published in the Federal Register (78 FR 77430) a notice of availability of the Final Recovery Plan for the S-CCC DPS.

The Final Recovery Plan provides background on the natural history of S-CCC DPS, current population trends, and the threats to their viability. The Final Recovery Plan lays out a recovery strategy to address the threats based on the best available science and includes goals that incorporate objective, measurable criteria which, when met, would result in a determination that the species may be removed from the Federal list of threatened and endangered species. The Final Recovery Plan is not regulatory, but presents guidance for use by agencies and interested parties to assist in the recovery of the S-CCC DPS. The Final Recovery Plan identifies substantive recovery actions needed to achieve recovery by addressing the systemic threats to the species, and provides a time-line and estimated costs of recovery actions. Specific actions addressing the Salinas are included, as follows.

2.2.2.1 Salinas River

Develop and implement operating criteria to ensure the pattern and magnitude of groundwater extractions and water releases from Salinas Dam[9] to provide the essential habitat functions to support the life history and habitat requirements of adult and juvenile steelhead. Physically modify all fish passage impediments, including the Salinas Dam, to allow steelhead natural rates of migration to upstream spawning and rearing habitats, and passage of smolts and kelts downstream to the estuary and ocean. Manage instream mining to minimize impacts to migration, spawning, and rearing habitat, and protect spawning and rearing habitat in major tributaries, including the Arroyo Seco. Identify, protect, and where necessary, restore estuarine rearing habitats, including management of artificial breaching of the sandbar at the river's mouth.

2.2.3 Recent Fishery Studies in the Salinas River Watershed

MCWRA has conducted fisheries studies on the Salinas River Watershed in the Nacimiento, Arroyo Seco, and Salinas Rivers and the Salinas River Lagoon. These studies focused primarily on the tributaries to the Salinas River because the tributaries historically provided the best

[9] Salinas Dam is on the southern end of the Salinas River near its origin in the Santa Lucia Range and forms Santa Margarita Lake, in San Luis Obispo County, California.

spawning and rearing habitats in the watershed. Additionally, MCWRA measured conductivity, dissolved oxygen, and water temperature on the Salinas River and Lagoon and conducted an impoundment survey at the SRDF.

In 2010, MCWRA developed and implemented a Juvenile Outmigration Monitoring Program to: (1) determine the abundance of downstream migrating steelhead smolts in the Salinas River Basin; (2) determine the relative contribution of the tributaries on smolt abundances to the overall Salinas River Basin abundance; (3) characterize the migration timing of steelhead smolts; and (4) evaluate potential relationships to environmental factors. Sampling was conducted from March 12 through May 28 during 2010 at three locations: Salinas River, Arroyo Seco River and Nacimiento River (MCWRA 2011) and during the same time period in 2011 (MCWRA 2012).

During the November 2010 impoundment survey, no *O. mykiss* were observed (MCWRA2011). However, electrofishing and seining surveys conducted on the Nacimiento and Arroyo Seco Rivers during 2010 resulted in capture of *O. mykiss* on the Arroyo Seco River (MCWRA 2011). During the 2010 juvenile outmigration survey period, a total of 140 *O. mykiss* were captured in the Arroyo Seco River, which led to an abundance estimate of 480 juvenile *O. mykiss*. No *O. mykiss* were captured in the Nacimiento River and only two *O. mykiss* were captured on the Salinas River, so no abundance estimates could be generated (MCWRA 2011).

The impoundment survey was also conducted during 2011, but was not completed due to unforeseen environmental conditions not allowing efficient sampling to occur. Electrofishing and seining was also conducted during 2011 in the Nacimiento and Arroyo Seco rivers. Twenty-eight *O. mykiss* were captured in the Arroyo Seco River and no *O. mykiss* were captured in the Nacimiento River. The Salinas Basin Juvenile *O. mykiss* Outmigration Monitoring report published in September 2011 documented the second year of outmigration monitoring in the Salinas River watershed. A total of 64 *O. mykiss* were captured in the Arroyo Seco River, resulting in an abundance estimate of 332 *O. mykiss* for the sampling season (MCWRA 2012). No *O. mykiss* were captured in the Nacimiento River and only two *O. mykiss* were captured on the Salinas River, so no abundance estimates could be generated (MCWRA 2012). Non-salmonid species captured during the 2010 and 2011 surveys conducted by MCWRA (2011, 2012) are presented in those reports.

The 2011 study concluded that similar to 2010, there were no apparent overall relationships between downstream migration timing, water temperature and dissolved oxygen (MCWRA, 2012). The report further suggested that migration timing may be affected by turbidity, with small peaks in migration occurring during small changes in turbidity. However, because turbidity and flow vary in correlation to each other, it is difficult to identify the influences of turbidity and flow independently (MCWRA 2012).

MCWRA conducts sandbar management at the mouth of the Salinas River as part of its flood control activity. The Lagoon Monitoring Program, conducted by MCWRA since 2002, was altered in 2010 to be consistent with the NMFS 2009 BO for sandbar management at the mouth of the Salinas River. The BO calls for fish population sampling in the Salinas River Lagoon during spring (April and May), summer (June through August), and fall (October or early November). Sampling is focused on capturing rearing juvenile steelhead that may be present in the lagoon with the objective to determine whether steelhead are present, and evaluate steelhead distribution, relative abundance (catch per unit effort), and condition (MCWRA as cited in HDR 2015).

The 2011 lagoon monitoring began in April of that year with high flows from the Salinas River and an open lagoon. The lagoon was closed for the October sampling. For the first time since 2002, juvenile steelhead were captured during each of the three sampling periods. However, only one individual was captured during each of the three surveys. The winter conditions of 2010-2011 led to good migration conditions and the flow at Spreckels remaining high through late-May, led to conditions at Arroyo Seco that would support adult steelhead migration, which is in agreement with the smolt trapping conducted during 2011 that documented migration of juvenile steelhead from the Arroyo Seco River, with the majority of migrating juveniles being smolts and silvery parr. Smolts would pass quickly through the estuary while parr and young-of-year may spend time rearing in the estuary. The low number of parr and young-of-year migrating from the Arroyo Seco River is consistent with the lack of observed steelhead rearing in the Salinas River lagoon (MCWRA as cited in HDR 2015).

The water conditions in 2012 were dry and resulted in low flows during migration periods for adult steelhead in the Salinas River system, but adequate flows for migrating smolts. The late season rain in March and April led to high flows likely beneficial for smolts. With a full impoundment behind the inflatable dam, a minimum of 2 cfs was bypassed to the Salinas River Lagoon for 27 days (October 20th thru November 15th). During the irrigation season flows were bypassed through the fish ladder and the regulating weir at the SRDF and averaged 10-22 cfs throughout the season (MCWRA as cited in HDR 2015).

The 2007 NMFS BO stated that one of the terms and conditions of the BO requested that adult steelhead escapement monitoring be conducted for a minimum of 10 years, unless NMFS and MCWRA agree to an alternative timeframe. In 2011, an adult steelhead escapement monitoring program was set up, but subsequently the weir system became inoperable. Due to multiple factors, monitoring was not conducted during the entire timeframe outlined in the BO (December 1 to March 31). Between January 19, 2011 and February 17, 2011, 23 steelhead passage events were detected by the system at the Salinas River Weir, 18 upstream passages, and 5 downstream passages, with a total of 13 adult steelhead documented. Although steelhead cannot be distinguishable from salmon with silhouettes alone, based on passage timings and the fact that the Salinas River is not known to support any salmon species, the assumption was made that silhouettes observed were steelhead (MCWRA as cited in HDR 2015).

During the 2012 period, monitoring protocols were amended regarding the weir and flow events. From November 30, 2011 through April 2, 2012, the system recorded a net upstream passage of 17 adult steelhead (19 recorded passing upstream and 2 recorded passing downstream), which was an increase of four adult steelhead upstream passages over the previous monitoring season. No apparent relationships between migration timing, flow, water temperature, turbidity, and dissolved oxygen were identified during the 2012 migratory period for steelhead. However, failure to detect such trends and relationship is (at least partially) attributable to a very small population size of steelhead in the Salinas River basin MCWRA as cited in HDR 2015). Furthermore, the 2011/2012 winter was relatively "dry" that resulted in only two very small peaks in flow. Future monitoring efforts may yield additional information and elucidate relationships between upstream migration of steelhead and environmental variables. Appendix L presents additional information about steelhead occurrences in the project area based on recent and relevant steelhead monitoring results finding that steelhead are highly unlikely to be present in the lower Salinas watersheds under existing conditions (Jeff Hagar, HES, July 19, 2016).

2.3 Project Background

This section provides information on the purposes for and background of the GWR Project, including a description of the agencies that have primary responsibility for its development and implementation (MRWPCA and Water Management District), and an overview of the water resources of the Monterey Peninsula area and the Salinas Valley.

2.3.1 Monterey Regional Water Pollution Control Agency

The project proponent for the GWR Project is the MRWPCA. MRWPCA was established in 1972 under a Joint Powers Authority agreement between the City of Monterey, the City of Pacific Grove and the Seaside County Sanitation District. MRWPCA operates the regional wastewater treatment plant, including a water recycling facility (collectively known as the Regional Treatment Plant), a non-potable crop irrigation water distribution system known as the CSIP, sewage collection pipelines, and 25 wastewater pump stations. Since 1972, other northern Monterey County communities became Joint Powers Authority participants including the cities of Del Rey Oaks, Seaside, Sand City, Marina, and Salinas and the unincorporated communities of Castroville, Moss Landing, and Boronda, in addition to other unincorporated areas in northern Monterey County.

MRWPCA's Regional Treatment Plant is located two miles north of the City of Marina, on the south side of the Salinas River, and has a permitted capacity to treat 29.6 million gallons per day (mgd) of wastewater effluent. At the Regional Treatment Plant, water is treated to two different standards: (1) Title 22 California Code of Regulations standards (tertiary filtration and disinfection) for unrestricted agricultural irrigation use within a facility known as the Salinas Valley Reclamation Plant, and (2) secondary treatment for permitted discharge through the ocean outfall. Influent flow that has been treated to a tertiary level is distributed to nearly 12,000 acres of farmland in the northern Salinas Valley for irrigation use (recycled water is delivered using a distribution system called the CSIP). The Regional Treatment Plant primarily treats municipal wastewater, but also accepts some dry weather urban runoff and other discrete wastewater flows.

2.3.2 Monterey Peninsula Water Resource System

The primary objective of the GWR Project is to replenish the Seaside Basin with 3,500 AFY of high quality water to replace a portion of Cal-Am's water supply as required by state orders. Cal-Am currently supplies water for the Monterey Peninsula from the Carmel River and the Seaside Basin, and the Water Management District, a partner agency on the GWR Project, manages these water resources. Both of these sources have historically been over-drafted and are currently being actively managed, as discussed below.

2.3.2.1 Monterey Peninsula Water Management District

The Water Management District is partnering with MRWPCA to fund and manage the studies for the GWR Project. The Water Management District was created by the California Legislature in 1977 for the purposes of conserving and augmenting the water supplies by integrated management of ground and surface water supplies; control and conservation of storm and wastewater; and promotion of the reuse and reclamation of water. The Water Management District includes the six Monterey Peninsula cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Seaside, and Sand City, and unincorporated communities within Monterey County including Pebble Beach, the Carmel Highlands, a portion of Carmel Valley, and areas adjacent to Highway 68 between Del Rey Oaks and the Laguna Seca area.

The Water Management District manages production and use of water from the Carmel River stored in Los Padres Reservoir, water production in the Carmel Valley aquifer, and groundwater pumped from municipal and private wells in Carmel Valley, the Seaside Basin, and other areas within the Water Management District boundary. The Water Management District regulates public fresh water supply systems within its boundaries, including systems owned by Cal-Am, the largest purveyor of water in the Monterey Peninsula and surrounding area.

2.3.2.2 Seaside Basin

Purified recycled water produced by the GWR Project's AWTF would be injected into the Seaside Basin, which would enable Cal-Am to extract the water from the Seaside Basin for delivery to its customers and also would replenish the Seaside Basin. The Seaside Basin underlies an approximately 19-square mile area at the northwest corner of the Salinas Valley, adjacent to Monterey Bay.

Historical and persistent low groundwater elevations caused by pumping have led to concerns that seawater intrusion may threaten the Seaside Basin's groundwater resources. The Seaside Basin has experienced chronic overdraft conditions with declining water levels in both of the Basin's primary aquifers that are used for water supply (the deeper, confined Santa Margarita aquifer and the shallower, unconfined Paso Robles aquifer).

In 2006, an adjudication process (Cal-Am v. City of Seaside et al., Case No. M66343) led to the issuance of a court decision that created the Seaside Basin Watermaster (Watermaster). The adjudication requires Cal-Am to decrease its operating yield from the basin by 10% triennially until it reaches its allotted portion of the court-defined “natural safe yield” (or the quantity of groundwater existing in the Seaside Basin that occurs solely as a result of natural replenishment) of 1,494 AFY beginning in 2021. In addition to these reductions in pumping, Cal-Am is required to “pay back” historic over-pumping and plans to accomplish this by reducing its pumping from the Seaside Basin by an additional 700 AFY for 25 years.

2.3.2.3 State Orders to Reduce Carmel River Diversions Affecting Water Supply

In 1995, the SWRCB issued Order No. WR 95-10, which found that Cal-Am was diverting 10,730 AFY from the Carmel River Basin without authorization. The SWRCB ordered Cal-Am to implement actions to terminate its unlawful diversions from the Carmel River and to maximize use of the Seaside Groundwater Basin (to the extent feasible) to reduce diversions of Carmel River water. In addition, a subsequent Cease and Desist Order (SWRCB Order Number WR 2009-0060) issued in 2009 requires Cal-Am to secure replacement water supplies for its Monterey District service area by January 2017 and reduce its Carmel River diversions to 3,376 AFY no later than December 31, 2016.

In filings with the California Public Utilities Commission, Cal-Am estimates that it needs a total supply source of 15,296 AFY to satisfy the Cease and Desist Order (CDO) and forecasted demand. In order to do this, Cal-Am will need to augment its water supplies by 9,752 AFY, which includes water to satisfy a requirement to return water to the Salinas Valley to offset the amount of fresh water in the feed water from the desalination plant’s slanted coastal intake wells. In 2016, the SWRCB recently extended the CDO to December 31, 2020 in order to allow completion of new water supplies without an economic disruption on the Monterey Peninsula from a drastic reduction in water supplies (see SWRCB Order 2016-0060). A key part of this order was that the GWR Project would be implemented to provide an alternative source of water and the CDO established timelines for California Public Utilities Commission (CPUC) approval of the Water Purchase Agreement and more generally for implementation. On September 15, 2016, the CPUC approved the Water Purchase Agreement as well as upgrades needed on Cal-Am’s system to deliver the water to Cal-Am customers. The following are mechanisms that ensure the water produced by the GWR Project will be used to replace Cal-Am pumping from the Carmel River:

- Cal-Am, Water Management District, and MRWPCA have entered into a WPA under which Cal-Am will purchase water from the GWR Project, which was approved by the CPUC on September 15, 2016.

- SWRCB extended the Cease and Desist Order (CDO) in SWRCB Order 2016-0016 to include milestones for the GWR Project, including requirements for CPUC to approve the GWR Project WPA by December 2016, and for construction to occur in water year 2017-2018.

- SWRCB's approval of water rights for Salinas Agricultural Wash Water (Wastewater Change Petition WW0089) and SWRCB's issuance of draft water rights for Blanco Drain (WR #32263A) and Reclamation Ditch (WR #32263B) require that these "new source waters" collected for recycling and sent through the advanced water treatment facility be used to reduce Carmel River pumping.

2.3.2.5 *Relationship of GWR Project to the Monterey Peninsula Water Supply Solutions*

The GWR Project will provide part of the replacement water needed for Cal-Am to comply with the CDO and the Seaside Basin Adjudication. However, the GWR Project would not produce all of the needed replacement water, and thus Cal-Am is pursuing other sources of water, which could include a proposed desalination plant. Regardless of whether the CPUC approves this desalination plant, the GWR Project will provide approximately 3,500 AFY of replacement water. In other words, the GWR Project could accomplish its objective, and be useful in reducing Carmel River diversions, independent from approval of Cal-Am's proposed desalination plant. However, both projects would use the same distribution system improvements (including the Monterey Pipeline) that were approved by the Water Management District on June 29, 2016 and by the CPUC on September 15, 2016. In 2016-2017, Cal-Am intends to begin construction of improvements to their distribution system to serve the Aquifer Storage and Recovery Project water delivery needs. These improvements will enable Cal-Am to move water to and from the Seaside Basin and all parts of its Monterey District delivery system with or without any new water supply sources. While the extraction and delivery of water from the Seaside Basin is not financed by CWSRF funds and thus is outside of the scope of this consultation, information about the use of the GWR Project's product water is provided to place the GWR Project in the larger context of Monterey Region water resource planning.

2.3.3 Salinas River Basin

The GWR Project will provide additional water to the Regional Treatment Plant that could be used for crop irrigation through the Salinas Valley Reclamation Plant and CSIP system. The provision of recycled water through the Salinas Valley Reclamation Plant and CSIP reduces use of groundwater from the Salinas Valley Groundwater Basin (SVGB) for crop irrigation. By increasing source water available for recycling and by enabling the Salinas Valley Reclamation Plant to operate more consistently throughout the year, the crop irrigation component of the GWR Project would further reduce use of groundwater from the SVGB.

The SVGB extends along the river valley floor from Bradley north to the Monterey Bay. It is the primary source of water supply for Monterey County, providing approximately 500,000 AFY for agricultural, industrial and municipal use. The groundwater basin is recharged in all but the Pressure Subarea, which has a clay layer above the major water bearing layers. The Pressure Subarea encompasses approximately 140 square miles, and consists of three primary aquifers: the 180-Foot Aquifer, the 400-Foot Aquifer and the 900-Foot (Deep) Aquifer. The 180-Foot and 400-Foot Aquifers connect to the Pacific Ocean, and have experienced seawater intrusion since the 1930's due to groundwater pumping along the coast. The geographic extent of seawater intrusion in these aquifers is shown on the Monterey County Water Resources Agency website[10]. Recently, the Department of Water Resources designated the SVGB as a high priority basin and as being subject to critical conditions of overdraft, due to seawater intrusion. Several projects have been developed to address this seawater intrusion, as discussed below.

2.3.3.1 Monterey County Water Resources Agency

MCWRA is a water and flood control agency with jurisdiction coextensive with Monterey County and governed by the Board of Directors of the MCWRA and the MCWRA Board of Supervisors. The Monterey County Water Resources Agency was established in 1995 pursuant to the Monterey County Water Resources Agency Act, and was formerly the Monterey County Flood Control and Water Conservation District. MCWRA has flood control responsibility for the natural and man-made stormwater channels within the County, including the Carmel, Pajaro and Salinas Rivers, the Blanco Drain and the Reclamation Ditch system in northern Monterey County.

The SVGB is not adjudicated, but the MCWRA manages the Basin to address the problem of seawater intrusion. As described in Section 2.3.3.4 below, MCWRA operates Lakes Nacimiento and San Antonio to recharge the groundwater basin, and with MRWPCA operates the CSIP and Salinas Valley Water Project to supply recycled and river water to growers to reduce the use of groundwater for crop irrigation on land overlying the Pressure subarea of the SVGB. Funding for operation and maintenance of these facilities originate from zones of assessment and benefit.

2.3.3.2 City of Salinas

The City of Salinas is located in northern Monterey County, approximately ten miles inland from the coast. Salinas is the largest city in Monterey County with a population of over 150,000 people and covering an area of about 23 square miles. Monterey County is called the nation's salad bowl, and a significant portion of the industry in Salinas is agricultural processing. The City's water supply comes from wells in the Pressure and East Side Subareas of the SVGB. Municipal wastewater from the City is collected at the MRWPCA Salinas Pump Station at the southwest corner of the City and pumped to the MRWPCA Regional Treatment Plant. Wastewater from the agricultural processing industries in the southeastern part of the City is collected separately and treated at the Salinas Industrial Wastewater Treatment Facility, located along the Salinas River at Davis Road.

Most of stormwater from the City flows into the Reclamation Ditch system, which includes Alisal, Gabilan and Natividad Creeks, and stormwater from much of the southern part of the city flows to the Salinas River. The City has a stormwater management program that is

[10] http://www.mcwra.co.monterey.ca.us/seawater_intrusion_monitoring/seawater_intrusion_maps.php

implemented to comply with their permit from the Central Coast Regional Water Quality Control Board (RWQCB) for Municipal Stormwater Discharges.

2.3.3.3 Marina Coast Water District

The Marina Coast Water District is a county water district established in 1960 pursuant to Water Code §30000, et seq. The District provides water supply and wastewater collection services to the City of Marina and the former Fort Ord. This service area is generally located between the MRWPCA Regional Treatment Plant and the Seaside Basin, where the GWR Project's injection wells would be located.

Marina Coast Water District's water supply comes from wells in the Pressure Subarea of the SVGB. Wastewater from the Marina Coast Water District's service areas is collected and conveyed to the MRWPCA interceptor system, and treated at the Regional Treatment Plant. Marina Coast Water District is the only member jurisdiction within the MRWPCA with the right to purchase back its municipal wastewater as recycled water.

Water demands on the former Fort Ord are projected to increase with development envisioned in the Fort Ord Base Reuse Plan. To address the need for additional water supply, Marina Coast Water District is developing the Regional Urban Water Augmentation Project (RUWAP). The RUWAP would provide an additional 2,400 AFY of potable and/or recycled water. Marina Coast Water District certified the EIR for the RUWAP in 2005, and approved addenda to the EIR in 2007 and 2008 to address changes to the proposed pipeline alignment, construction assumptions, and water quantities. The trunk main of the RUWAP system is coincident with the GWR Project's RUWAP Pipeline alignment option. The RUWAP recycled water distribution system has been designed and partially constructed, but is not yet in operation.

2.3.3.4 Salinas Valley Water Projects

Monterey County, acting through MCWRA, has implemented several projects to reduce seawater intrusion along the coast and increase the reliability and availability of water supply. These projects are described in the following sections.

Reservoirs

Nacimiento Reservoir was constructed in 1957 to provide water supply for municipal, domestic, industrial, irrigation and recreational uses. MCWRA may capture up to 180,000 AFY from the Nacimiento River basin, which is approximately 372 square miles in size. The reservoir holds 377,900 ac-ft. of water. The agency may use up to 350,000 AFY of diverted and/or stored water for the permitted uses.

San Antonio Reservoir was constructed in 1967 for flood control and to provide water supply for municipal, domestic, industrial, irrigation and recreational uses. MCWRA may capture up to 220,000 AFY from the San Antonio River basin, which is approximately 344 square miles in size. The reservoir holds 335,000 ac-ft. of water. The agency may use up to 210,000 AFY of diverted and/or stored water for the permitted uses.

MCWRA releases flows from Lakes Nacimiento and San Antonio to recharge the SVGB. This practice has resulted in sustained high groundwater levels in the Upper Valley and Forebay Subareas. Before the development of the Salinas Valley Water Project (discussed below), releases were managed to achieve 100% percolation of released flows from the Salinas River into the SVGB (that is, no non-stormwater flow in the Salinas River over the Pressure Subarea). Following construction of the Salinas Valley Water Project, increased reservoir releases are made and rediverted for beneficial use at the Salinas River Diversion Facility.

Salinas Valley Reclamation Project/Plant

The MRWPCA Regional Treatment Plant was constructed in 1988 and 1989 and began operation in 1990, treating municipal wastewater to a secondary level and discharging it to the Pacific Ocean. In 1992, MRWPCA and MCWRA formed a partnership to build the Monterey County Reclamation Projects, including the Salinas Valley Reclamation Project recycled water plant (Salinas Valley Reclamation Plant) and the CSIP distribution system. The Reclamation Projects provide recycled water for crop irrigation, reducing the use of SVGB groundwater along the coast.

The Salinas Valley Reclamation Plant was constructed in 1995 through 1997, and is located within the Regional Treatment Plant site. At the plant, secondary-treated municipal wastewater is tertiary treated and disinfected using a three-step process (flocculation, filtration and disinfection) and stored in an 80 ac-ft. reservoir. The plant has been in operation since 1998, producing up to 15,000 AFY of recycled, treated wastewater for crop irrigation use. In addition to retarding seawater intrusion and protecting drinking water supplies by reducing use of well water, wastewater recycling also reduces wastewater discharge into the Monterey Bay National Marine Sanctuary.

Castroville Seawater Intrusion Project (CSIP)

The CSIP is the distribution system for the recycled wastewater produced by the Salinas Valley Reclamation Plant. It consists of 45 miles of pipelines and 22 wells, supplying irrigation water to growers on 12,000 acres in northern Monterey County. While the CSIP is designed to reduce groundwater use for irrigation, some groundwater pumping still occurs in the summer months to meet peak day demands which exceed the available amount of recycled water, and in the winter months when demands are smaller than the 5 mgd minimum production rate of the Salinas Valley Reclamation Plant. The CSIP system is owned by the MCWRA, but operated by the MRWPCA under contract.

Salinas Valley Water Project and Salinas River Diversion Facility

In 2009, the MCWRA constructed the SRDF near the Salinas Valley Reclamation Plant. Water released from San Antonio and Nacimiento Reservoirs that does not percolate into the SVGB may be rediverted at the Salinas River Diversion Facility. This water is filtered, chlorinated and added to the 80 ac-ft. reservoir at the Salinas Valley Reclamation Plant for use in the CSIP system, further reducing the amount of groundwater pumped to meet peak day demands. The facility includes an inflatable rubber dam that creates a seasonal intake pool for the diversion pump station, a metered release weir for maintenance of downstream flows and a fish ladder to allow passage of migratory fish species.

Relationship of the GWR Project to the CSIP

As discussed in detail above, the SVGB is experiencing seawater intrusion due to continued overdraft of the aquifer. The CSIP, operated by MRWPCA and by the MCWRA, supplies recycled water produced at the Salinas Valley Reclamation Plant, Salinas River water, and Salinas Valley groundwater for irrigation of farmland in northern Monterey County. The river water is diverted at the Salinas River Diversion Facility, located southeast of the Regional Treatment Plant. The recycled and river water supplies have replaced between 16,600 AFY and 21,500 AFY of Salinas Valley groundwater pumping for irrigation, depending on the annual irrigation demands. The CSIP system still uses from 2,700 AFY to 8,600 AFY of Salinas Valley groundwater to meet summer peak demands that exceed the available recycled and river supplies, and also to meet small winter demands that are below the minimum 5 mgd capacity of the Salinas Valley Reclamation Plant. The GWR Project would provide up to 5,290 AFY of additional recycled water for distribution through the CSIP system. This would reduce the amount of groundwater used within the existing CSIP system.

The GWR Project would collect various new source water supplies, which include agricultural wash water from the City of Salinas, stormwater runoff from the cities of Salinas and Monterey, surface water diversions from the Reclamation Ditch, and Blanco Drain, and unused municipal wastewater. All of the collected source waters would be conveyed to the MRWPCA Regional Treatment Plant, blended with the existing wastewater streams and would then be treated to a primary and secondary level before a portion is diverted to the newly constructed AWTF. New source water beyond the amount needed to supply 3,500 AFY per year to Cal-Am would be used as additional influent for the Salinas Valley Reclamation Plant to increase the volume and consistency of recycled water produced during the peak demand months.

The Salinas Valley Reclamation Plant has a design minimum production capacity of 8 mgd. Through operational efficiencies, the plant managers can currently meet demands as low as 5 mgd. Irrigation demands within the CSIP service area below that level have been met in the past using groundwater. As part of the GWR Project, the Salinas Valley Reclamation Plant would also be modified to meet wet-season irrigation demands as low as 0.5 mgd. This would increase the late fall, winter, and early spring use of secondary-treated municipal wastewater, which would otherwise be discharged through the ocean outfall.

As an additional means of providing recycled water for crop irrigation, the GWR Project's features would be sized to produce a 1,000 ac-ft. drought reserve in addition to producing 3,500 AFY per year for use by Cal-Am. This would be accomplished by seasonally treating additional source water (when available) during the months of October through March to produce up to 200 AFY for groundwater injection, until a surplus of 1,000 ac-ft. has been injected into the

Seaside Basin. During dry years, MRWPCA would reduce the amount of treated water that it injects into the Seaside Basin during the peak irrigation demand months (April through September), making more of its source water available to recycle and distribute to meet agricultural irrigation demands in the CSIP area. Cal-Am extractions of GWR-injected water quantities of 3,500 AFY would continue in those years by drawing upon the previously "banked" groundwater up to the amount of drought reserve water previously injected.

3.0 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action for this ESA consultation is the funding of the GWR Project by the SWRCB/USEPA using the Clean Water State Revolving Fund[11] and issuance of a Clean Water Act Section 404 permit by the Corps. This section describes the MRWPCA's GWR Project for the purpose of the application to the State. Existing and proposed facilities, including a depiction of the interconnection of those facilities in context of the GWR Project are presented in **Figures 3-1, 3-2 and 3-3**. These figures contain facilities and locations that are referenced in the following discussion of the GWR Project.

3.1 Facilities and Operations

This section describes the existing wastewater and water infrastructure systems that are relevant to the action addressed in this BA. The GWR Project would recycle and reuse water from the following sources:

- Municipal Wastewater
- Salinas Agricultural Wash Water
- Salinas Stormwater
- Reclamation Ditch
- Blanco Drain

[11] The Fund includes federal funds that are managed by the USEPA. See Section 1.1 on page 1 of this report.

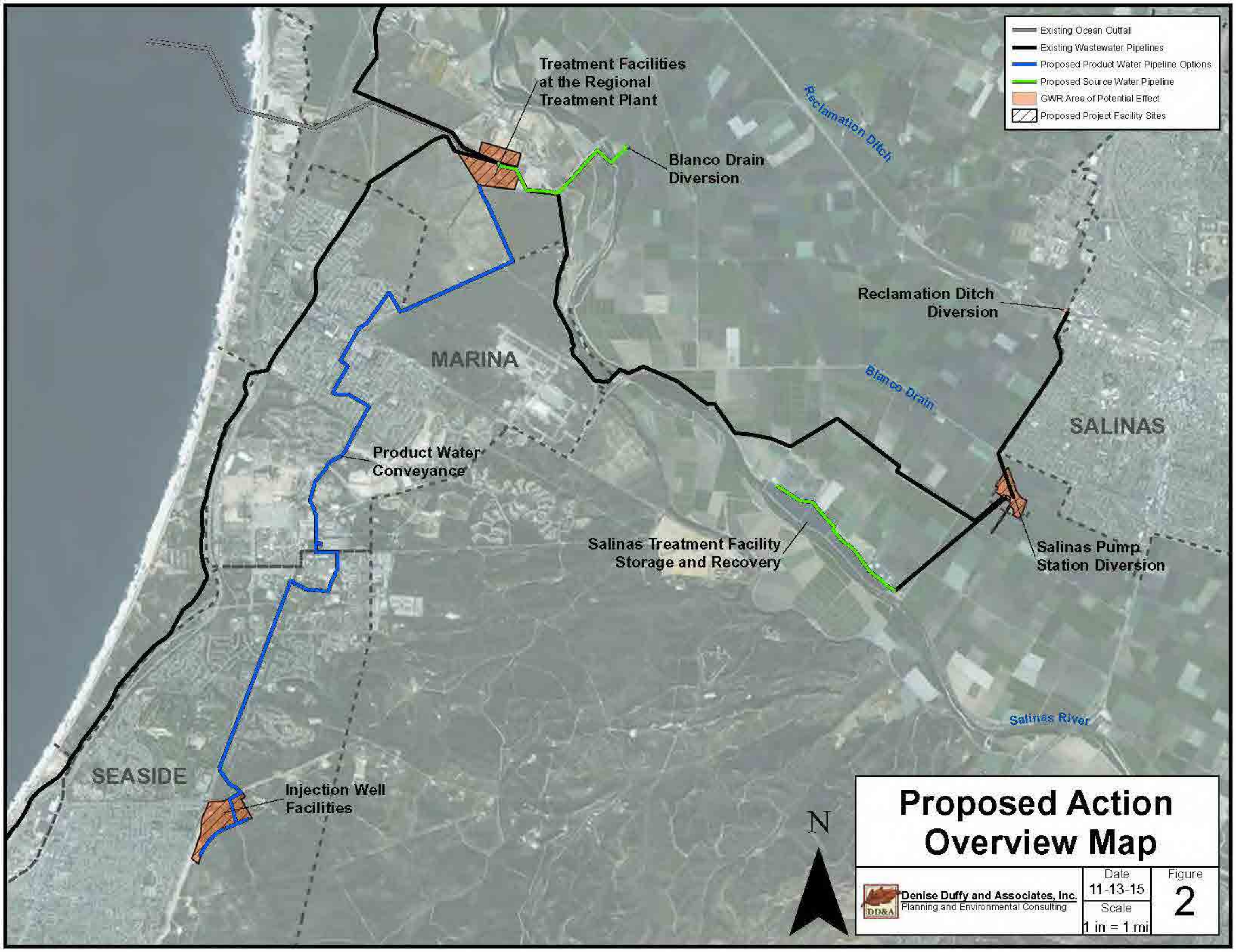

Figure 3-1a. Map of GWR Project - Aerial

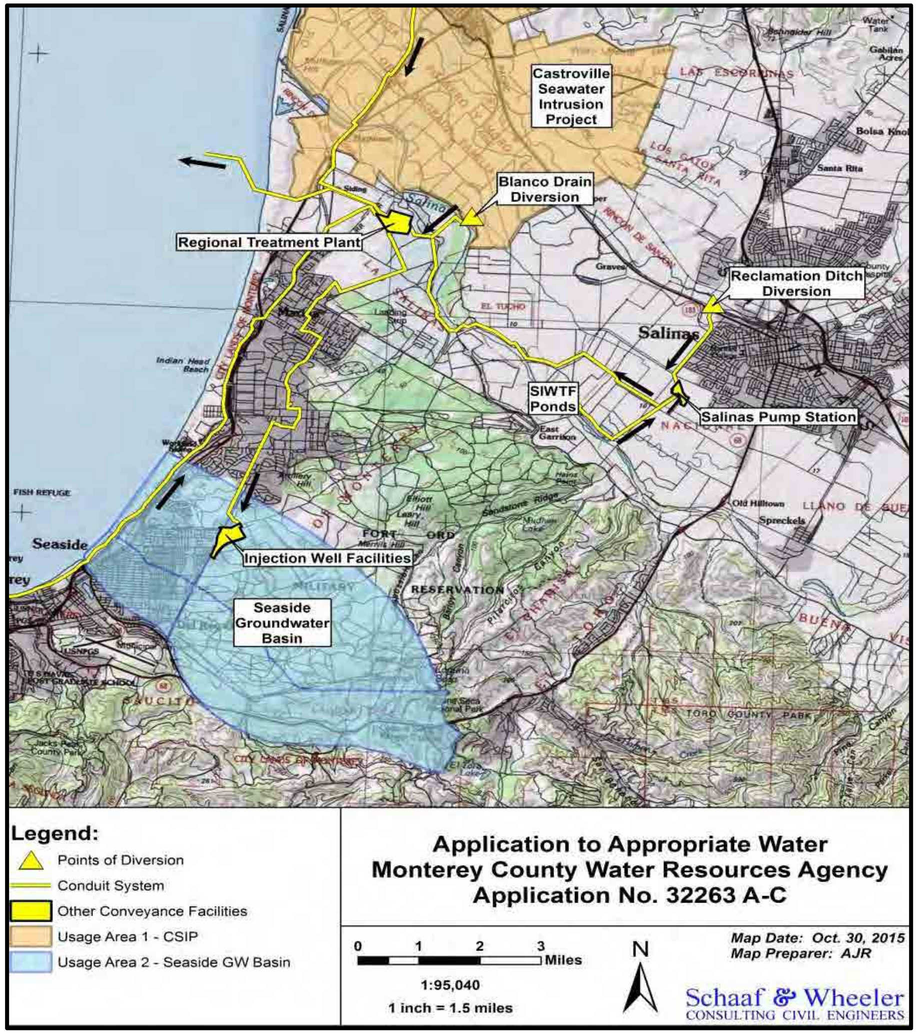

Figure 3-1b. Map of GWR Project - USGS

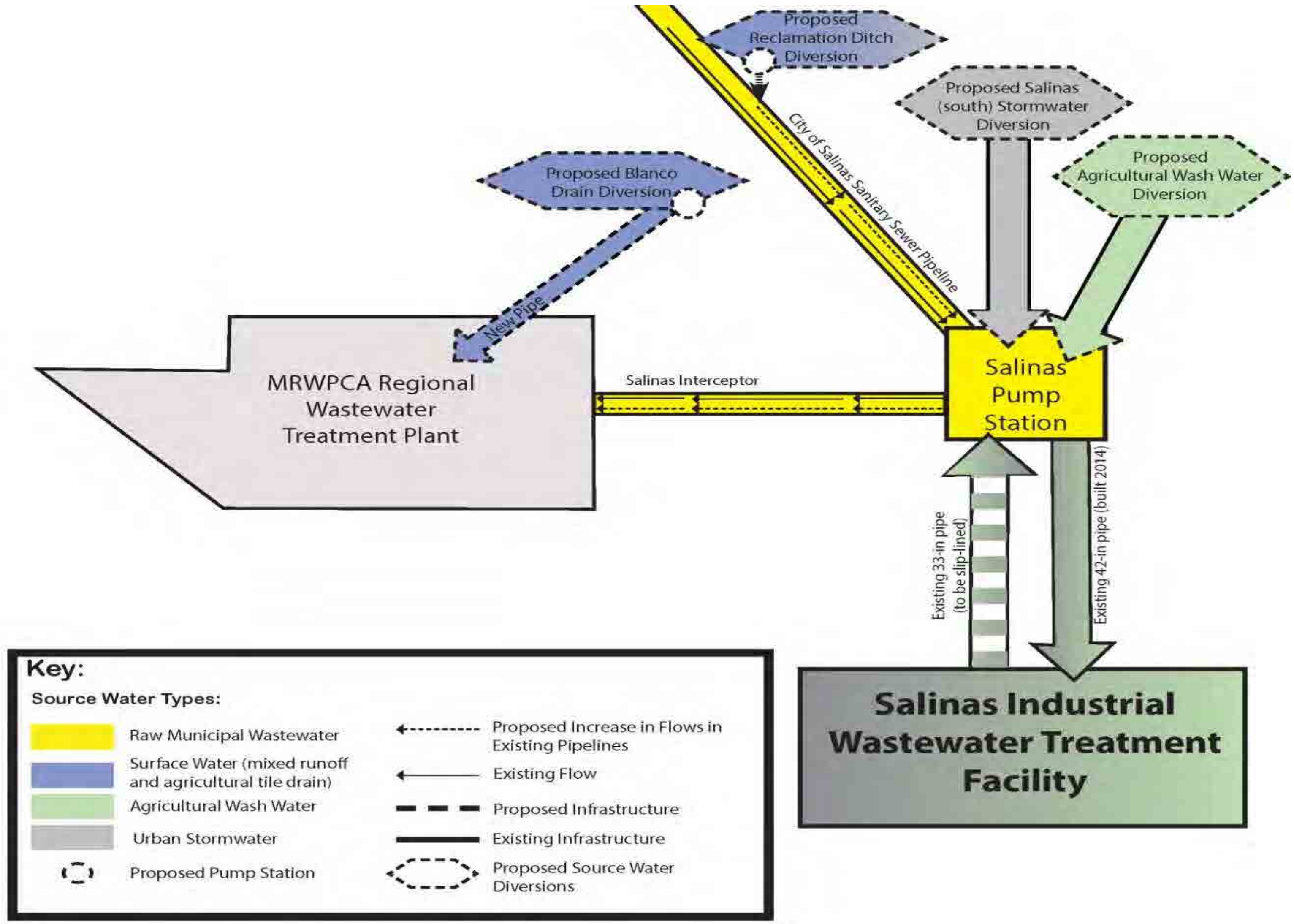

Figure 3-2. Schematic of GWR Project Source Water Collection

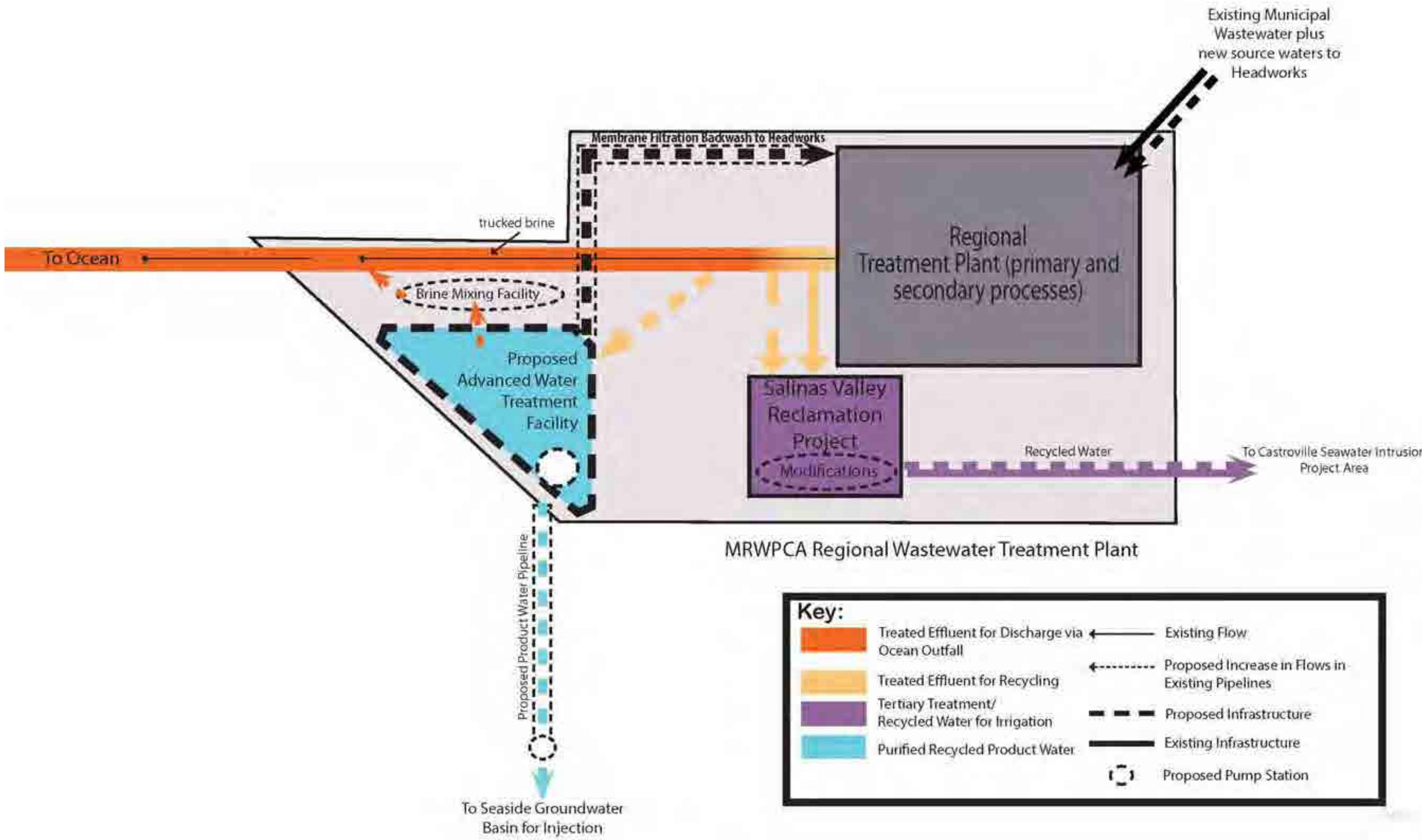

Figure 3-3. Schematic of GWR Project Treatment Plant Flow Paths

Existing infrastructure systems that are relevant to these sources of water, which are described in detail below, include the following:

- MRWPCA Regional Treatment Plant (including water recycling facilities at the existing Salinas Valley Reclamation Plant)
- municipal wastewater collection and conveyance systems
- agricultural wash water collection, conveyance and treatment system
- urban dry-weather runoff and stormwater collection and conveyance systems

After source water is treated at the proposed new AWTF, it would be conveyed to new Injection Well Facilities at the Seaside Basin. The purified recycled water would then be extracted by Cal-Am for delivery to its customers. Existing infrastructure systems that are relevant to extraction and delivery of the purified recycled water to urban users include the following:

- Monterey Peninsula Aquifer Storage and Recovery facilities
- Cal-Am water supply facilities (Monterey District)

In addition, recycled water produced for crop irrigation would be conveyed to growers through the existing CSIP distribution system.

3.1.1 MRWPCA Regional Treatment Plant, including Water Recycling Facilities and Ocean Outfall

The existing MRWPCA Regional Treatment Plant would be used to provide primary and secondary treatment for all source waters. The new AWTF would be constructed at the existing MRWPCA Regional Treatment Plant, and improvements would be made to the existing Salinas Valley Reclamation Plant, which is co-located at the Regional Treatment Plant. The plants are located north of the City of Marina and south of the Salinas River in unincorporated Monterey County.

Residential, commercial, and industrial wastewater is conveyed to the MRWPCA Regional Treatment Plant via a regional wastewater collection system that interconnects and serves the Cities of Monterey, Pacific Grove, Seaside, Del Rey Oaks, Sand City, Marina, and Salinas, unincorporated communities in Castroville, Moss Landing, Boronda and the former Fort Ord. The Regional Treatment Plant has an average dry weather design capacity of 29.6 mgd and a peak wet weather design capacity of 75.6 mgd. It currently receives and treats approximately 16 to 17 mgd and therefore has capacity to treat additional flows.

MRWPCA Regional Treatment Plant has two distinct treatment standards: 1) primary and secondary treatment in the Regional Treatment Plant for discharge through the MRWPCA ocean outfall or use as influent for the tertiary treatment system, and 2) Title 22 California Code of Regulations standards (tertiary filtration and disinfection) for unrestricted crop irrigation use.

In most winter months, secondary treated wastewater from the Regional Treatment Plant is discharged to Monterey Bay (11,260 feet offshore at a depth of approximately 100 feet) through the MRWPCA ocean outfall and diffuser. The diffuser on the ocean outfall is designed to convey wet weather flows of up to 81.2 mgd, however, the current permitted capacity of the outfall is 75.6 mgd. Secondary treated effluent from the Regional Treatment Plant is also recycled at the co-located Salinas Valley Reclamation Plant for irrigation of 12,000 acres of farmland in the northern Salinas Valley. The existing facilities at the Regional Treatment Plant, including the Reclamation Plant are designed to produce up to 29.6 mgd of recycled water. The Salinas Valley Reclamation Plant includes an 80 ac-ft. storage pond that holds tertiary-treated and Salinas River water before it is distributed to farmland by a distribution system called the Castroville Seawater Intrusion Project (CSIP). The use of recycled wastewater for irrigation reduces regional dependence on and use of local groundwater, which, in turn reduces groundwater pumping-related seawater intrusion into the Salinas Valley aquifers.

The amount of tertiary water that has been delivered via the CSIP for crop irrigation has averaged 12,936 AFY (2001 through 2013), but is trending upward. The amount of water delivery each year is dependent on the crops grown and weather patterns. The amount of wastewater available for recycled water production is trending lower during this same period due to reduced flows of wastewater to the Regional Treatment Plant.

In January 2014, Brezack & Associates, Inc. completed a report that projected municipal wastewater flows to the Regional Treatment Plant to help MRWPCA plan for use of available water for recycling. The MRWPCA has observed that influent to the Regional Treatment Plant has been decreasing for the last several years and thus, a key objective of the analysis was to determine if the trend would continue. The report forecasts wastewater flows based on population and per capita wastewater generation in the service area. A spreadsheet model was developed using historical population and flow data to produce a range of potential projections through the year 2055. The analysis found that municipal wastewater flow to the Regional Treatment Plant is projected to decrease to a range of 19.2 to 17.1 mgd. After 2030, flows may increase to a range of highs between 22.7 and 24.3 mgd. The future increase is dependent upon whether urban growth projections assumed in the 2014 projections are realized. Because it is not certain that such planned urban growth will occur, the GWR Project source water estimates assume municipal wastewater availability will not increase in the future. If municipal wastewater flows were to increase, less of the other source waters would potentially be used for the GWR Project. The GWR Project would divert source water to augment wastewater flows only up to the demands for purified and/or tertiary recycled water.

3.1.2 Municipal Wastewater Collection and Conveyance Systems

Under the GWR Project, the existing municipal wastewater collection and conveyance systems would continue to be used to convey wastewater to the Regional Treatment Plant. In addition, several new connections to the wastewater system would be constructed to convey the new proposed sources of water to the Regional Treatment Plant. Use of the existing conveyance and collection system would minimize GWR Project costs and environmental impacts, and would assist in enabling the GWR Project to be constructed within the short time period needed to accomplish the Project Objectives.

The existing MRWPCA wastewater collection and conveyance system includes ten pump stations located throughout the northern Monterey County area, including Castroville and Moss Landing to the north, and City of Salinas to the east. Following are descriptions of the wastewater collection and conveyance systems serving the Salinas and Monterey Peninsula areas.

3.1.2.1 Salinas Wastewater Collection and Conveyance

Several of the new sources (Salinas agricultural wash water, Salinas stormwater runoff, and the Reclamation Ditch waters diverted at Davis Road) would be diverted into the existing wastewater collection system upstream of the Salinas Pump Station. MRWPCA's sanitary sewer pump station that serves the City of Salinas (Salinas Pump Station) is located on Hitchcock Road in Salinas, a half mile southeast of the intersection of Blanco and Davis Roads. The Salinas Pump Station was constructed in 1983 and is located within the City of Salinas at the site of the City's former municipal wastewater treatment plant, known as Treatment Plant No. 1 or "TP1." The site is surrounded by unincorporated land within Monterey County that is currently used for agricultural production. Existing stormwater, municipal wastewater (or sanitary sewer), and agricultural wash water pipelines traverse the pump station property in very close proximity to one another, but currently flow to different ultimate endpoints. Only the municipal wastewater enters the Salinas Pump Station at this time.

Municipal wastewater is conveyed from the Salinas Pump Station to the Regional Treatment Plant in a 36-inch diameter force main pipeline that is approximately 7.5 miles in length. The average daily and peak flows through the pump station have been relatively constant at approximately 12 mgd and 25 mgd, respectively, over the last several years. Flows at the pump station are highest during the summer months when the population of the City of Salinas expands due to the large migrant workforce associated with the agricultural industry.

The City of Salinas's aggressive collection system improvement program has reduced winter infiltration and inflow of stormwater into the municipal wastewater system and thus has also reduced total flows reaching the Salinas Pump Station. MRWPCA conducted flow testing of the Salinas Pump Station in October 2008 as part of the Salinas Pump Station Flow Study. The testing indicated the pump station had a pumping capacity of 32.8 to 35.4 mgd (assuming one pump is out of service), and a capacity of up to 38.5 mgd with all pumps running. Independent from the GWR Project, the City of Salinas and MRWPCA are currently developing plans to address potential emergency sewer overflow situations at the Salinas Pump Station by designing and implementing improvements to the municipal and industrial wastewater collection and conveyance systems to allow wastewater to flow (in emergency situations, only) to the Salinas Industrial Wastewater Treatment Facility for temporary storage before returning to the Salinas Pump Station for conveyance to the Regional Treatment Plant.

3.1.3 Agricultural Wash Water Generation, Collection/Conveyance, and Treatment

Existing operations and infrastructure relevant to the proposed Salinas agricultural wash water diversion are described in this section. The City of Salinas operates an industrial wastewater collection and treatment system that serves approximately 25 agricultural processing and related businesses located east of Sanborn Road and south of U.S. Highway 101. This wastewater collection system is completely separate from the Salinas municipal wastewater collection system and includes 14-inch to 33-inch diameter gravity pipelines that flow to the Salinas Pump Station Diversion site, and then flow into a 42-inch gravity pipeline to the Salinas Industrial Wastewater Treatment Facility (Salinas Treatment Facility). Over 80% of the wastewater flows in this system are from fresh vegetable packing facilities (typically, wash water used on harvested row crops). The remaining flows originate from businesses associated with seafood processing, refrigerated warehousing, manufactured ice, preserves (frozen fruits, jams and jellies) and corrugated paper boxes. Wastewater is conveyed in a pipeline that traverses near the Salinas Pump Station to the Industrial Treatment Facility located adjacent to the Salinas River, downstream of the Davis Road crossing. The Salinas Treatment Facility consists of an influent pump station, an aeration lagoon, percolation ponds, and evaporation/infiltration beds to treat, percolate and evaporate the industrial wastewater.

All industrial wastewater entering the ponds passes through a bar screen at the influent pump station with a peak design flow of 6.8 mgd. Piping and valves permit the water to be pumped to the aeration lagoon, the percolation ponds, or the evaporation/infiltration beds; however, the National Pollutant Discharge Elimination System permit for the facility requires aeration as part of the treatment process. Biological treatment in the aeration lagoon includes aerobic decomposition to about one-third of the water depth using twelve 50-horsepower surface aerators and natural anaerobic decomposition in the lower layers.

The wastewater is treated using aeration then flows by gravity to three percolation ponds in series (from east to west, Ponds 1 through 3). Water levels must be maintained with no less than 1-foot of freeboard. These water levels are maintained by pumping to evaporation/infiltration beds, including permanent beds (also referred to as "drying beds" north of Pond 3) and temporary rapid infiltration basins located between the ponds and the Salinas River.

The Salinas Treatment Facility operates year-round, with a peak monthly inflow during summer months of approximately 3.5 to 4.0 mgd (annual average of approximately 3 mgd). This summer peak corresponds with the peak agricultural harvesting season in the Salinas Valley. In recent years, substantial flows to the Salinas Treatment Facility have continued during the winter months due to the importation of agricultural products from Arizona for processing in the facilities that discharge wastewater to this system.

3.1.4 Stormwater Runoff, Agricultural Drainage Collection and Conveyance

The existing systems for the collection and conveyance of various types of runoff and agricultural land drainage that are relevant to the GWR Project include the following systems:

- Facilities that capture and discharge City of Salinas stormwater to the Salinas River,
- Watershed characteristics (natural, urban, and agricultural) of the Reclamation Ditch system, and
- Agricultural runoff and tile drain systems contributing to the Blanco Drain system.

The following sections describe these systems and their characteristics.

3.1.4.1 City of Salinas: Urban Runoff to Salinas River

The GWR Project would capture and divert runoff from the City of Salinas. Urban runoff from the southwestern part of the City of Salinas flows through pipes that cross nearby the Salinas Pump Station site southeast of the intersection of Blanco and Davis Roads. The runoff system currently drains an area of about 2.5 square miles and eventually flows to the Salinas River through a 66-inch gravity pipeline. The drainage area is virtually all within the developed portion of Salinas and does not appear to intercept water from non-urban areas. Therefore, flows are likely to be almost entirely from urban runoff. The climate of Salinas is semiarid, with the rainy season occurring from November through March. **Table 3-1** shows an estimate of stormwater runoff from the City's Salinas River watershed. No flow gage or other measurements of runoff exist for this watershed, so a hydrologic analysis using rainfall gage data, hydrologic soil group information, and land use data was conducted to develop estimates of surface runoff into the Salinas River from the City of Salinas (Schaaf & Wheeler 2015a).

Table 3-1 Estimated Urban Runoff from the City of Salinas to Salinas River (ac-ft.)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Average	8	26	53	53	45	34	19	2	0	0	0	1	242
Maximum	65	229	390	414	530	147	238	31	10	8	22	18	857

Salinas has an existing municipal stormwater permit issued by the Central Coast Region Water Quality Control Board (CCRWQCB) that requires reductions in pollutant loads to nearby surface water bodies, including the Salinas River and the Reclamation Ditch and its downstream receiving waters, such as Tembladero Slough. The latter water bodies are described in the following section.

3.1.4.2 Reclamation Ditch Watershed: Mixed Runoff

The proposed Reclamation Ditch diversion site at Davis Road was selected based on the availability of reliable flows and proximity to existing wastewater collection facilities, which may be used to convey the flows to the MRWPCA Regional Treatment Plant. The Reclamation Ditch, created between 1917 and 1920, is a network of excavated earthen channels used to drain surface runoff and facilitate agricultural use of the surrounding lands. The Reclamation Ditch watershed is approximately 157 square miles that includes headlands, agricultural areas, the City of Salinas and portions of Castroville and Prunedale. It collects water from Alisal Creek at

Smith Lake southeast of the City of Salinas, Gabilan and Natividad Creeks within Salinas at Carr Lake, and Santa Rita Creek west of Salinas.

Alisal, Gabilan, and Natividad Creeks are seasonal in their upper reaches. The Reclamation Ditch is perennial downstream of agricultural and urban development. However, the presence of dry-season flow is a consequence of dry-season urban discharges and agricultural runoff and tile drain water (Casagrande and Watson 2006). There is a United States Geological Survey (USGS) gage station on the Reclamation Ditch at San Jon Road, approximately one mile west of Salinas. Flow data from that gage is provided in **Table 3-2**. The lower reaches of the system, including Tembladero Slough and the Old Salinas River Channel, are tidally influenced.

Table 3-2 USGS Gage, Reclamation Ditch at San Jon Road, period 2003 to 2013 (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Average Monthly Flow	300	293	1,044	1,329	1,203	1,598	905	263	198	193	181	133	7,640

3.1.4.3 Blanco Drain Watershed: Agricultural Runoff and Tile Drainage

Blanco Drain is a proposed source of water for the GWR Project. It is a man-made reclamation ditch draining approximately 6,400 acres of agricultural lands east of the City of Salinas. The watershed for the Blanco Drain is between the Salinas River and Alisal Slough, and discharges to the Salinas River at RM 5 (**Figure 3-3**). The Blanco Drain is separated from the Salinas River by a flap gate, which prevents Salinas River water from entering the Blanco Drain under high water conditions. Summer flows in the Blanco Drain are generally tile drainage and runoff from irrigated agriculture. Winter flows include stormwater runoff, although some fields remain in production and are irrigated year-round.

In 2009-2010, the MCWRA constructed the SRDF downstream of the Blanco Drain. The SRDF includes an inflatable rubber dam that impounds water during the summer months to supply the diversion pump station. To overcome the backwater into the Blanco Drain channel, a new slide gate and pump station were installed at the lower end of the Drain, several hundred feet above the confluence with the Salinas River. The pump station lifts Blanco Drain flows past the slide gate and into the gravity portion of the channel. **Table 3-3** shows an estimate of flows in Blanco Drain (Schaaf & Wheeler 2014a).

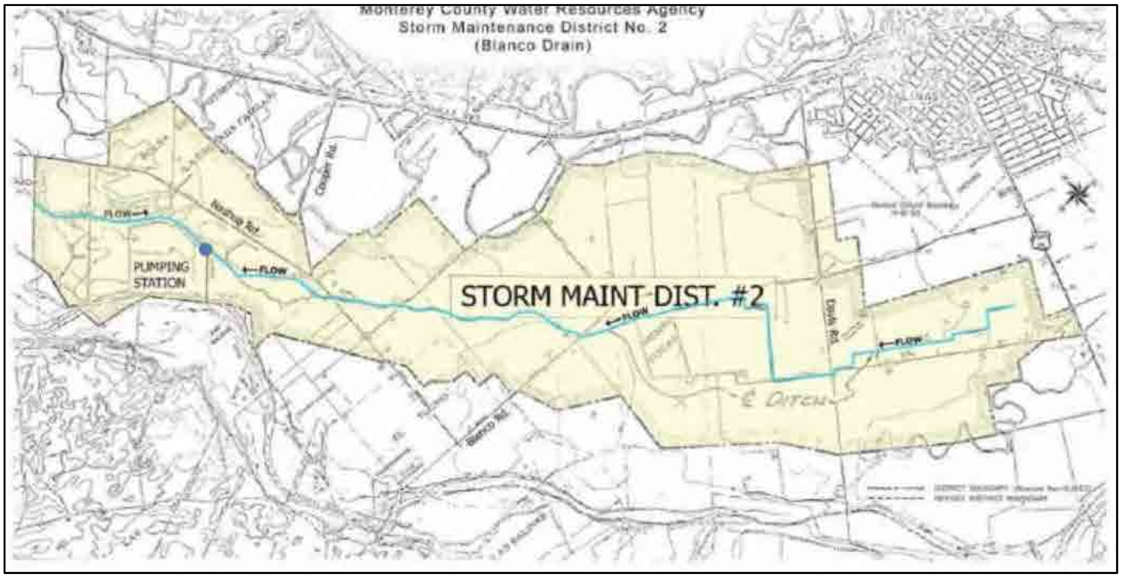

Figure 3-4. Blanco Drain Storm Drain Maintenance District

Table 3-3 Blanco Drain Flow Availability Estimate (ac-ft.)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
Estimated Flow Availability	209	223	246	252	225	274	277	244	184	168	133	185	2,620

3.1.4.4 Cal-Am Monterey District Water Supply Facilities

Water injected into the Seaside Basin will be withdrawn through existing Cal-Am groundwater wells, and delivered to customers through the existing municipal potable water distribution system. In 2016 through 2017, Cal-Am will build a pipeline to facilitate the movement of water from Seaside through Monterey to achieve the objectives of the GWR Project. These facilities are not included in the MRWPCA permit or funding applications, and are not described in detail herein because they are not interrelated to or interdependent with the GWR Project, and would be constructed regardless of whether or not the GWR Project is funded by the CWSRF due to its independent utility to Cal-Am's distribution system.

3.2 GWR Project

3.2.1 Overview of the GWR Project

This and the following sections describe the principal components of the GWR Project. **Figure 3-1a and 3-1b** show an overview of the GWR Project facilities and **Figures 3-2 and 3-3** provide overall project process flow schematics to illustrate the existing and proposed facilities and relevant water flow paths by type of water.

The following project components are described in the subsections below:

- Source water diversion and storage – facilities to enable diversion of new source waters to the existing municipal wastewater collection system and conveyance of those waters as municipal wastewater to the Regional Treatment Plant to increase availability of wastewater for recycling. Modifications would also be made to the existing Salinas Industrial Wastewater Treatment Facility to allow the use of the existing treatment ponds for storage of excess winter source water flows and later conveyance to the Regional Treatment Plant for recycling.
- Treatment facilities at Regional Treatment Plant – use of existing primary and secondary treatment facilities at the Regional Treatment Plant, as well as new pre-treatment, advanced water treatment , product water stabilization, product water pump station, and concentrate disposal facilities, and modifications to the Salinas Valley Reclamation tertiary treatment plant.
- Product water conveyance – new pipelines, booster pump station, appurtenant facilities along one of two optional pipeline alignments to move the product water from the Regional Treatment Plant to the Seaside Basin injection well facilities.
- Injection well facilities – new deep and vadose zone wells to inject GWR Project product water into the Seaside Basin, along with associated back-flush facilities, pipelines, electricity/ power distribution facilities, and electrical/motor control buildings.

3.2.2 GWR Project Operations Overview

The GWR Project would operate with annual and seasonal variations based on the amount of available runoff, the water year type, the varying irrigation demand for recycled water, and the amount of water stored in the Seaside Basin as a drought reserve each year. The GWR Project's primary objective is to replenish the Seaside Groundwater Basin by producing high quality water to replace Cal-Am's Carmel River water supply as required by SWRCB Orders. The project's ability to meet the primary project objective of providing Cal-Am extractions of 3,500 AFY would not depend on water year type (wet, normal, or dry).

The GWR Project would also increase the amount of recycled water available for crop irrigation within the existing CSIP service area. This amount is within the total permitted dry weather capacity of the Regional Treatment Plant and the peak capacity of the Salinas Valley Reclamation Plant of 29.6 mgd. Irrigation demands vary seasonally, peaking in the spring and summer months, and also by water year type, increasing in dry and hotter years. Irrigation demand can also change in response to changes in cropping patterns and irrigation practices. The Salinas Valley Reclamation Plant produces tertiary-treated, disinfected water supply (recycled water) from treated municipal wastewater for the CSIP. Peak irrigation demands in the CSIP system exceed the amount of available treated municipal wastewater, so additional water is supplied from the Salinas River and the SVGB. The GWR Project would increase the availability of recycled water during the peak demand periods by providing new sources of water supply to the Salinas Valley Reclamation Plant. The Project also would increase the availability of recycled water for crop irrigation during low demand periods by modifying the Salinas Valley Reclamation Plant to allow production and delivery at lower daily rates, thus further reducing pumping from supplementary groundwater wells.

In addition, to better accommodate variable annual crop irrigation demands for recycled water, an additional 200 AFY would be produced and injected into the Seaside Basin during most years to develop a drought reserve of up to 1,000 ac-ft. of stored water. This would allow MRWPCA to reduce deliveries of product water to the Seaside Basin during drought years, while still enabling Cal-Am to pump 3,500 AFY from the Seaside Basin by using the reserved water. By reducing deliveries of product water to the Seaside Basin during drought years, MRWPCA would be able to increase deliveries of recycled water to growers by a commensurate amount.

The GWR Project's AWTF would be designed and constructed to allow production rates from 1.3 mgd (900 gpm) to 4.0 mgd (2,700 gpm). During a wet or normal year, the AWTF would operate at an average rate of 3.5 mgd during the summer months (April to September). If the drought reserve is full (1,000 ac-ft. additional have been "deposited" in the Seaside Basin), the winter production rate would remain 3.5 mgd. If the drought reserve is not full, the winter production rate would be increased to 4.0 mgd to allow the production of an additional 200 AFY. During certain dry years, the AWTF production rate would be decreased in the summer months, to rates as low as 1.3 mgd, depending upon the amount of water "deposited" in the drought reserve and the demands of the CSIP irrigators. The GWR Project would produce enough advanced treated water in each year so that the amount of injected water plus the amount of "withdrawn" drought reserve equals the 3,500 AFY extracted by Cal-Am. Water supplies not used for the AWTF would be used by the Salinas Valley Reclamation Plant to produce additional recycled water for the CSIP.

Table 3-4 summarizes typical flow operations for the AWTF based on seasonal flow and demand conditions. Although presented as fixed water year types, actual system operation would require daily or weekly management of the production rates to address the variability in irrigation demands and supply availability. Source water diversions would be similarly managed to maximize water availability during the peak irrigation season, as discussed above.

Table 3-4 GWR Project Monthly Flows for Various Flow Scenarios Advanced Water Treatment Facility Reverse Osmosis Influent/Feed (ac-ft.)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (AFY)
1. After drought reserve is full	367	331	367	355	367	355	367	367	355	367	355	367	4,321
Extra to build drought reserve	42	38	42	-		-				42	41	42	247
2. Wet and Normal Years	409	369	409	355	367	355	367	367	355	409	396	409	4,568
3. Drought Years when Full Drought Reserve	409	369	409	133	137	133	137	137	133	409	396	409	3,211

3.2.3 Overview of Source Water Approach

The source waters for recycling by the GWR Project will include municipal wastewater, urban stormwater runoff, industrial wastewater, Reclamation Ditch waters, and Blanco Drain waters, as described below.

- City of Salinas urban stormwater and runoff from the southwest portion of the City that is currently discharged into the Salinas River near Davis Road via a 66-inch outfall line;
- Salinas agricultural wash water, 80 to 90% of which is water used for washing produce, that is currently conveyed to the Salinas Treatment Facility for treatment (aeration) and disposal by evaporation and percolation;
- Agricultural runoff and tile drainage water from Blanco Drain, a man-made reclamation ditch that collects drainage from approximately 6,400 acres of agricultural lands near Salinas;
- Reclamation Ditch water sources that include urban, natural, and agricultural runoff and tile drainage water;
- Municipal wastewater from MRWPCA member agencies that is treated with existing primary and secondary processes at the Regional Treatment Plant and that would otherwise be discharged to the Pacific Ocean (i.e., not treated to a tertiary level for agricultural irrigation).

To maximize the ability to use these sources, two existing facilities would be modified:

- Modifications to the existing Salinas Valley Reclamation Plant to enable the plant to run at less than 5 mgd, and
- Addition of a pipeline and pump station at the Salinas Treatment Facility and slip-lining of an existing 33-inch industrial wastewater pipeline between Salinas Pump Station and the Salinas Treatment Facility to allow storage and recovery of winter agricultural wash water and south Salinas stormwater.

3.2.3.1 Summary of Source Water Flow Availability for GWR Project

Table 3-5 summarizes the results of the Water Management District and MRWPCA's analysis of the data and assumptions used to estimate source water availability and use. These estimates have been used to identify the range of flows affecting design of the GWR Project facilities. Details of the estimation process are included in GWR Project EIR Appendices B and C (MRWPCA and MCWRA 2015), as amended by the assumptions regarding source water availability in NMFS' Water Rights Protest Dismissal Letter dated August 23, 2016 (Appendix M). **Table 3-5** provides estimates by month to develop the range of potential flows for use in designing GWR Project facilities (for AWTF, Product Water Conveyance, and Injection Well Facilities) to meet the primary GWR Project goal of delivering purified recycled water to the Seaside Basin, as well as the secondary Project goals of increasing crop irrigation water for growers in the CSIP area and establishing a drought reserve of up to 1,000 ac-ft. (Schaaf & Wheeler 2015c).

Table 3-5 Summary of the results of the Water Management District and MRWPCA's analysis of the data and assumptions used to estimate source water availability and use

Type of Source Water	Definitions of Existing Flows (AFY)							Projected future flows in 2017 (AFY)	Proposed Project Maximum Use of Source Water Flows, (AFY) (Note 2)
	2012 (actual)	2013 (actual)	Historical Average Flows (averaging period)						
			2012-13 (2-yr average)	2009-13 (5-yr average)	2007-13 (7-yr average)	2004-2013 (10-yr average)	All data (see below)		
Excess/Unused Regional Treatment Plant Municipal Effluent (MRWPCA, Regional Treatment Plant flow monitoring data, January 2014)	9,714	4,621	7,183	8,225	8,704	9,457	10,300 (1999-2013)	6,242 (Note 1)	3,000 to more than 5,000
Agricultural Wash Water Flows (Source: City of Salinas and MRWPCA 2014)	3,058	3,228	3,143	2,676	2,579	NA (Note 3)	2,579 (2007-13)	3,732 (Note 1)	2,579
City of Salinas Urban Runoff to Salinas River (Source: Schaaf & Wheeler 2015a)	229	19	124	196	165	176	225 (1932-2013)	225	>225
Reclamation Ditch at Davis Road (Source: Schaaf & Wheeler 2015b and Appendix M)	6,759	1,965	4,362	7,034	6,374	7,482	7,159 (2003-13)	7,159	1,014
Tembladero Slough at Castroville (Source: Schaaf & Wheeler 2015b)	9,190	2,610	5,900	9,536	8,531	10,030	9,593 (2003-13)	9,593	1,135
Blanco Drain Diversions (Source: Schaaf & Wheeler 2014b)	NA (Note 5)	NA (Note 5)	NA (Note 5)	NA	NA	NA	2,620 (2010-12)	2,620 (Note 5)	2,620
Lake El Estero Storage Management Water (Source: Schaaf & Wheeler 2014a)	65	0	33	66	55	60	87 (1952-2013)	87	87
TOTALS (Note 6)	22,256	10,478	16,383	21,557	20,034	NA (Note 4)	25,404	NA	unknown (Note 6)

Shaded rows are provided for completeness of analysis but described sources are not part of the action evaluated in this BA.

Notes:

1. Projection of flows available in first year of GWR Project operation 2017 (See EIR **Appendix B-Revised**).
2. Source: Schaaf & Wheeler/Monterey Peninsula Water Management District, 2015 (see EIR **Appendix B-Revised**) as modified by the protest resolution on Water Right Application 32263B for the Reclamation Ditch diversion.
3. Flows not available for years prior to 2007.
4. Due to lack of data regarding agricultural wash water prior to 2007 and recent trends, these numbers could not be summed to provide a total of source water flows for this averaging period.
5. Blanco Drain flows calculated based on seasonal pumping records (April to November).
6. The total use of source water would be less than the sum of all source waters due to seasonal nature of the demands and losses due to Salinas Treatment Facility Storage and Recovery. The analysis assumes that new source water that exceeds the amount used by the GWR Project for recycling would be disposed via the MRWPCA existing ocean outfall. The amount of effluent to be disposed to the MRWPCA ocean outfall would be less with GWR Project than current conditions as shown in EIR **Appendix B-Revised**.

3.2.3.2 *Source Water Operation: Diversion, Treatment and Use*

The availability of some of the sources of water supplies for the GWR Project would vary inversely with the Project's water demands. The sources of supply that capture rainfall (urban runoff and surface water diversions within urban areas in their watershed) peak during periods of low irrigation demands, and have minimal or no available flows during periods of peak irrigation demands. By contrast, two sources of supply, agricultural wash water and secondary treated municipal wastewater, have some seasonal variability but are available year-round.

To address the seasonality of supplies and demands, the use of source water would be prioritized by source, and in some cases managed by season. **Table 3-6,** lists proposed sources by priority of use wherein excess unused wastewater is assumed to be used first as the most efficient source water to collect, convey, and treat. Potential operational scenarios that may be used in various water year types to optimize the GWR Project by prioritizing source waters for energy efficiency and reduction of ocean discharges are detailed in Schaaf & Wheeler (2015c).

Treated municipal wastewater currently is used to produce recycled water at the Salinas Valley Reclamation Plant for crop irrigation. Recycled water users under previous agreements have the first right to this supply. Under the GWR Project, at times when unused treated municipal wastewater is not needed for crop irrigation, and instead would otherwise be discharged through the ocean outfall, it would become the first priority source of supply for the AWTF, with a goal of minimizing the amount of flow discharged to the ocean and energy use by the GWR Project.

Table 3-6 Source Water Use Scenarios, including Priority, Seasonality, and Use by Project Phase and Drought Reserve Status

Priority	Source	Seasonal Availability	Usage Period	Projected Use Scenarios by Type of Operational Year (AFY)		
				While Building Drought Reserve	Drought Reserve is Full at 1,000 AFY	During Years when CSIP Uses Drought Reserve
1	Unused Treated Municipal Wastewater	October through March	When available	1,992	1,787	1,503
2	Agricultural Wash Water	Year-round	Store at Salinas Treatment Facility for summer	2,579	2,579	2,362
3	Salinas Urban Stormwater Runoff	October through April				
4	Reclamation Ditch at Davis Road	Year-round, higher in October through April	When available after allowing for fish passage in accordance with Mitigation Measure BF-2a	721	721	1,014
5	Blanco Drain Pump Station	Year-round, higher in April through September, except in years with no SRDF operation	When available	1,268	1,020	2,003 (See Note 1)
Note 1: Pursuant to the MCWRA Water Rights for Blanco Drain (WR #32263A), this yield would likely be less in the years when the SRDF does not operate pursuant to the Water Rights #11						

Agricultural wash water, which is currently treated at the Salinas Treatment Facility, is available year-round and is the most reliable source of new water supply for the GWR Project in the summer months. It would be diverted to the Regional Treatment Plant during peak irrigation time periods and managed to meet the peak summer demand season by storing winter flows in the existing ponds at the Salinas Treatment Facility. In the summer months, both the incoming agricultural wash water and the stored stormwater would be directed to the Regional Treatment Plant, allowing production of advanced treated water for groundwater injection and increased recycled water production for CSIP.

Urban stormwater runoff may be diverted to the sanitary sewer collection system for minimal cost and without a water rights permit, and is therefore the next priority source of supply for the GWR Project. However, when this supply is most available, irrigation demands are low and secondary-treated municipal wastewater would typically be available in adequate quantities to meet project objectives. If that is the case, urban runoff from the City of Salinas would be routed to the Salinas Treatment Facility for seasonal storage. Runoff from summer storms would be diverted to the Regional Treatment Plant when available.

SWRCB Water Rights Permits 32263A and 32263B for surface water diversions from the Blanco Drain and Reclamation Ditch are likely to be issued in the 4th quarter of 2016, including terms and conditions developed during the protest resolution process between February and 4th quarter of 2016. Flows in these channels are less seasonal than urban runoff, but still peak in the winter months during rain events. These sources would be diverted when flows are available and when the other sources of supply are not sufficient to meet the full GWR Project demands. Radio controlled supervisory control and data acquisition (SCADA) equipment at each diversion pump station would allow the system operators to adjust the diversion rates in response to daily rainfall and irrigation conditions.

Based on the maximum expected diversion flows developed for the GWR Project, the following water rights would be needed for the GWR Project:

1. diversion from the Reclamation Ditch at Davis Road of up to 2,000 AFY with a 6 cfs maximum diversion rate, but typically only approximately 1,000 AFY based on Schaaf & Wheeler analysis conducted in support of the water rights protest resolution; and
2. diversion from the Blanco Drain of up to 3,000 AFY with a 6 cfs maximum diversion rate.

The place of use in each of these applications would be for storage in the Seaside Basin and use within the CSIP area and Cal-Am's Monterey District system. The 6 cfs diversion rate from the Reclamation Ditch was determined to be the available excess conveyance capacity in the municipal wastewater collection system between the Reclamation Ditch at Davis Road and the MRWPCA Salinas Pump Station (Schaaf & Wheeler 2015b). In the Blanco Drain, 6 cfs was the peak rate of agricultural tile drainage observed in the growing season (Schaaf & Wheeler 2015b). It should be noted that the annual diversion amounts are considered "face amounts" that cannot be exceeded in any single year. These amounts do not reflect the GWR Project use on an average basis. See Appendix M [NMFS' letter to SWRCB dismissing protests dated August 23, 2016] for more information on yield resulting from the water rights protest resolution.

3.2.4 Source Water Allocations

3.2.4.1 Quantity Needed for Injection into the Seaside Basin

The GWR Project would produce 3,500 AFY average of purified recycled water for injection into the Seaside Basin and later extraction by Cal-Am for delivery to their customers. In addition, in normal or wet years when the drought reserve is being filled, the GWR Project would produce an additional 200 AFY for storage in the Seaside Basin. The GWR Project would require more source water than the amount of water to be produced due to the loss of water (reject) from operation of the reverse osmosis system at the AWTF, which is estimated to operate at an 81% product water recovery rate. In this case, to produce 3,700 AFY of treated water, a total of 868 AFY (19% of the AWTF influent) of concentrated reject water from the reverse osmosis system would be disposed through the ocean outfall. To produce 3,700 AFY of treated water, the GWR Project would require a minimum of approximately 4,568 AFY of raw source waters to feed the proposed new AWTF in wet and normal years (assumed five years out of six).

3.2.4.2 Quantity for Crop Irrigation

During wet and normal years, approximately 4,500 to 4,750 AFY of additional source water is proposed to be collected to augment recycled water supplies for crop irrigation by distribution through the CSIP. This quantity is within the approved capacity of the Salinas Valley Reclamation Plant of 29.6 mgd. The total maximum amount of recycled water that would be treated and made available to the existing CSIP areas under the GWR Project would be less than 29.6 mgd which represents:

- The monthly average dry weather flow capacity of the Regional Treatment Plant pursuant to the permits for the plant; and
- The daily design capacity and annual expected maximum "basic demand" of the Salinas Valley Reclamation Plant.

During drought conditions, when dry season crop irrigation demands within the CSIP area cannot be met by other non-groundwater sources, the GWR Project would reduce its production for injection into the Seaside Basin to as little as 2,600 AFY, allowing the growers served by the Salinas Valley Reclamation Plant and CSIP to use up to 1,000 ac-ft. more of the available source water (up to as much as 5,900 AFY). The actual dry year AWTF production for injection to the Seaside Basin would depend upon the amount of drought reserve water previously injected, so that the Cal-Am Water supply extraction of GWR water (including production plus the previous reserve "deposits") would continue to total 3,500 AFY in every year. The results and assumptions of this analysis are contained in Appendix B of the EIR

(MRWPCA 2015). Descriptions of the source waters discussed above are summarized in the following descriptions.

3.2.5 Source Water Types and Origin

3.2.5.1 Unused Treated Wastewater from MRWPCA Regional Treatment Plant

Description and Estimated Yield

Secondary effluent from the Regional Treatment Plant currently is used as influent for the tertiary treatment plant that is referred to as the Salinas Valley Reclamation Plant, which supplies tertiary treated recycled water for agricultural irrigation use via the distribution system that comprises the CSIP. To determine how much and when to treat the secondary effluent to a tertiary level outside of the growing season, the growers submit water orders one to three days before water is needed. This prevents MRWPCA from creating excess tertiary-treated water that would remain too long in the tertiary storage pond creating too much algae to be used by the growers. During the growing season, MRWPCA treats as much recycled water as possible. If the storage pond fills, then MRWPCA slows down or stops creation of recycled water. If the pond water level descends to a specific elevation, Salinas River water stored behind the SRDF is pumped, screened, disinfected, and mixed into the pond.

Secondary effluent in excess of the CSIP demands is not sent to the tertiary treatment plant, and instead is discharged to the Monterey Bay through MRWPCA's existing ocean outfall. Under the GWR Project, effluent that otherwise would be discharged through the ocean outfall would instead be sent to the AWTF and treated for injection into the Seaside Basin. In addition, some of the secondary effluent that otherwise would be sent to the ocean outfall during winter months would be used to produce additional recycled water for crop irrigation during low demand periods. The SVRP was designed for a minimum daily flow of 8.0 mgd. Facility modifications within the plant would be implemented to lower the minimum daily flow. No new off-site conveyance facilities would need to be constructed to use water from this source. Therefore, use of this source is preferred over other potential new sources.

The quantity of excess secondary effluent that otherwise would be discharged to the ocean outfall each year is highly variable, because the CSIP demands are both weather-dependent, peaking in dry years, and crop dependent, varying by what is planted. Ocean outflows have ranged from 4,600 AFY (water year 2013, record low rainfall) to 12,100 AFY (water year 2006, above average rainfall with a particularly wet spring). Average unused secondary effluent flows are estimated to total 6,242 AFY in 2017 (the anticipated year that the GWR Features would commence operations). Depending upon the water year type and the drought reserve status, the GWR Project may use from 3,000 AFY to 4,800 AFY from this source, predominantly in the winter months. The methodology for estimating these available flows is found in Appendix B of the EIR (MRWPCA 2015).

Diversion Method and Facilities

As described above, municipal wastewater is conveyed to the Regional Treatment Plant through existing infrastructure, and undergoes primary and secondary wastewater treatment before being either supplied to the SVRP for tertiary treatment or discharged through the ocean outfall. To use this treated wastewater, the GWR Project would include construction of a new diversion structure on the existing secondary effluent pipeline to capture unused secondary-treated effluent.

3.2.5.2 *Sources Flowing to the Salinas River*

Agricultural Wash Water

Description and Estimated Yield
Salinas agricultural wash water, 80 to 90% of which is water used for washing produce, is currently conveyed to the Salinas Treatment Facility for treatment (aeration) and disposal by evaporation and percolation.

To use water from this source for the GWR Project, this water would be diverted to the existing Salinas Pump Station using a new diversion structure and new short pipelines connecting the existing agricultural wash water pipeline to the existing municipal wastewater system just prior to the Salinas Pump Station. The agricultural wash water would then mix with the municipal wastewater and be conveyed through the existing 36-inch diameter Salinas interceptor to the Regional Treatment Plant. A temporary connection was installed in April 2014, diverting all agricultural wash water to the Regional Treatment Plant to augment the Salinas Valley Reclamation Plant production of recycled water during the current drought, to provide data regarding treatability of the agricultural wash water (with and without municipal wastewater) using the demonstration facility, and to allow the City of Salinas to perform maintenance on the Salinas Treatment Facility.

Agricultural wash water influent to the Salinas Treatment Facility totaled 3,228 ac-ft. in 2013, and is projected to total 3,733 ac-ft. in 2017 (the anticipated year that GWR Features would commence operations) based on data showing that agricultural processing wastewater flows have increased by about 0.25 mgd each year since 2010. The feasibility analysis for the GWR Project did not assume any continued increases in this source beyond 2017, although development of new or expanded facilities may continue to occur pursuant to the Salinas Agricultural Industrial Center Specific Plan, contributing additional wastewater flows to the Salinas industrial wastewater collection system beyond that year.

Agricultural wash water would be available year-round, with peak flows occurring during the summer harvest season. To maximize the use of all available sources, agricultural wash water would only be diverted directly to the Regional Treatment Plant during the peak irrigation demand months (typically April through October). From November through March, agricultural wash water flows would be sent to the Salinas Treatment Facility for treatment and stored in the existing ponds, which can hold approximately 1,250 ac-ft. From May to October, the incoming flows would be diverted to the Salinas Pump Station, and stored water would be pumped from the Salinas Treatment Facility ponds back to the Salinas Pump Station. Taking into consideration evaporative losses, seepage losses and recovery of stored water, the Salinas Treatment Facility ponds would be empty by the end of each irrigation season. The net yield after accounting for storage losses would be approximately 2,710 AFY. The following section describes the facility modifications that would be needed to achieve this yield.

Diversion Method and Facilities

Salinas Pump Station Diversion Structure and Pipelines

Two of the proposed sources of raw water for the GWR Project would be captured and diverted from subsurface conveyance structures to the existing MRWPCA Salinas Pump Station: agricultural wash water and City of Salinas urban runoff (described in Section 2.7.2.3). Both of these sources would necessitate construction of new diversion structures and short pipelines near the existing Salinas Pump Station. The Salinas Pump Station Diversion site (also referred to as Treatment Plant 1, or TP1) would include several new diversion facilities to redirect flows of agricultural wash water and City of Salinas stormwater and dry weather runoff to the existing Salinas Pump Station for blending with Salinas's municipal wastewater and treatment and recycling at the Regional Treatment Plant. The combined storm and waste waters would be conveyed from the existing Salinas Pump Station through the MRWPCA's existing 36¬inch diameter interceptor to the Regional Treatment Plant. The diversion facility would also accommodate the routing of agricultural wash water and winter stormwater to the Salinas Treatment Facility for seasonal storage, and would provide a termination point for the pipeline that would carry returned flows of stored waters to the Salinas Pump Station. Generally, these facilities include the following:

- A new underground junction structure to be constructed over the existing 48-inch sanitary sewer line, to mix sanitary, agricultural wash water and stormwater flows. This structure would also receive agricultural wash water and stormwater return flow from the Salinas Treatment Facility's Pond 3.
- Modifications to the existing agricultural wash water underground diversion structure, and addition of approximately 150-foot long 42-inch diameter underground pipeline and metering structure between this structure and the new junction structure to be constructed over the existing 48-inch sanitary sewer line.
- An underground stormwater diversion structure (Stormwater Diversion Structure No. 1) and underground pipeline between this new structure and the existing 33-inch agricultural wash water line.
- An underground stormwater diversion structure (Stormwater Diversion Structure No. 2) near the existing stormwater pump station and underground pipeline to divert stormwater flow to the Salinas Pump Station through an existing 30-inch abandoned pipeline.

- Meters, valves, electrical and control systems, and fencing around the diversion structures.

Salinas Treatment Facility Pond Storage and Recovery

The City of Salinas is constructing a new 42-inch industrial wastewater pipeline to replace the existing 33-inch gravity main between the City's TP1 site (the site on which the Salinas Pump Station is located) and the Salinas Treatment Facility. Winter flows of agricultural wash water and Salinas urban stormwater runoff would be conveyed to the ponds using the new 42-inch pipeline. Water within the Salinas Treatment Facility currently moves as gravity overflows from the aeration basin to Pond 1, then Pond 2 and finally, Pond 3.

Seasonal storage of agricultural wash water and Salinas urban stormwater runoff at the Salinas Treatment Facility ponds would require construction of a new return pipeline and pump station to return the stored water to the Salinas Pump Station Diversion site. The proposed return pipeline would be an 18-inch pipeline, installed inside the existing, soon to be abandoned 33-inch pipeline. A new return pump station and a new valve and meter vault would be located within the existing Salinas Treatment Facility site near the existing pump station. The new return pump station would include two variable frequency drive pumps, a primary and a secondary. A new pipeline would be constructed from the lower end of the Pond 3 to the new return pump station. A second new pump station near the lower end of Pond 3 would be needed to lift stored agricultural wash water and stormwater into a pipeline returning to the return pump station. A new short pipeline would also be constructed to convey the treated wastewater from the aeration basin to the pipeline that returns water from Pond 3 or directly to the return pump station. The existing facilities related to the Salinas Wastewater Treatment System are shown in **Figure 3-5**. The proposed new pipelines and pumps are shown in **Figure 3-6**, Proposed Salinas Treatment Facility Storage and Recovery Conceptual Site Plan.

Construction

Salinas Pump Station Diversion Site

Construction activities at this site would include demolition, excavation, site grading and installation of new junction structures, new meter vault or flow measurement structures and short pipeline segments. Existing pump stations operations would be ongoing during construction due to the uninterruptible nature of conveyance of wastewater (and in some cases, stormwater flows). For this reason, temporary shunts of various waters may be necessary to maintain the collection and conveyance of waters to treatment facilities. Construction may occur up to 24 hours per day, 7 days per week due to the necessity of managing wastewater flows; however, major construction of new facilities would be limited to daytime hours. Approximately 0.75 acres would be temporarily disturbed and up to 0.25 acres of new impervious surfaces would be added to the site. The permanent facilities would be subsurface. The site would be under construction for up to five months.

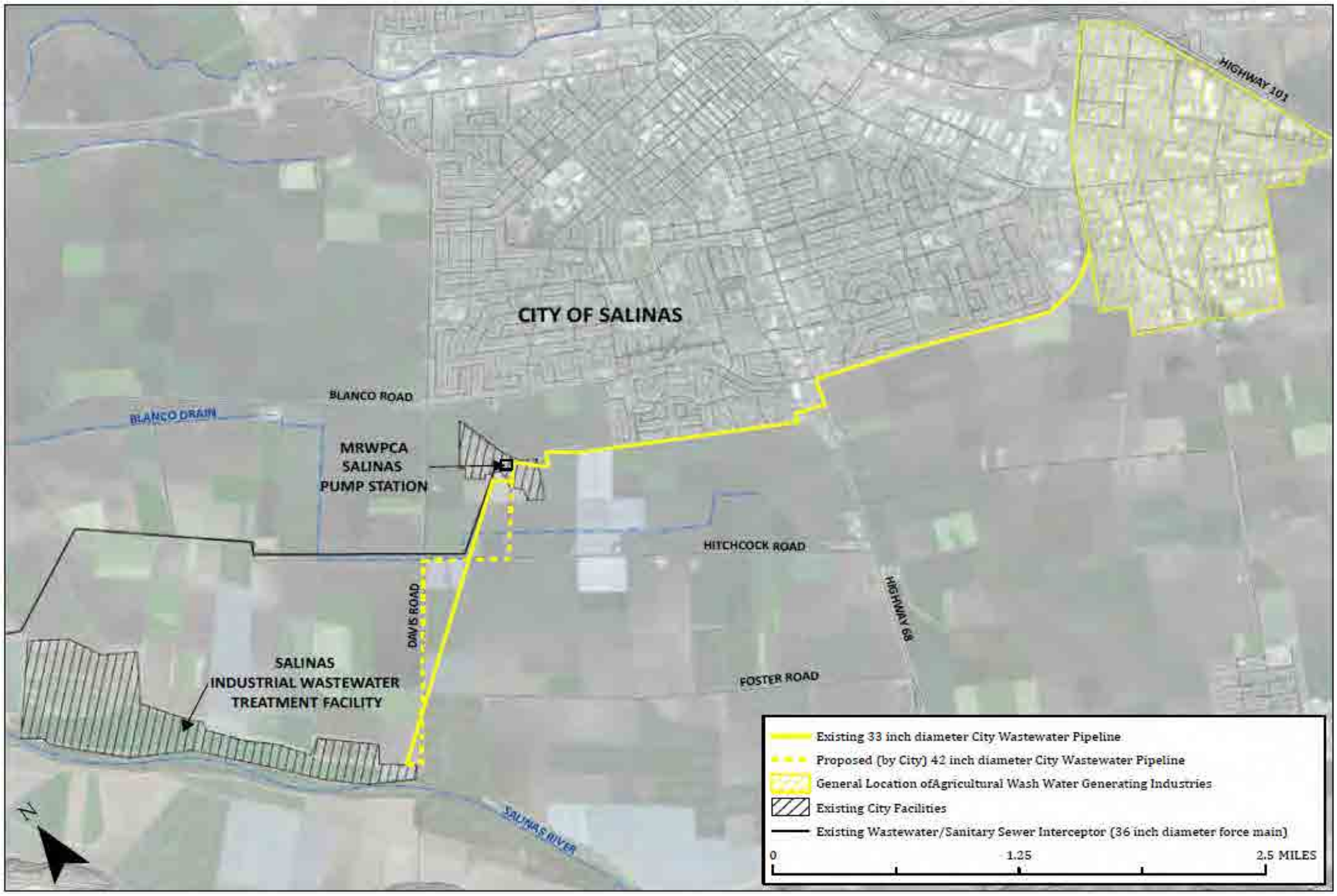

Figure 3-5. Existing Salinas Wastewater Treatment System Location

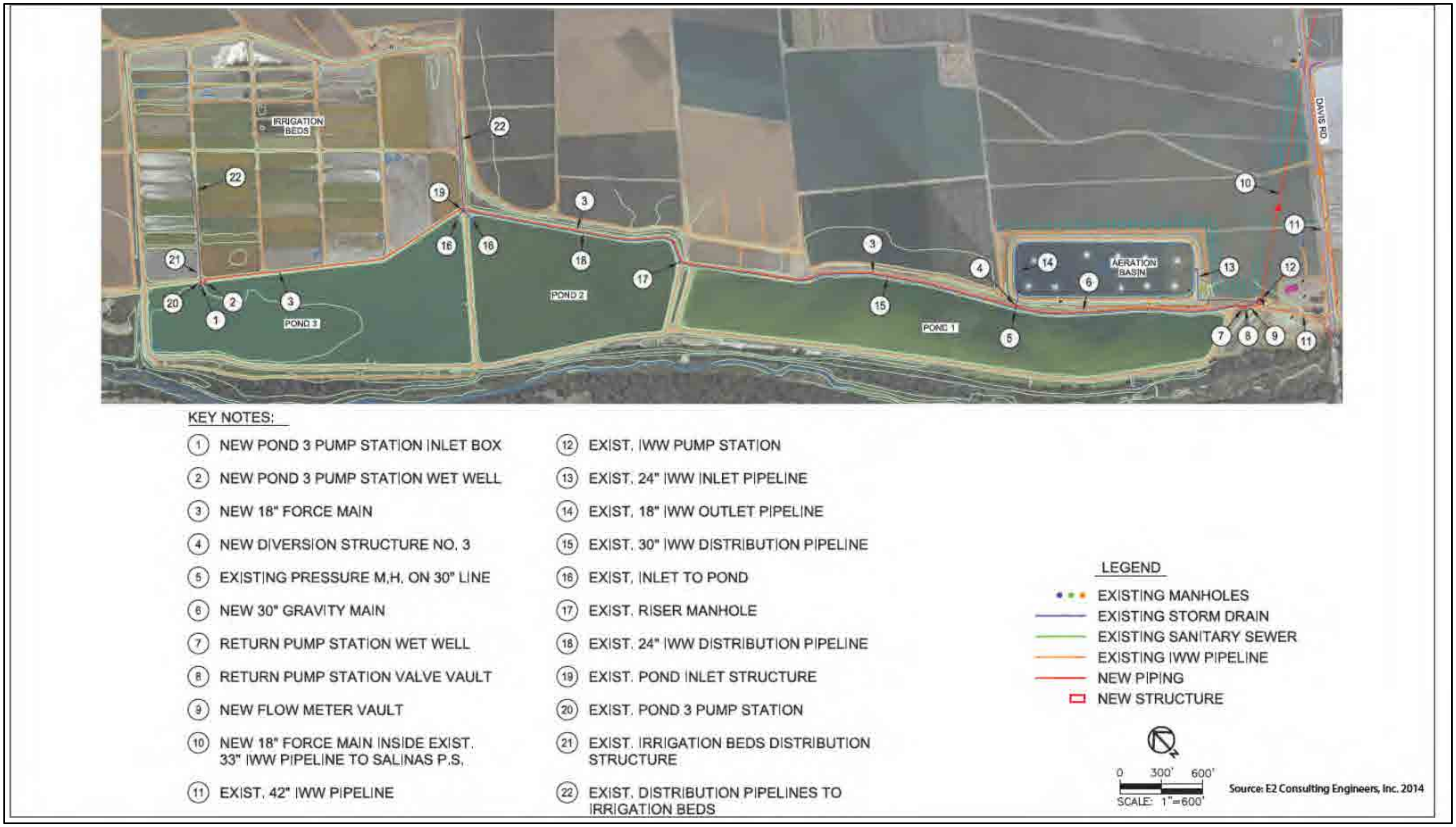

Figure 3-6. Proposed Salinas Treatment Facility Storage and Recovery Conceptual Site Plan

Salinas Treatment Facility Storage and Recovery

The majority of the construction activity for the Salinas Treatment Facility Storage and Recovery Facilities would occur within the existing 281-acre Salinas Treatment Facility site. New pipelines from Pond 3 and the aeration basin to the return pump station, including precast concrete manholes, would be constructed within the existing unpaved access road and parallel to the existing pipelines. A new lift station would be constructed at Pond 3 to return water to the return pump station. This new lift station would be constructed adjacent to the existing City of Salinas irrigation transfer station in Pond 3. If the work for the new lift station in Pond 3 must be performed while it is full, sheet piling and dewatering equipment will be required. The return pump station would be located near the existing influent pump station at the east end of the site. Return pump station and pipelines construction would include trenching and installation of new pipelines, new pump and lift station, new pumps/pump motors, electrical facilities, valve vaults and flow meter, requiring equipment delivery trucks, loaders, compactors, and backhoes.

The recovery or return pipeline from the Salinas Treatment Facility to the Salinas Pump Station Diversion site would be constructed inside the existing 33-inch influent pipeline, which is scheduled to be abandoned in place in late 2015 after a new 42-inch pipeline is completed. Installing a new pipeline inside the existing pipeline would require excavating access pits every 600-ft to 800-ft along the existing alignment, cutting into the existing pipe, pulling the new assembled pipe into the existing pipe and connecting the new pipe segments before closing the pit. The work area at each pit would be up to 20-ft wide, approximately 60-ft long and up to 10-feet deep. Equipment would include equipment delivery trucks, loaders, backhoes, pipe cutting and welding equipment, pipeline fusing equipment (if fusible pipe is used), and pipeline pulling equipment. If work must occur in an existing street, paving equipment would be required for repairing the site.

Operations and Maintenance

The Salinas Pump Station Diversion site is adjacent to and north of the existing Salinas Pump Station within the City's Treatment Plant 1 site (also called, TP1), and would be maintained by the same MRWPCA operations staff as currently operate the pump station. No additional employee site visits would be required at the Salinas Pump Station site. The facility would operate continually using automated flow metering, gates and valves. Operations would consist of seasonally adjusting the diversion settings to direct flows to the Pump Station or to the Salinas Treatment Facility. Gates and valves would be exercised annually if not operated more frequently. Installed flow meters would require periodic inspection and calibration on a less-than-annual frequency. Power usage at the site would be incidental to the existing pump station and would only be needed for SCADA and metering and controls for the gates and valves. No ongoing materials delivery or solid waste generation would occur.

Similarly, the new storage and recovery facilities at the Salinas Treatment Facility would be managed by the same number of staff that currently operates the Salinas Treatment Facility. During the storage season (November to April), the return pumps would not be operated. The Salinas Treatment Facility aeration pond would continue to operate as it currently does.

Volumes in Ponds 1, 2, and 3 would be monitored. If inflows exceed the storage capacity, some flows would be diverted to the existing drying beds, or adjustments may be made at the Salinas Pump Station Diversion to send some agricultural wash water to the Regional Treatment Plant. The return pumps at the Salinas Treatment Facility and the Pond 3 lift station would be inspected during the storage season, and routine mechanical services would be scheduled during this season. Trucks with lifting equipment would be required to pull the pumps out of the wet wells for maintenance.

During the return pumping season (June to October), the return pump station would operate during the period of off-peak electrical rates, at flow rates up to 5 mgd, depending upon the daily volume of new agricultural wash water diverted directly to the Salinas Pump Station. The pumping rate may be reduced during the peak hours of agricultural wash water flows. Stored water in Pond 3 (the westernmost pond at the Salinas Treatment Facility) would be conveyed to the return pump station using a new lift state and gravity pipeline. At the end of this season, the Salinas Treatment Facility ponds would be empty or nearly empty, allowing maintenance to be performed, if needed, on the gates, valves, overflow structures, pump stations and levee banks.

City of Salinas Urban Runoff to Salinas River

Description and Estimated Yield

City of Salinas urban runoff and stormwater from the southwest portion of the city is currently discharged into the Salinas River near Davis Road via a 66-inch outfall line. Rain events may occur year-round, but the majority of the flows occur between November and April.

Under the GWR Project, City of Salinas urban runoff and stormwater would be diverted to the Regional Treatment Plant rather than discharged to the Salinas River. This source is estimated to yield an average raw water supply of 225 AFY, based upon estimated daily runoff from the contributing portions of the city and available capacity at the Salinas Pump Station (Appendix O of the EIR, Schaaf & Wheeler 2015a).

To use water from this source for the GWR Project, stormwater would be diverted by gravity from the existing city stormwater pipelines to the existing MRWPCA Salinas Pump Station using one or two new diversion structure(s). It would also be diverted into the Industrial Wastewater System for storage at the Salinas Treatment Facility ponds and returned to the Salinas Pump Station for conveyance to the Regional Treatment Plant for recycling and summer use as discussed under Agricultural Wash Water.

Consistent with existing conditions, excess stormwater during large rain events, which exceeds the available Salinas Pump Station capacity or the conveyance capacity to the Salinas Treatment Facility, would be discharged to the Salinas River through the existing stormwater infrastructure. In extreme storm events, stormwater also could continue to overflow to the Blanco Detention Basin, an existing earthen depression adjacent to the Salinas Pump Station that currently captures excess stormwater runoff that cannot be conveyed to the storm drain pipeline that discharges to the Salinas River.

Diversion Method and Facilities
The Salinas Pump Station Diversion structures and pipelines that are described above in Section 3.4.2.2 would also be used to divert Salinas urban runoff to the Regional Treatment Plant for recycling for crop irrigation demands and use by the AWTF.

Construction
Construction of the Salinas Pump Station urban runoff diversion structure is discussed as part of the Agricultural Wash Water facility construction in Section 3.4.2.2.

Blanco Drain

Description and Estimated Yield
As described in the Blanco Drain Yield Study (Schaaf and Wheeler 2014), estimates of stream flow capture from the Blanco Drain were made based on limited seasonal flow data. There is an existing slide gate and pump station on the Blanco Drain, constructed as part of the Salinas River Diversion Facility (SRDF) project (**Figure 3-7**). A weir gage was installed in 2007 to record flows for sizing that pump station, and operational records were available for 2010 through 2013. Because the SRDF only operates during the peak irrigation season, flow data was only available for April through October. Flows in the Blanco Drain were estimated as return flows from applied irrigation and natural precipitation within the watershed based on an average return flow of 17%. The MCWRA CSIP irrigation quantities and the Salinas rainfall records along with this return flow factor were used to estimate source flows. **Table 3-7** below shows the monthly return flows calculated by Schaaf and Wheeler (2014).

Table 3-7 Estimated Flows in Blanco Drain.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Totals
Applied Irrigation + Precipitation (AF)	1,229	1,314	1,446	1,481	1,323	1,613	1,629	1,436	1,080	989	782	1,088	15,410
17% return (AF)	209	223	246	252	225	274	277	244	184	168	133	185	2,620
Average Return Flow Rate (cfs)	3.4	4	4	4.2	3.7	4.6	4.5	4	3.1	2.7	2.2	3	

No reduction for infrastructure capacity or for fish bypass requirements were used to develop yield from these calculated available flows. This diversion would not rely upon existing wastewater collection systems. The resolution of water rights permit protests filed with the SWRCB include terms that require a flow of 2 cfs to be bypassed from Blanco Drain to the Salinas River during certain conditions. Specifically, the requirement is as follows:

Between April 1 and October 31 of years when the Salinas River Diversion Facility has not operated due to dry or drought conditions, and when the Salinas River Lagoon is closed to the ocean, MCWRA shall:

a) Monitor and report the average daily water levels in the Salinas River Lagoon and the operational characteristics of the slide gate between the Salinas River Lagoon and the Old Salinas River channel.

b) Maintain Salinas River Lagoon water surface elevation and provide flows to the Old Salinas River channel by adhering to the following two conditions:

   i. If the water level in the Salinas River Lagoon drops below 3.0 feet National Geodetic Vertical Datum of 1929 (NGVD29) (or the then-current Salinas River Lagoon water surface elevation management requirement) for 7 consecutive days, then cause MRWPCA to limit Blanco Drain diversions to flows above 2.0 cfs (or to provide an alternative source of 2 cfs to the Salinas River Lagoon that does not currently exists, if not prohibited by other regulations) until the Salinas River Lagoon water surface elevation increases to a minimum of 3.2 feet NGVD29 or until October 31 whichever occurs first.

   ii. If the slide gate between the Salinas River Lagoon and the Old Salinas River channel has been closed for more than 7 consecutive days, adjust the slide gate to allow 0.5 to 1.0 cfs of Salinas River Lagoon water to flow into the Old Salinas River Channel and cause MRWPCA to limit Blanco Drain diversions to flows above 2.0 cfs (or to provide an alternative source of 2 cfs that does not currently exist, if not prohibited by other regulations) until the Salinas River Lagoon water surface elevation reaches 3.2 feet NGVD29 or until October 31 whichever occurs first.

During these years, yield reduction would occur; however, the yield of this component was estimated to be equal to the calculated flows on an average basis. Note that the values above reflect monthly average flow rates. Summer flows (April to September) have little variability because all areas are farmed in the summer (i.e., all areas are irrigated). Winter flows are more variable, and additional water would be available for capture during larger rain events. Capturing these peak flows would require additional infrastructure beyond the 6 cfs pump station considered in the GWR Project.

Figure 3-7. Blanco Drain at diversion site looking northeast towards Nashua Road

Diversion Method and Facilities

The Blanco Drain is the only source of supply not located near an existing wastewater collection facility that could be used to convey flows to the RTP. Development of this source would require not only a new pump station, but also a two-mile pipeline that would cross under the Salinas River.

The proposed Blanco Drain Diversion pump station would be located just upstream of the existing seasonal pump station operated by MCWRA. The new pump station would consist of a new intake structure on the channel bottom, connecting to a new wet well on the channel bank via a new gravity inlet pipe. The new pump station would discharge through a new 16-inch force main running from the pump station to the headworks of the Regional Treatment Plant. The channel banks and invert near the pump station intake would be lined with concrete to prevent scouring. In accordance with proposed terms and conditions for the SWRCB Water Rights Permit for Blanco Drain (Water Right Application #32263A), diversions of Blanco Drain water would be allowed up to 6 cfs of water flowing in the channel at the diversion point, except in certain circumstances, when diversions would be limited to flows above 2 cfs. Specifically, the following terms (or similar) are expected to be included in the draft water right permit that is relevant to this discussion:

1. No water shall be diverted under this right during April 1 through October 31 of years when the Salinas River Diversion Facility has not operated under the terms of Water Rights Permits 10137, 12261, and 21089; and when the Salinas River Lagoon is closed to the ocean subject to the following conditions:

   a. If the Salinas River Lagoon water surface elevation is below 3.0 feet NGVD for seven consecutive days, no water shall be diverted unless the flow is above 2.0 cubic feet per second at the Diversion Point. This restriction shall continue until the Lagoon water surface elevation increases to 3.2 feet NGVD; or

   b. If the slide gate between the Lagoon and the Old Salinas River channel is closed for seven consecutive days, the slide gate shall be adjusted to allow 0.5 to 1.0 cubic feet per second to flow into the Old Salinas River channel, and no water shall be diverted unless the flow is above 2.0 cubic feet per second at the Diversion Point. This restriction shall continue until the Lagoon water surface elevation increases to 3.2 feet NGVD.

2. Right holder shall monitor the Salinas River Lagoon and the operational characteristics of the slide gate between the Salinas River Lagoon and the Old Salinas River channel during April 1 through October 31 of years when the Salinas River Diversion Facility has not operated under the terms of Water Rights Permits 10137, 12261, and 21089; and when the Salinas River Lagoon is closed to the ocean. During this condition, information shall be presented in a monthly report to be submitted to the SWRCB, Department of Fish and Wildlife, and National Marine Fisheries Service. Said report shall include at a minimum the:

   a. Daily mean, in NGVD29, of the water surface elevation in the Salinas River Lagoon,

   b. Dates of when the slide gate to the Old Salinas River was closed compared to open,

   c. Size of the slide gate opening in inches,

   d. Estimated daily mean of flows released to Old Salinas River in cubic feet per second when flow is required, and

   e. Daily mean bypass flows of Blanco Drain at the point of diversion.

To comply with these anticipated terms of the Blanco Drain water rights, the following physical facilities and operational protocol are proposed for the Blanco Drain point of diversion.

The Blanco Drain Diversion Pump Station (BDDPS) will be constructed at a location immediately upstream of the existing MCWRA Pump Station and the associated barrier wall. Flow in the Blanco Drain will be diverted to the BDDPS wet well by means of an Intake Box constructed into the bottom of the drain ditch, and a 30-inch diameter inlet pipe connecting the Intake Box to the BDDPS wet well. Water diverted into the wet well is pumped to the RTP

Influent Junction structure at the headworks by means of three (3) submersible pumps conveying the diverted water through a force main approximately 9,000 feet in length. The force main is 16-inch diameter polyvinyl chloride (PVC) pressure pipe, except for a river crossing of approximately 600 foot length which is 18-inch diameter high density polyethylene (HDPE) pipe. The river crossing will be constructed using the Horizontal Directional Drilling (HDD) method in order to avoid any contact with the riparian habitat area along the river, and to achieve sufficient depth below the riverbed to provide a margin of safety to minimize the risk of frac-out.

Pumped flow will be measured by a magnetic flow meter (magmeter) located at the BDDPS. All three (3) pumps are furnished with variable speed drives in order to maximize and control diversion from the Blanco Drain under conditions of varying flow. Maximum pumping capacity with 3 pumps operating at full speed is 6 cfs (2,690 gpm). The facility also includes a flow measurement flume on the discharge from the Blanco Drain, to be continuously monitored and recorded. A principal purpose of this flow measurement flume is to confirm compliance with requirements for downstream bypass when Operating Condition B is in effect (see below).

When operating the diversion in Operating Condition A: The Blanco Drain will be operated in this condition at all times when the Salinas River Lagoon is open to the ocean and throughout the calendar year when the Salinas River Diversion Facility has operated in that year. Under this operating condition the Intake Box at the MRWPCA BDDPS will not have the removable stop logs in place on the top of the Intake Box, thereby enabling all water in the upstream side of the Blanco Drain barrier wall to be diverted. No monitoring and reporting of the Salinas River Lagoon elevation will be required. No reporting of slide gate conditions and flow will be required. All water in Blanco Drain, up to the maximum allowed diversion of 6 cfs, is able to be diverted in this scenario.

When operating the diversion in Operating Condition B: The following monitoring and operational protocol will be implemented during the Operating Condition B, which will be in effect April 1 through October 31 of any year during which the Salinas River Diversion Facility has not operated pursuant to MCWRA's Salinas River Water Right Permits #10137, 12261, and 21089, and when the Salinas River Lagoon is not open to the ocean.

- Online data from MCWRA's ALERT system of Salinas River Lagoon stage at a water level meter located in the Salinas River Lagoon would be monitored by MRWPCA with an alarm set point when the Salinas River Lagoon level drops below 3.0 feet NGVD29 for more than 6 days. At this time, or by April 1 regardless of the Salinas River Lagoon water level (if desired), MRWPCA will install removable stop logs around the entire perimeter of the open top of the BDDPS Intake Box to prevent diversion of low flows from the Drain. The height of the stop logs will correspond to that water level in the drain that will enable 2 cfs to bypass the Intake Box and discharge from Blanco Drain to the Salinas River. This bypassed flow will be measured and recorded by means of a flow measurement flume constructed on the Blanco Drain discharge. Water level in the Blanco Drain exceeding the height of the stop logs will overflow into the Intake Box and the BDDPS wet well and then the diverted water will be pumped to the Regional Treatment Plant. Another alarm set point would then be established to alert MRWPCA to when the Salinas River Lagoon levels rises up to 3.2 feet NGVD29, at which time the aforementioned stop logs on the Blanco Drain Intake Box could, at the option of the MRWPCA, be removed and maximum flow diverted to the pump station. If MRWPCA determines that Operating Conditions B is likely to re-occur frequently during the summer season, they may opt to leave the stop logs in place for the duration of the season (through October 31).

- If the slide gate between the Salinas River Lagoon and the Old Salinas River Channel is closed, MCWRA staff will conduct a daily site visit to the slide gate between the Salinas River Lagoon and the Old Salinas River, unless and until another method of measuring flow from the Salinas River Lagoon to the Old Salinas River is implemented. During the site visit, the slide gate position will be noted and the amount of water flowing from the Salinas River Lagoon into the Old Salinas River channel will be noted. If the slide gate is closed and no water is observed to be flowing through or around the slide gate for seven (7) or more days, the slide gate will be adjusted to enable 0.5 to 1 cfs of water to flow to the Old Salinas River channel and the above protocol will be initiated to ensure that diversions are limited to flows above 2 cfs. If the slide gate is open, weekly site visits will be performed. Alternatively, the MCWRA may install (or cause MRWPCA to install) a flow monitoring device to reduce the need for site visits to confirm flows from the Salinas River Lagoon to the Old Salinas River channel.

The force main pipeline must cross under the Salinas River. This work would be performed using a trenchless method, most likely directional drilling. The crossing method would be determined during detailed design and permitting. Trenchless construction would require work areas approximately 40-ft by 60-ft on each side of the river.

Key construction information about the proposed Blanco Drain Diversion Pump Station:

- Open excavation to install new intake structure, new wet well and new pipeline.
- New pump station will be constructed adjacent to the existing MCWRA pump station.
- The Blanco Drain is maintained as a trapezoidal channel.

Key construction information about the proposed Force Main and Gravity Pipeline (including pipelines located at the RTP):

- Open excavation to install the majority of the new pipeline. The segment crossing the Salinas River will be installed using trenchless methods (directional drilling), with sending/receiving pits on either side.

- The pipeline will start at the new pump station and follow the farm road on the west bank of the Blanco Drain to the point the pipeline crosses the Salinas River. On the south side of the river, the pipeline will run north-west and then south-west under existing farms roads, then cross a portion of Monterey Regional Waste Management District landfill, and finally a portion of the MRWPCA Regional Treatment Plant to the headworks.

The existing Blanco Drain site located in and near waterbodies are shown in detail in **Figure 3-8**. The site plan and cross-sections for Blanco Drain are provided in **Figure 3-9** and **3-10**, respectively.

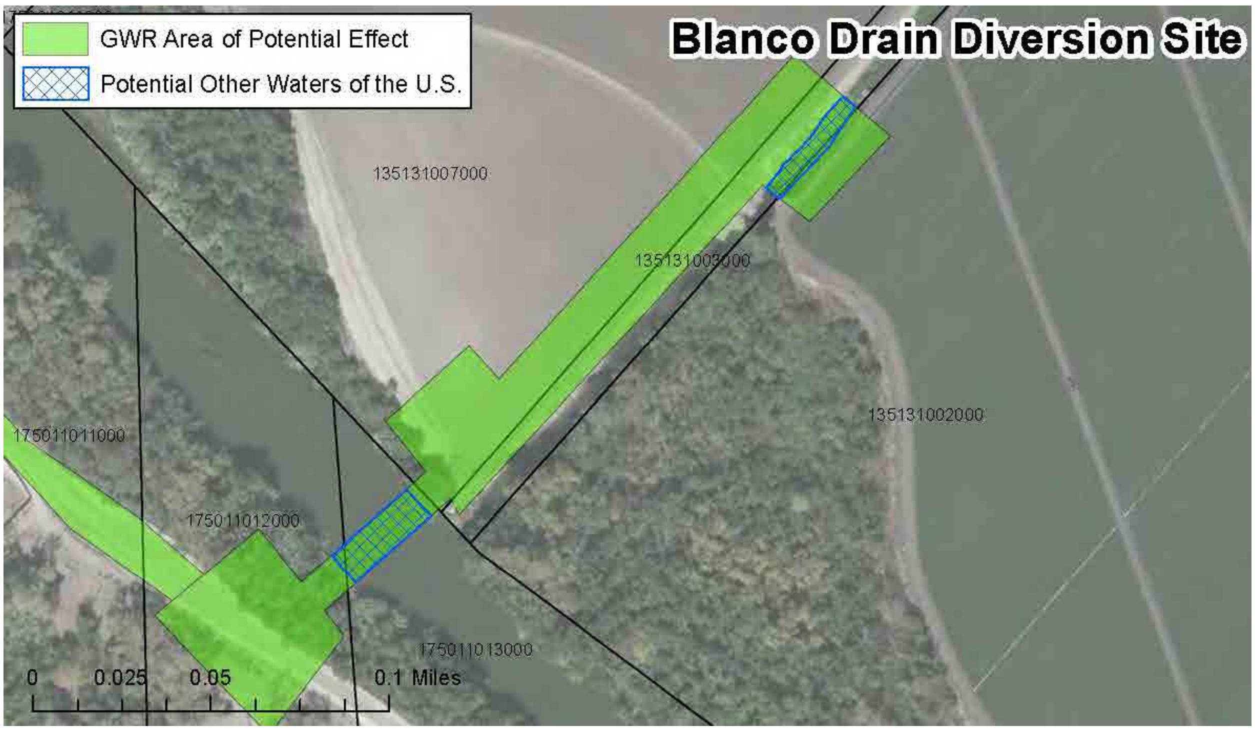

Figure 3-8. Location of Proposed Blanco Drain Diversion Facilities in relationship to waterbodies

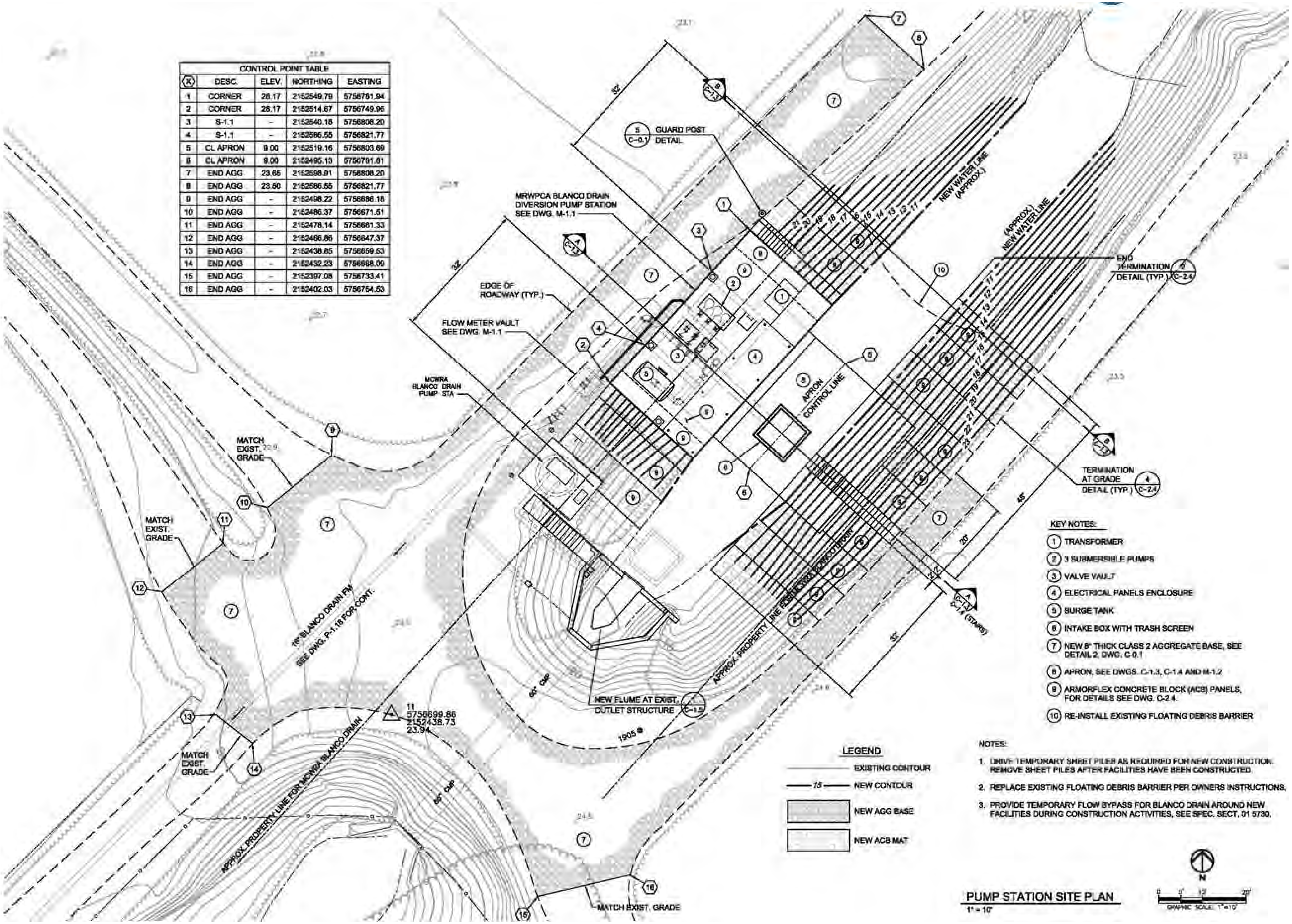

Figure 3-9 Details of Proposed Blanco Drain Diversion Facilities

3.2.5.3 Reclamation Ditch

Description and Estimated Yield

For the EIR and the preliminary draft BA(March 2, 2016), Schaaf & Wheeler[12] estimated a conservative yield from the Reclamation Ditch water source assuming a maximum 6 cfs diversion rate at Davis Road (the available capacity in the Salinas sanitary sewer trunk main), and leaving an in-stream flow of 2 cfs at Davis Road in the winter, 0.7 cfs in the summer. Since that analysis, the protest resolution process occurred and added further, more stringent fisheries by-pass requirements. The diversion point would be on Reclamation Ditch at Davis Road, where an existing 54-inch City of Salinas sanitary sewer main crosses the Reclamation Ditch. A photo of the site is provided in **Figure 3-9 and 3-10**. A new diversion structure would be installed in the ditch, and a new pump station, valve and meter vaults would be installed on the southern bank, to divert flows, when available, into the existing 54-inch sanitary sewer main, which conveys wastewater to the MRWPCA Salinas Pump Station (**Figure 3-10**). Based on the available conveyance capacity in the gravity sewer system between the point of diversion and the Salinas Pump Station and the historic flows in the Reclamation Ditch, diversions of up to 6 cfs are estimated to be able to be diverted. Since the resolution of the water rights protest, the new assumptions include in-stream (bypass) flow requirements of 1 cfs in the month of June, 0.7 cfs in July to November, and 2.0 cfs during the months of December to May for fish migration. In addition, if flows are above 30 cfs, MRWPCA is required to cease pumping and not restart pumping until flows recede to 20 cfs. This source would yield an average 1,014 AFY for a 6 cfs water right permit. Monthly yields are presented in **Table 3-8.**[13]

Table 3-8 Estimated Average-Year Diversion from the Reclamation Ditch at Davis Road (AF)

Maximum Rate	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
6 cfs	70	66	70	106	80	99	113	109	72	65	90	76	1,014

The approved Mitigation Monitoring and Reporting Program (MMRP) (October 2015), included mitigation measures to ensure adequate fish passage flows in the Reclamation Ditch by making their implementation subject to NMFS' review and approval. MRWPCA committed to the maintenance of adequate fish migration flows per BF-2a; however, implementation of this mitigation measure has now been enhanced because the local agencies have committed to complying with the proposed terms and conditions for the SWRCB water right permits to resolve protests on the application from NMFS and CDFW.

Based on the availability of other supply sources for the GWR Project, diversions from these sources may be reduced during the winter months. The proposed diversion facilities would be equipped with supervisory control and data acquisition (SCADA) equipment which allows the

[12] Schaaf & Wheeler, *Reclamation Ditch Yield Study*, March 2015.

[13] In addition, the terms of the water right protest require diversions to cease when flows exceed 30 cfs and that pumps not be turned on until flows recede back to under 20 cfs. These upper flow limits do not reduce yield for the project substantively as the occurrence of these flows are limited to very short periods of time when there is typically more flow to the RTP than can be recycled.

diversions to be turned off remotely. If excess treated municipal wastewater is available at the Regional Treatment Plant, these diversions would be shut off rather than diverting surface water while simultaneously discharging treated wastewater to the ocean outfall. The methodology used for estimating available flows is found in Appendix P of the EIR (Schaaf & Wheeler 2015b) as amended in the water rights protest resolution memorandum (attachment to NMFS' letter in Appendix M).

Reclamation Ditch Diversion Site Construction

Construction of the Reclamation Ditch diversion would include minor grading, installation of a wet well/diversion structure, modification of an existing sanitary sewer manhole and a short pipeline from the existing manhole to the new pump station. The work would disturb approximately 0.15 acres of land, including approximately 0.05 acres of the Reclamation Ditch banks and channel bottom. Construction would be limited to July 1 through October 31. The channel carries flow year-round, so a temporary coffer dam would be required above and below the site, with a small diversion pump to convey existing channel flows past the project construction area. The temporary coffer dams would consist of waterproof tarps or membranes wrapped around gravel fill material, which would be removed when the work is completed. Key construction aspects include the following:

- Open excavation to install new intake structure, new wet well and new pipeline to connect to existing sanitary sewer main, and
- New pump station will be constructed approximately 60-ft from the receiving sanitary sewer manhole.

The site has been previously disturbed by the adjacent railroad, construction of the Davis Road overpass, construction of the Salinas sanitary sewer siphon and realignment of the Reclamation Ditch. The Reclamation Ditch is maintained as an unvegetated trapezoidal channel.

Figure 3-10. Oblique aerial photo of the Reclamation Ditch diversion site at the Davis Road overpass looking upstream

Diversion Method and Facilities

The Reclamation Ditch Diversion would consist of a new intake structure on the channel bottom, connecting to a new wet well (manhole) on the channel bank via a new gravity pipeline. The new intake would be screened to prevent fish and trash from entering the pump station. Two submersible pumps would be installed in the wet well, controlled by variable frequency drives. The electrical controls and drives would be in a locked, weatherproof cabinet near the wet well and above flood level. The new pump station would discharge through two new short force mains (approximately 50-ft each), discharging to an existing manhole on the City of Salinas 54¬inch sanitary sewer main. Two new underground vaults would be installed along the force main, one to hold the check and isolation valves, and one for the flow meter. The channel banks and invert near the pump station intake would be lined with concrete to prevent scouring and facilitate the management of by-pass flows. Key existing and proposed facilities at this site are shown in **Figures 3-11**.

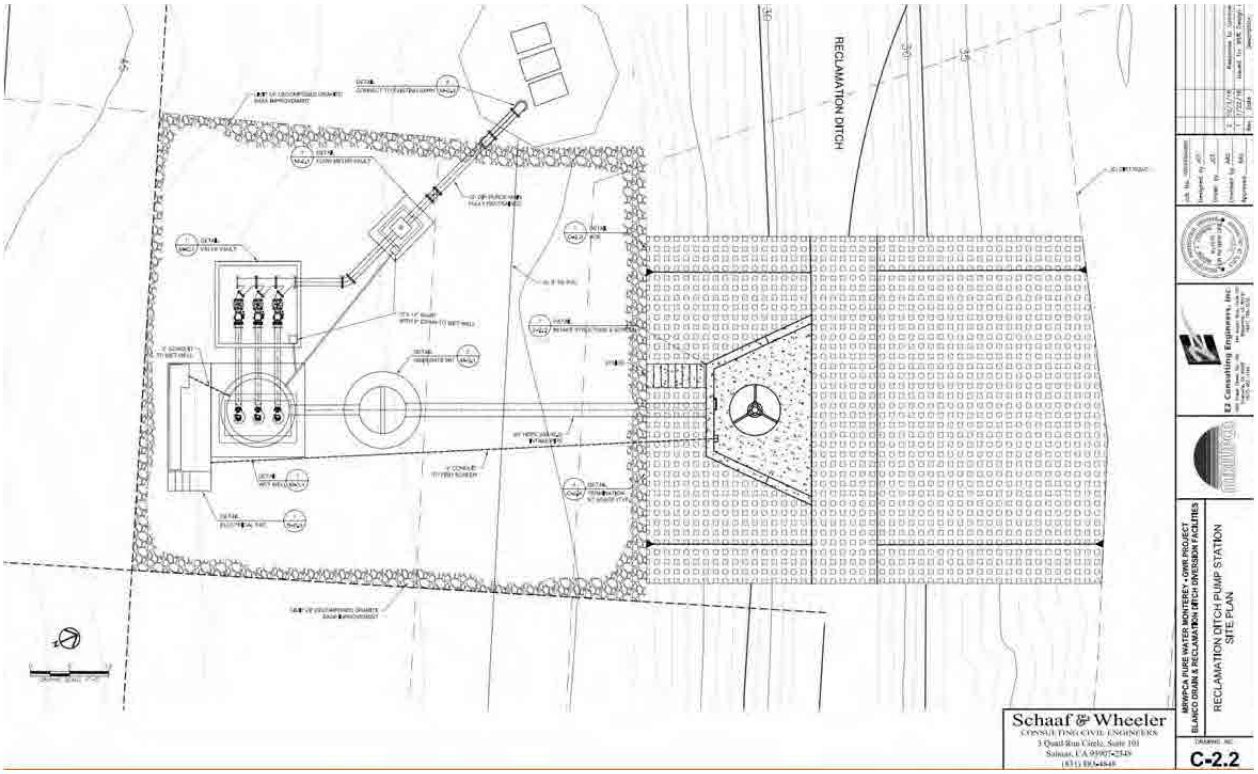

Figure 3-11. Design plan of the Reclamation Ditch diversion facility at Davis Road.

The proposed Reclamation Ditch Diversion site is shown in relation to Waters of the U.S. is shown in detail in **Figure 3-12**.

Figure 3-12. Waters of the United States near the Reclamation Ditch Diversion Site

Flow metering

The proposed diversion system will include a magnetic flow meter on the pipeline connecting the pump station to the gravity sewer. This type of meter is recommended because it has no parts inside the pipe which might be damaged by sediments in the water, and is accurate to plus or minus 0.5%. The meter will be capable of outputting the instantaneous flow rate, and totalizing the cumulative flow. The meter register will show the cumulative flow in cubic feet. The flow rate and cumulative flow will be transmitted via the Supervisory Control and Data Acquisition (SCADA) system to the system operator at the MRWPCA Regional Treatment Plant for real-time monitoring.

To perform periodic verification of the meter accuracy, there are two methods available to the MRWPCA.

- Method 1 is to install a calibrated clamp-on ultrasonic flow meter on the exposed portion of the pump station discharge pipeline. Depending on the instrument used, there may be room in the meter vault to install a device adjacent to the fixed meter. There is also an exposed segment of the pipeline where it joins the City of Salinas sanitary sewer system. The flow readings between the installed meter and the test meter can be compared to see if the installed meter still meets the accuracy requirement.

- Method 2 is to conduct a pump-down test in the wet well. To do this, the pumps must be turned off so that the wet well fills to a measured level. The weir gate must then be raised above the level of flow in the Reclamation Ditch to prevent additional flow from entering the wet well. The volume of water in the wet wells is estimated as the volume of the wet well plus the volume of the feeder pipe plus the available volume in the weir manhole (equation below). One pump can then be run, and the volume pumped from the well calculated and compared to the meter reading.

  $V = \pi(D_W^2/4)H + \pi(d^2/4)L + ½\, \pi(D_M^2/4)h$

  Where:

  V = Volume pumped
  D_W = diameter of the wet well (nominally 8-ft)
  H = depth of water in wet well
  d = pipe diameter (nominally 15-in)
  L = pipe length
  D_M = diameter of the weir manhole (nominally 6-ft)
  h = depth of water in the weir manhole

The meter vault as well as all access hatches will be locked. Regulatory agency staff wishing to inspect the equipment will need to coordinate access through the MRWPCA operations staff.

Fish screen
Fish screen criteria (listed below) were taken from the NMFS Publications: Fish Screening Criteria for Anadromous Salmonids and Juvenile Fish Screen Criteria for Pump Intakes.

Parameter	**Fry Criteria** (under 2.36″)	**Fingerling Criteria** (2.36″ or longer)
Approach velocity (maximum)	0.33 ft/s	0.8 ft/s
Passive Screen approach velocity (max)	0.2 ft/s	0.2 ft/s
Profile bar screen opening (maximum)	0.0689 in (1.75 mm)	0.25 in (6.35 mm)
Percent open area (minimum)	27%	40%

The fish screen was sized to meet the more stringent Fry criteria, although the proposed diversion location is within a potential migratory corridor and not a spawning and rearing habitat. Using the maximum diversion rate of 6 cfs, the required scree area is calculated as:

A = Q/(V x %Open) = 6 cfs / (0.2 ft/s x %Open)

The proposed screen has a 32% open area (0.125 inch profile bars with 0.06 inch spaces), so the required surface area is 94 sq-ft. The inlet design has two 4-ft by 12-ft screen panels, totaling 96 sq-ft. If the NMFS determines that the fingerling criteria is applicable to this site, the installed screen will use 0.375 inch profile bars with 0.25 inch spaces, resulting in 40% open area. The heavier bars are preferred due to the exposed location.

By-pass flows

Water entering the pump station overflows the adjustable weir gate. To ensure minimum by-pass flows are maintained, the weir gate height will be raised or lowered, depending upon the season. The estimated weir height elevations are tabulated below based on the existing channel dimensions and the existing channel invert elevation of 26.8 feet[14] . Channel slope was obtained from the latest FEMA Flood Insurance Study. The weir gate operating stem will extend to within 12-inches of the lid, so that the system operator can adjust the height without entering the weir manhole.

By-pass target	Weir crest elevation
0.7 cfs	26.94 ft
1.0 cfs	26.97 ft
2.0 cfs	27.06 ft

By-pass flows are measured downstream at USGS stream gage number 11152650, Reclamation Ditch near Salinas, CA, located at San Jon Road. Real-time data for that station is available on-line at http://waterdata.usgs.gov/nwis/uv?site_no=11152650. Stream velocities at the target bypass rates range from 1.3 ft/s to 2 ft/s, so it will take 2 to 3 hours to see the results at the gage, which is 2.65 miles (14,000 feet) downstream. The initial calibration of by-pass weir height settings may take several days to complete, but once established, will only require periodic spot checking.

To protect passage opportunities for migratory fish, the pump station will shut off when flows in the Reclamation Ditch reach 30 cfs, and not restart until the flows decline to 20 cfs. A level sensor (transducer) will be installed in the weir manhole on the channel side of the gate, where the water level is approximately equal to that in the channel. The control PLC will be programmed to shut off the pumps when the water level corresponds to a flow of 30 cfs in the

[14] All elevations use the North American Vertical Datum of 1988 (NAVD88).

channel (initially estimated to be at elevation 28.1), and to allow them to restart when the water level corresponds to a flow of 20 cfs (estimated to be at elevation 27.85 feet). The system will operate similar to a well pump control switch with upper and lower tank elevation limits. Just as with the weir gate settings, the estimated elevations are based on the existing channel dimensions and invert, and will require field calibration to match actual conditions. The initial calibration of the set points may be an iterative process, but once completed, the level settings should not require future adjustment.

Sewer System Shut-Off

The maximum diversion rate of 6 cfs is based upon available conveyance capacity in the City of Salinas sanitary sewer system under peak dry weather flow conditions[15]. The station will include a float switch in the receiving manhole which will shut off the diversion pumping if the sanitary sewer manhole starts to surcharge. The switch will be set at 54-inches above the manhole invert, which is the crown of the gravity sewer pipe.

The receiving sewer is the Davis Road Trunk Sewer, which flows by gravity past the project site and terminates at the MRWPCA Salinas Pump Station, which then pumps the flow to the Regional Treatment Plant. The Salinas Pump Station is monitored and controlled by the MRWPCA through their SCADA system. If the operational staff needs to reduce inflows to the Salinas Pump Station for maintenance or to address peak wet weather flows, they can turn off the Reclamation Ditch diversion remotely through the SCADA system.

Reporting

The MRWPCA/MCWRA will submit annual diversion reports to the SWRCB documenting the monthly volumes of water diverted from the Reclamation Ditch, using the appropriate forms or the eWRIMS reporting system. If required, daily pumping data can be captured from the SCADA system and submitted as a report table.

By-pass flows can be verified using the USGS stream gage records for Station 11152650. MRWPCA will prepare and submit an annual report to the SWRCB documenting compliance with the by-pass requirements. The report will include a data table listing the mean daily flow at the USGS stream gage, the daily status of the diversion pump station (operating or not operating) and the daily diversion volume. On days when the gaged flow is below the minimum by-pass flow (0.7, 1.0 or 2.0 cfs) or above the fish passage condition flow (30 cfs), the pump station should not operate. The annual report will address any variances, including days where the station operated for only a portion of the day in response to rising or declining flows. The report will also verify that the station did not restart after a fish passage condition is no longer in effect, specifically, when the in-stream flow declines to 20 cfs.

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[15] Reclamation Ditch Yield Study, page 9.

3.2.6 Project Construction Schedule

The GWR Project is expected to be producing water by 2018. A schedule for the project construction of the key components of concern for NOAA NMFS, including dewatering activities highlighted with a red box, can be found in **Table 3-9**, below.

3.2.7 Avoidance and Minimization Measures and Water Rights Terms and Conditions

Table 3-10 provides a summary of the relevant avoidance and minimization measures that were approved for implementation within the Mitigation Monitoring and Reporting Program by the MRWPCA during their approval of the GWR Project on October 8, 2015. See Appendix C. In addition to these measures, the proposed terms and conditions of the water right permits which were adopted by the local agencies in June 2016 are included following Table 3-10. These terms and conditions are considered to be a part of the Proposed Action because MRWPCA has committed to implement them in their approval of the GWR Project and its approval of the protest resolution terms and conditions in June 2016. See Appendix M.

Table 3-9 Key Components of Project Construction Schedule *(note: work in an near waterbodies would be restricted to June through November in accordance with Avoidance and Minimization (Mitigation) Measure Bf-1a for S-CCC Steelhead)*

Project Component	General Construction Activities	2016							2017													2018		
		J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
Reclamation Ditch Diversion																							
Including pipes, wet wells/diversion structures, valves, SCADA	Site preparation and Demolition												X										
	Pipeline Trenching and Installation													X	X								
	Bypass Flow Diversion														X	X	X						
	Excavate/form/cast wet well and intake structure														X	X	X						
	Install valves/Gates in wet well and intake structures																	X					
	Install electrical and controls																	X					
	Start-up and testing																	X					
	Site Paving																X						
Blanco Drain Diversion and Pipeline																							
Including pipes, wet wells/diversion structures, valves, SCADA	Site preparation and Demolition											X											
	Bypass Flow Diversion															X	X	X	X				
	Excavate/form/cast wet well and intake structure																X	X	X				
	Gravity Pipeline Trenching and Installation											X	X	X									
	Salinas River Crossing														X	X							
	Install gravity pipeline to RTP															X	X	X					
	Install valves/Gates in wet well and intake structures																		X				
	Install pumps, electrical and controls																	X	X				
	Start-up and testing																			X			
	Site Paving																		X				

Table 3-10. Avoidance and Minimization Measures (Adopted Mitigation Measures) related to Fisheries

Impacts	Avoidance and Minimization Measures (Adopted Mitigation Measures)	Applicable Components
Impact BF-1: Habitat Modification Due to Construction of Diversion Facilities	**Mitigation Measure BF-1a**: **Construction during Low Flow Season**. Implement Mitigation Measure BT-1a.Conduct construction of diversion facilities, including the directional drilling under the Salinas River, during periods of low flow outside of the SCCC steelhead migration periods, i.e. between June and November, which would be outside of the adult migration period from December through April and outside of the smolt migration period from March through May.	Reclamation Ditch & Blanco Drain Diversions
	Mitigation Measure BF-1b: Relocation of Aquatic Species during Construction. Conduct pre-construction surveys to determine whether tidewater gobies or other fish species are present, and if so, implement appropriate measures in consultation with applicable regulatory agencies, which may include a program for capture and relocation of tidewater gobies to suitable habitat outside of work area during construction. Pre-construction surveys shall be consistent with requirements and approved protocols of applicable resource agencies and performed by a qualified fisheries biologist.	Reclamation Ditch Diversion
	Mitigation Measure BF-1c: Tidewater Goby and Steelhead Impact Avoidance and Minimization. To ensure compliance with the federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA), consultation with NFMS/NOAA, USFWS, and CDFW shall be conducted as required, and any necessary take permits or authorizations would be obtained. If suitable habitat for tidewater goby (Tembladero Slough) and steelhead cannot be avoided, any in-stream portions of each project component (where the Project improvements require in-stream work) shall be dewatered/ diverted. A dewatering/diversion plan shall be prepared and submitted to NMFS, USFWS, and CDFW for review and approval. Specific plan elements are noted below and will be refined through consultation with USFWS, NMFS and CDFW: Required Pre-Construction surveys identified in Mitigation Measure BF-1b shall be consistent with requirements and approved protocol of applicable resource agencies and performed by a qualified fisheries biologist. All dewatering/diversion activities shall be monitored by a qualified fisheries biologist. The fisheries biologist shall be responsible for capture and relocation of fish species out of the work area during dewatering/diversion installation. The project proponents shall designate a qualified representative to monitor on-site compliance of all avoidance and minimization measures. The fisheries biologist shall have the authority to halt any action which may result in the take of listed species. Only USFWS/NMFS/CDFW-approved biologists shall participate in the capture and handling of listed species subject to the conditions in the Incidental Take Permits as noted above. No equipment shall be permitted to enter wetted portions of any affected drainage channel. All equipment operating within streams shall be in good conditions and free of leaks. Spill containment shall be installed under all equipment staged within stream areas and extra spill containment and clean up materials shall be located in close proximity for easy access. Work within and adjacent to streams shall not occur between November 1 and June 1 unless otherwise approved by NMFS and the CDFW. If project activities could degrade water quality, water quality sampling shall be implemented to identify the pre-project baseline, and to monitor during construction for comparison to the baseline. If water is to be pumped around work sites, intakes shall be completely screen with wire mesh not larger than five millimeters to prevent animals from entering the pump system. If any tidewater goby or steelhead are harmed during implementation of the project, the project biologist shall document the circumstances that led to harm and shall determine if project activities should cease or be altered in an effort to avoid further harm to the species.	Reclamation Ditch Diversion

Table 3-10. Avoidance and Minimization Measures (Adopted Mitigation Measures) related to Fisheries

Impacts	Avoidance and Minimization Measures (Adopted Mitigation Measures)	Applicable Components
	Water turbidity shall be monitored by a qualified biologist or water quality specialist during all instream work. Water turbidity shall be tested daily at both an upstream location for baseline measurement and downstream to determine if project activities are altering water turbidity. Turbidity measures shall be taken within 50 feet of construction activities to rule out other outside influences. Additional turbidity testing shall occur if visual monitoring indicates an increased in turbidity downstream of the work area. If turbidity levels immediately downstream of the project rise to more than 20 NTUs (Nephelometric Turbidity Units) above the upstream (baseline) turbidity levels, all construction shall be halted and all erosion and sediment control devices shall be thoroughly inspected for proper function, or shall be replaced with new devices to prevent additional sediment discharge into streams. The above mitigation is subject to review and approval for CESA and FESA requirements by approving agencies as identified above and may be modified to further reduce, avoid or minimize impacts to species.	
Impact BF-2: Interference with Fish Migration	**Mitigation Measure BF-2a: Maintain Migration Flows.** Implement BF-1a, BF-1b, and BF-1c. Operate diversions to maintain steelhead migration flows in the Reclamation Ditch based on two criteria – one for upstream adult passage in Jan-Feb-Mar and one for downstream juvenile passage in Apr-May. For juvenile passage, the downstream passage shall have a flow trigger in both Gabilan Creek and at the Reclamation Ditch, so that if there is flow in Gabilan Creek that would allow outmigration, then the bypass flow requirements, as measured at the San Jon Gage of the Reclamation Ditch, shall be applied (see Hagar Environmental Science, *Estimation of Minimum Flows for Migration of Steelhead in the Reclamation Ditch*, February 27, 2015, in Appendix G-2, of the Draft EIR and Schaaf & Wheeler, *Fish Passage Analysis: Reclamation Ditch at San Jon Rd. and Gabilan Creek at Laurel Rd.* July 15, 2015 in Appendix CC of this Final EIR). If there is no flow in Gabilan Creek, then only the low flow (minimum bypass flow requirement as proposed in the project description) shall be applied, and these flows for the dry season at Reclamation Ditch as measured at the San Jon USGS gage shall be met. *Note: If there is no flow gage in Gabilan Creek, then downstream passage flow trigger shall be managed based on San Jon Road gage and flows. Alternately, as the San Jon weir located at the USGS gage is considered a barrier to steelhead migration and the bypass flow requirements have been developed to allow adult and smolt steelhead migration to have adequate flow to travel past this obstacle, if the weir were to be modified to allow steelhead passage, the mitigation above would not have to be met. Therefore, alternate Mitigation Measure BF-2a has been developed, as follows:* **Mitigation Measure Alternate BF-2a**: **Modify San Jon Weir.** Construct modifications to the existing San Jon weir to provide for steelhead passage. Modifications could include downstream pool, modifications to the structural configuration of the weir to allow passage or other construction, and improvements to remove the impediment to steelhead passage defined above. The above mitigation is subject to compliance with CESA and FESA and appropriate approving agencies may modify the above mitigation to further reduce, avoid, or minimize impacts to species.	Reclamation Ditch Diversion

Table 3-10. Avoidance and Minimization Measures (Adopted Mitigation Measures) related to Fisheries

Impacts	Avoidance and Minimization Measures (Adopted Mitigation Measures)	Applicable Components
Impact BT-1: Construction Impacts to Special-Status Species and Habitat	**Mitigation Measure BT-1a: Implement Construction Best Management Practices**. The following best management practices shall be implemented during all identified phases of construction (i.e., pre-, during, and post-) to reduce impacts to special-status plant and wildlife species: A qualified biologist must conduct an Employee Education Program for the construction crew prior to any construction activities. A qualified biologist must meet with the construction crew at the onset of construction at the site to educate the construction crew on the following: 1) the appropriate access route(s) in and out of the construction area and review project boundaries; 2) how a biological monitor will examine the area and agree upon a method which would ensure the safety of the monitor during such activities, 3) the special-status species that may be present; 4) the specific mitigation measures that will be incorporated into the construction effort; 5) the general provisions and protections afforded by the USFWS and CDFW; and 6) the proper procedures if a special-status species is encountered within the site. Trees and vegetation not planned for removal or trimming shall be protected prior to and during construction to the maximum extent possible through the use of exclusionary fencing, such as hay bales for herbaceous and shrubby vegetation, and protective wood barriers for trees. Only certified weed-free straw shall be used, to avoid the introduction of non-native, invasive species. A biological monitor shall supervise the installation of protective fencing and monitor at least once per week until construction is complete to ensure that the protective fencing remains intact. Protective fencing shall be placed prior to and during construction to keep construction equipment and personnel from impacting vegetation outside of work limits. A biological monitor shall supervise the installation of protective fencing and monitor at least once per week until construction is complete to ensure that the protective fencing remains intact. Following construction, disturbed areas shall be restored to pre-construction contours to the maximum extent possible and revegetated using locally-occurring native species and native erosion control seed mix, per the recommendations of a qualified biologist.	All components
Impact BT-1: Construction Impacts to Special-Status Species and Habitat (continued)	Grading, excavating, and other activities that involve substantial soil disturbance shall be planned and carried out in consultation with a qualified hydrologist, engineer, or erosion control specialist, and shall utilize standard erosion control techniques to minimize erosion and sedimentation to native vegetation (pre-, during, and post-construction). No firearms shall be allowed on the construction sites at any time. All food-related and other trash shall be disposed of in closed containers and removed from the project area at least once a week during the construction period, or more often if trash is attracting avian or mammalian predators. Construction personnel shall not feed or otherwise attract wildlife to the area. To protect against spills and fluids leaking from equipment, the project proponent shall require that the construction contractor maintains an on-site spill plan and on-site spill containment measures that can be easily accessed. Refueling or maintaining vehicles and equipment should only occur within a specified staging area that is at least 100 feet from a waterbody (including riparian and wetland habitat) and that has sufficient management measures that will prevent fluids or other construction materials including water from being transported into waters of the state. Measures shall include confined concrete washout areas, straw wattles placed around stockpiled materials and plastic sheets to cover materials from becoming airborne or otherwise transported due to wind or rain into surface waters. The project proponent and/or its contractors shall coordinate with the City of Seaside on the location of Injection Well Facilities and the removal of sensitive biotic material.	

Table 3-10. Avoidance and Minimization Measures (Adopted Mitigation Measures) related to Fisheries

Impacts	Avoidance and Minimization Measures (Adopted Mitigation Measures)	Applicable Components
Impact HS-4: Operational Surface Water Quality Impacts due to Source Water Diversions	**Mitigation Measure HS-4**: **Management of Surface Water Diversion Operations**. Rapid, imposed water-level fluctuations shall be avoided when operating the Reclamation Ditch Diversion pumps to minimize erosion and failure of exposed (or unvegetated), susceptible banks. This can be accomplished by operating the pumps at an appropriate flow rate, in conjunction with commencing operation of the pumps only when suitable water levels or flow rates are measured in the water body. Proper control shall be implemented to ensure that mobilized sediment would not impair downstream habitat values and to prevent adverse impacts due to water/soil interface adjacent to the Reclamation Ditch and Tembladero Slough. During planned routine maintenance at the Reclamation Ditch Diversion, maintenance personnel shall inspect the diversion structures within the channel for evidence of any adverse fluvial geomorphological processes (for example, undercutting, erosion, scour, or changes in channel cross-section). If evidence of any substantial adverse changes is noted, the diversion structure shall be redesigned and the project proponents shall modify it in accordance with the new design.	Reclamation Ditch Diversion

Water Rights Protest Resolution Terms

1. MCWRA, MRWPCA, and Water Management District will abide by the following terms and commitments in regards to the Blanco Drain Diversion (Water Rights Application 32263A):

(a) Between April 1 and October 31 of years when the Salinas River Diversion Facility has not operated under the terms of Water Rights Permits 10137, 12261 and 21089; and when the Salinas River Lagoon is closed to the ocean, MCWRA shall:

i. Monitor and provide the SWRCB Division of Water Rights, CDFW, and NMFS monthly reports on the average daily water levels in the Salinas River Lagoon and the operational characteristics of the slide gate between the lagoon and the Old Salinas River channel. Monthly reports shall include the following:

- Water elevation in the lagoon (daily mean, referenced to NGVD29).
- Dates of when the slide gate to the Old Salinas River (OSR) was closed versus opened.
- Size of slide opening (inches) and estimated flows released to OSR when flow is required (daily mean, cfs).

ii. Maintain lagoon water surface elevation and provide flows to the Old Salinas River channel by adhering to the following two conditions:

a. If the water level in the Salinas Lagoon drops below 3.0 feet NGVD29 (or the then-current lagoon water surface elevation management requirement) for seven (7) consecutive days, then cause MRWPCA to limit Blanco Drain diversions to flows above 2.0 cubic feet per second (cfs) (or to provide an alternative source of 2 cfs to the lagoon that does not currently exist, if not prohibited by other regulations) until the lagoon water surface elevation increases to a minimum of 3.2 feet NGVD29 or until October 31 whichever occurs first.

b. If the slide gate between the Salinas Lagoon and the Old Salinas River channel has been closed for more than seven (7) consecutive days, adjust the slide gate to allow 0.5 to 1.0 cfs of Salinas Lagoon water to flow into the Old Salinas River Channel and cause MRWPCA to limit Blanco Drain diversions to flows above 2.0 cfs (or to provide an alternative source of 2 cfs that does not currently exist, if not prohibited by other regulations) until the lagoon water surface elevation reaches 3.2 feet NGVD29 or until October 31 whichever occurs first.

(b) MCWRA will cause MRWPCA to commit to monitoring water quality of diverted water as required by the SWRCB and Regional Water Quality Control Board for construction activities and during operations.

(c) MCWRA will cause MRWPCA to commit to including a flow meter and totalizer on the Blanco Drain diversion.

2. MCWRA, MRWPCA, and Water Management District will abide by the following terms and commitments in regards to the Reclamation Ditch Diversion (Water Rights Application 32263B):

(a) MCWRA will cause MRWPCA to commit to divert no more than 6 cfs under the Reclamation Ditch diversion water right and those diversions would be subject to the following minimum bypass flows (as measured at the USGS San Jon Road Gage and as available):

i. Bypass a minimum of 2.0 cfs, as available, from December 1 through May 31 (in-and out-migration period) except as allowed by item iii, below.

ii. Bypass a minimum of 1.0 cfs, as available, from June 1 through June 30 (transitional period).

iii. Bypass a minimum of 0.7 cfs, as available, from July 1 through November 30 (non-migration period). Note: This bypass minimum applies through the end of February of the following year, if no storm event has occurred that results in a flow of 30 cfs or more at the San Jon Road gage.

(b) To ensure adequate flows for both adult upstream and smolt/kelt downstream migration in the Reclamation Ditch below Davis Road, the MCWRA will cause MRWPCA to commit to cease diverting when flows measured at San Jon Road gage are above 30 cfs (the most conservatively low passage threshold for the San Jon Road USGS gage weir). Diversion may resume when streamflow recedes below 20 cfs at the San Jon Road gage.

(c) Operational decisions will be based on provisional mean daily and real-time USGS stream flow data. Such provisional USGS data used to make flow related diversion decisions may not always coincide with final published USGS data.

(d) The Right Holder shall provide, on a quarterly basis, graphs comparing the daily mean diversion from Reclamation Ditch and the daily mean flow recorded at the San Jon gage downstream of the diversion.

(e) MCWRA and MRWPCA would request technical assistance from NMFS' engineer staff and CDFW staff on the design for the new diversion facility on the Reclamation Ditch.

3.3 Deconstruction of the Proposed Action

NMFS uses a series of sequential analyses to assess the effects of federal actions on endangered and threatened species and designated critical habitat (NMFS 2009b). According to the document titled An Assessment Framework for Conducting Jeopardy Analyses Under Section 7 of the ESA (NMFS 2004a), one of the early steps in NMFS' evaluation process is to "deconstruct" the Proposed Action into its constituent parts. To assist NMFS in its assessment of effects of this action, this BA provides such a "deconstruction." It clearly defines the constituent parts of the Proposed Action that have the potential to affect listed species or critical habitat in the Action Area (i.e., Reclamation Ditch and Salinas River watersheds).

Given the suite of constituent components encompassed by the Proposed Action, as described above in section 3.2, the first step of the deconstruction process is to clearly identify and geographically distinguish the individual components. **Table 3-11** lists the constituent components of the Proposed Action. The constituent components shown in this table include existing Project facilities and changes associated with the Proposed Action. The second step in the deconstruction process is to examine all of the individual components and distinguish between: 1) actions that will have no effects to listed species or their critical habitats; 2) actions that may affect but are not likely to adversely affect listed species or their critical habitats; and 3) actions that may affect listed species or their critical habitat. This BA does not include future actions that will require separate ESA consultations. Discretionary actions in the Action area that are likely to adversely affect listed species or critical habitat are carried forward for further analyses in this BA. Each of these categories of the GWR Project is described below.

Table 3-11 Deconstruction constituent components of the Proposed Action

Component	Subcomponent	Location	Action	Potential Effect	Effect
Source Water	City of Salinas stormwater	Salinas River at Davis Road (RM 11.2)	Divert discharge	Reduce surface flow in Salinas River/ Lagoon[16] improve water quality	May affect, but not likely to adversely affect
	Construction				No effect
	Salinas Agriculture wash water	Salinas Pump Station/ Industrial Wastewater Treatment Facility	Divert from Salinas to ATW	Reduce percolation to Salinas River	May affect but not likely to adversely affect
	Construction				No effect
	Urban/agriculture runoff	Reclamation Ditch	Divert surface runoff to STP	Reduce surface flow in RD and TD and inflow to Old Salinas River and Moss Landing Harbor	May affect but not likely to adversely affect
	Construction				May effect but not likely to adversely affect
	Agricultural land runoff	Blanco Drain	Divert surface flow	Reduce surface flow Salinas River and Salinas River Lagoon	May affect but not likely to adversely affect
	Construction				May Affect but not likely to adversely affect
	Municipal wastewater from ocean outfall to irrigate agricultural land with recycled water	Regional Treatment Plant	Treat and reuse excess	Water Quality in ocean	No effect
	Construction				No effect
Treatment facilities at Regional Treatment Plant	Modify and upgrade facilities	Regional Treatment Plant	Improve, increase treatment capabilities		No effect
	Construction				No effect
Product Water Conveyance	Construction				No effect
Injection well facilities	Construction and operation				No effect

[16] The SVWP is required to maintain minimum bypass flow of 2 cfs to the lagoon as long as SRDF irrigation diversions are occurring or aquifer conservation releases from Nacimiento and/or San Antonio reservoirs are being made to the Salinas River. Reduction in inflow within the Action Area of the Salinas River could decrease minimum flow to the lagoon when the 2 cfs bypass is not required likely during extremely dry years. The terms of water rights protest resolution now include a requirement on the project that only flows over 2 cfs can be diverted in certain conditions (i.e., when the SRDF has not operated during that calendar year, the lagoon is closed to the ocean, and the lagoon levels decline below 3 cfs or if the slide gate between the lagoon and the Old Salinas River is closed for more than seven days).

3.3.1 Actions That Will Have No Effects to Listed Species or Critical Habitats

Consideration in the deconstruction process includes clear identification of components associated actions that will have no effects to listed species or critical habitat. The GWR Project includes components within the Action Area that are conducted in locations that are not occupied by any of the listed species addressed in this BA, and that are not designated as critical habitats. Although these activities will occur within the Action Area, many of them do not have the potential to transmit effects to waterways designated as critical habitat or potentially containing S-CCC steelhead. Such actions include installation of pipelines to transmit water to and from the treatment facilities that would not encroach or cross such waterways or construction of pumping stations or other facilities that are physically isolated from potentially affecting S-CCC steelhead waters or critical habitat (e.g., runoff or spills from site could not reach such waters) (**Table 3-9**).

3.3.2 Discretionary Activities That May Affect but are Not Likely to Adversely Affect Listed Species or Critical Habitat

The "may affect, but is not likely to adversely affect" conclusion is appropriate when effects to the species or critical habitats are expected to be beneficial, discountable, or insignificant.

Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. Construction of facilities physically isolated from waters is included in this category of deconstruction. In addition, although changes to flows and/or water quality in the Action Area may occur, the lack of species presence and the project proponents have now committed to maintain habitat conditions (including flow bypass and other measures to maintain or enhance conditions).

3.3.3 Discretionary Activities that Are Likely to Adversely Affect Listed Species or Critical Habitats

The "is likely to adversely affect" conclusion is appropriate when the species or critical habitats are expected to be adversely affect. If any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or beneficial (see definition of "is not likely to adversely affect").

4.0 THE ACTION AREA

4.1 Definition of Action Area and Adjacent Areas

The Action Area is defined as all areas affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). Direct effects are defined as "the direct or immediate effects of the project on the species or its habitat" (USFWS and NMFS 1998). Indirect effects are defined as "those [effects] that are caused by the Proposed Action and are later in time, but still are reasonably certain to occur" (50 C.F.R. § 402.02).

The GWR Project was determined to have potential direct effects on flow in the Salinas River downstream of Spreckels (RM 11.2 through RM 0) including Salinas River Lagoon, Blanco Drain, Reclamation Ditch downstream of Davis Road, including Tembladero Slough, the Old Salinas River channel, Moss Landing Harbor, and Elkhorn Slough (**Figures 4-1 and 4-2**).

4.2 Salinas River Basin

4.2.1 Salinas River

The GWR Project involves diversions that will affect surface flow in the vicinity of Davis Road. In addition, a larger magnitude change in surface flow would occur where Blanco Drain currently empties into the Salinas River, near the SRDF. Based on the potential effect of the GWR Project within the Salinas River, the Action Area of the Salinas River extends from near Davis Road to the Salinas River Lagoon. In addition, NMFS staff has indicated that potential changes to the Salinas River Lagoon may also indirectly affect the Old Salinas River channel and thus, the Salinas River Lagoon and the Old Salinas River channel are shown as part of the Action Area on **Figures 4.1 and 4.2**.

The Salinas River flows approximately 184 miles north/northwest from its headwaters in the Santa Lucia and La Panza Mountain Ranges in San Luis Obispo County, through the Salinas Valley and reaches the Monterey Bay near Castroville. With a drainage area of approximately 4,240 square miles, the Salinas River watershed is the largest in the central California coast area. Minor tributaries to the Salinas River include Santa Margarita Creek, Trout Creek, Tassajero Creek, Atascadero Creek, Santa Rita Creek, Paso Robles Creek, Jack Creek, Huerhuero Creek, San Juan Creek, and Big Sandy Creek. Major tributaries include the Estrella River, the Nacimiento River, the San Antonio River, San Lorenzo Creek, and the Arroyo Seco River.

The Salinas River is a managed river system, influenced by flow regulation from upstream dams, levees, and land use on the adjacent floodplains. Construction of Nacimiento and San Antonio dams in 1957 and 1965, respectively, altered the natural hydrology of the Salinas River to provide flood protection and aquifer recharge (and recreation, although this was not a primary purpose of the dams) (MCWRA 2001). Additionally, the upper 110 mi of the Salinas River are controlled by the Santa Margarita Dam (RM 154, constructed in 1942), which impounds 4,000 ac-ft. and forms Santa Margarita Lake (MCWRA 2012, 2013).

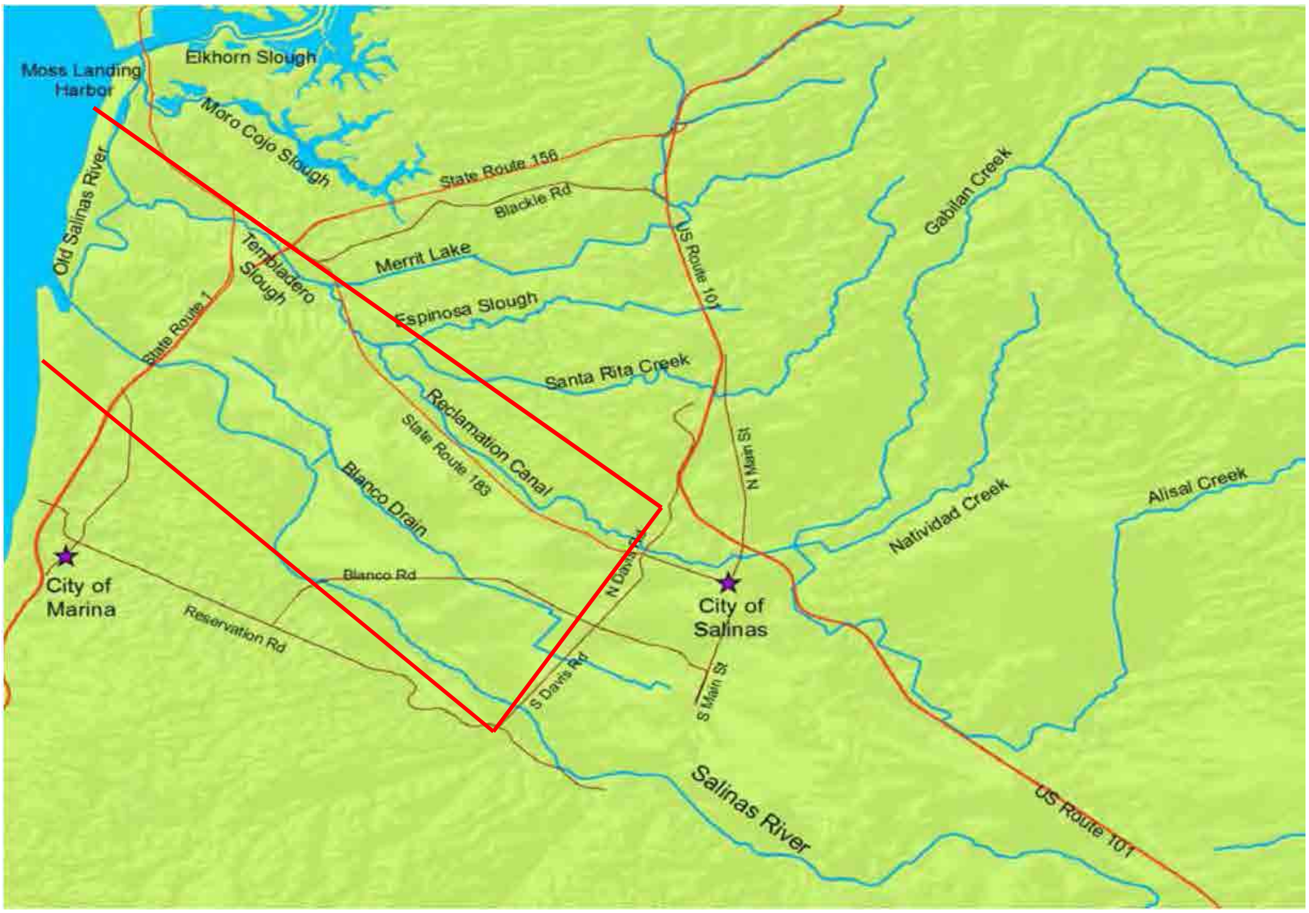


Figure 4-1. Salinas River Watershed and Action Area in GWR Project Vicinity

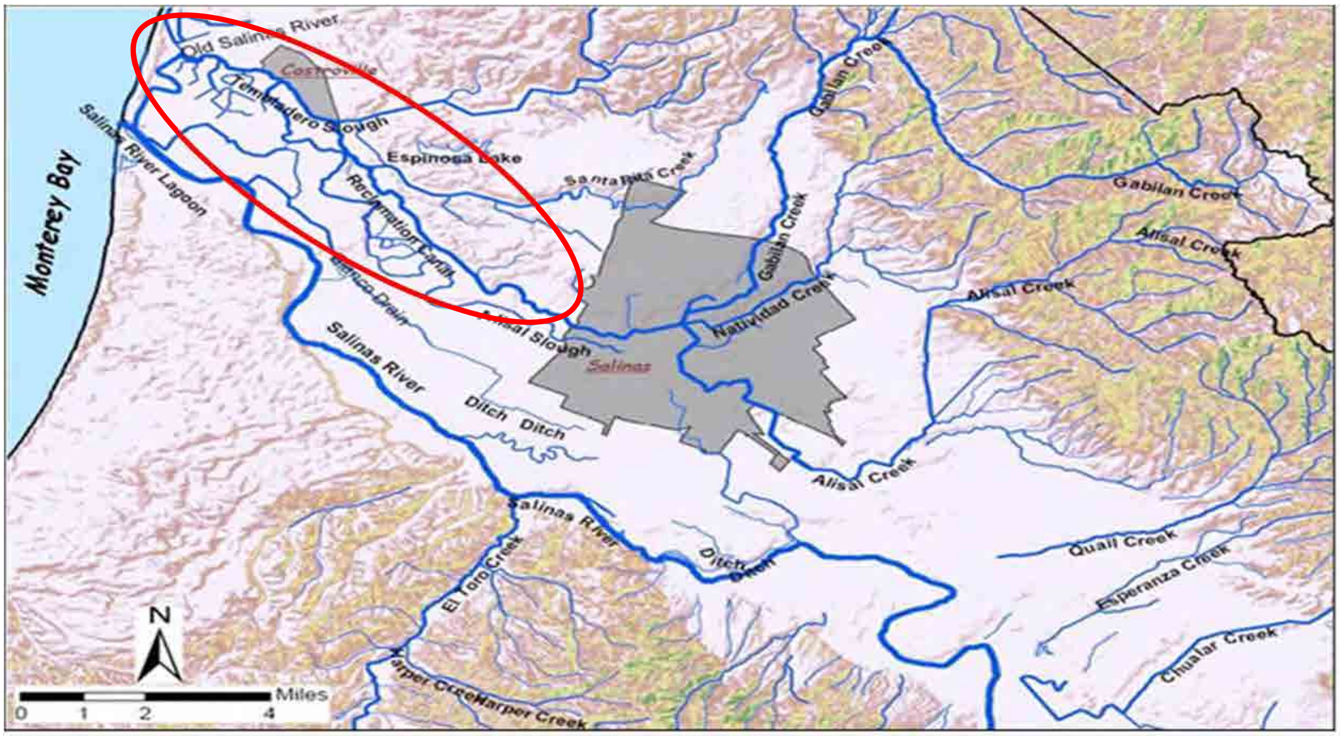


Figure 4-2. Reclamation Ditch Watershed in the GWR Project Vicinity

The Salinas River is roughly divided into two reaches based on the channel morphology. The lower 21 miles of river generally has a more narrow channel top width, typically about 500 to 1,000 ft., than the upper 73 miles of river. The Salinas River channel bed and banks are sand dominated along both reaches. The bed-form is usually plane-bed (i.e., relatively flat with little vertical oscillation in the bed topography) or low amplitude dune-ripples. Channel banks are usually well-vegetated, with widely varying amounts of vegetation growing on bars and the channel bottom.

The SRDF located at RM 4.8 is a diversion to supply surface waters to the Castroville Seawater Intrusion Project's non-potable agricultural irrigation system. The SRDF operates April 1-October 31. The dam has pneumatically controlled interlocking steel gates that span the width of the river; the height of the spillway gate is controlled by inflatable bladders (NMFS 2007). When in operation the dam will maintain upstream water surface elevation of the impoundment and a total operational storage volume of the impoundment is approximately 108 ac-ft. The SRDF includes a fish passage system with intake screens and fish ladders that comply with NMFS and California Department of Fish and Wildlife (CDFW) criteria (NMFS 2007).

Non-native species have been spreading pervasively in the Salinas River Watershed. The watershed has an infestation of *Arundo donax* (Giant reed) which provides little shading in the stream, and can lead to increased water temperatures and reduced habitat quality for aquatic wildlife (MCWRA 2013b).

Habitat conditions in the Lower Salinas River are generally not suitable for steelhead spawning or rearing. The substrate is primarily sand throughout and gravel is only a minor component (suitable gravel substrate is available only upstream of King City). Before Nacimiento and San Antonio Reservoirs were constructed, the Salinas River had little or no flow during most years (NMFS 2007). Even with present operations and release of water from the reservoirs throughout the summer, water temperature is reportedly too high for rearing juveniles (MCWRA 2001, NMFS 2007, MCWRA 2010, 2011, 2012, 2013, 2014). Steelhead populations spawning in the Arroyo Seco or in other tributaries to the Salinas River use the lower Salinas River as a migration corridor only. Low stream flow in the Salinas River may result in areas that are too shallow for fish to pass. Based on an assessment conducted by Dettman (1988), NMFS (2007) reported the Arroyo Seco River had the potential to support an estimated run of a few thousand steelhead.

4.2.2 Salinas River Lagoon

Habitat conditions in the Salinas River Lagoon are generally poor, but could potentially support S-CCC steelhead rearing[17]. When the river mouth is open, the Salinas River Lagoon is tidally influenced and sustains saltwater conditions. When the river mouth is closed, the Salinas River Lagoon is typically fresh with marginal water quality conditions. HES (2014) reported seasonal and longitudinal changes in salinity and other water quality conditions in 2013 when inflow to the Salinas River Lagoon was consistently greater than 14 cfs. Salinity decreased moving from the ocean to the upstream extent of the Salinas River Lagoon, while temperature distribution showed an opposite distribution. Prior to implementation of the bypass requirements established for the SVWP in the NMFS BO (2007), inflow to the Salinas River Lagoon was restricted to agriculture and industrial runoff into the lowermost Salinas River (lower 12 miles) and during storm events. The Salinas River Lagoon was known to have poor salmonid rearing conditions that reflected the timing of sandbar breaching and the magnitude and quality of freshwater inflow. Typically, salinity stratification and elevated temperatures and low dissolved oxygen levels yielded unsuitable juvenile rearing habitat. As such, the Salinas River Lagoon has been primarily a migration corridor for adult and juvenile steelhead.

4.2.3 Blanco Drain

The GWR Project will divert water from Blanco Drain that currently enters the Salinas River near the SRDF. Per above, the reduction in Salinas River flow at the current point of discharge of Blanco Drain into the Salinas River represents the largest potential reduction in flow from the project in the Salinas River. As such, Blanco Drain is included in the Action Area of this BA.

The Blanco Drain is a man-made reclamation ditch draining approximately 6,400 acres of agricultural lands near Salinas, CA. The watershed is between the Salinas River and Alisal Slough, and discharges to the Salinas River at RM 5. Summer flows are predominantly

[17] Fish surveys conducted in 2013 showed presence of steelhead in the lagoon throughout the year as one steelhead was collected during each of four seasonal surveys (HES 2014).

agricultural tile drainage. Irrigation supply is predominantly groundwater from the Pressure Subarea of the SVGB. A portion of the area tributary to the Blanco Drain is within the Castroville Seawater Intrusion Project (CSIP) service area. The CSIP supplies growers with recycled water from the Salinas Valley Reclamation Plant (SVRP), next to the MRWPCA RTP, and Salinas River water diverted at the MCWRA SRDF. MCWRA operates a pump during the summer to discharge the drain water to the Salinas River. Winter flows also include storm water runoff. A headwall and flap gate at the lower end of the ditch system prevents seasonal high flows in the Salinas River and the SRDF backwater effect from migrating up the Blanco Drain channel.

The SWRCB and the USEPA have listed Blanco Drain as an impaired water body pursuant to Section 303(d) of the Clean Water Act for pesticides, nitrate and low dissolved oxygen. Aquatic habitats within the Blanco Drain system are poor (**Figure 4-3)**. In addition to the poor water quality, the system is generally maintained as a drainage canal without vegetation or tree canopy, and the flap gate prevents fish passage during periods of high flow in the Salinas River.

The adjacent agricultural lands are used for growing table crops (leafy greens, berries and artichokes). The growers prevent vegetation from establishing along the Blanco Drain banks to discourage birds and rodents from nesting near their fields. In the BO for the Salinas Valley Water project, NMFS noted: "The outlet culvert of the Blanco Drain, where the drain enters the Salinas River, has a flap gate on its downstream end, preventing fish passage in Blanco Drain. Even if the flap gate fails and some fish are able to enter the drain, current water quality conditions are such that survival is not likely".

Figure 4-3. Blanco Drain

4.3 Reclamation Ditch

The GWR Project will divert surface flow from Reclamation Ditch. The reduction in surface flow in Reclamation Ditch can affect fish passage downstream of the diversion as well as conditions within Tembladero Slough, Old Salinas River, and Moss Landing Harbor. The Action Area within Reclamation Ditch extends from the GWR Project diversion site at Davis Road downstream to Moss Landing Harbor through the Potrero Tide Gates.

The Reclamation Ditch watershed is approximately 157 square miles with headwaters in the Gabilan Range above Salinas and discharging into the Tembladero Slough then to the Old Salinas River just upstream from Moss Landing Harbor (Casagrande and Watson 2006a,b) **(Figure 4-2)**. The lower watershed areas were formerly low lying areas with seasonal lakes, swamps, and wetland. Much of the middle and lower watershed channels have been altered for drainage and conveyance of flood flows. The watershed has five main tributaries including Gabilan Creek, Natividad Creek, Alisal Creek, Santa Rita Creek and the Merritt Lake drainage. Gabilan, Natividad, and Alisal Creeks converge at Carr Lake, a seasonal lake in the center of Salinas, and the outlet from Carr Lake forms the head of the Reclamation Ditch (**Figure 4-2**). During the growing season the Carr Lake bed is used for agricultural production (Casagrande and Watson 2006a,b).

5.0 STATUS OF THE SOUTH-CENTRAL CALIFORNIA COAST STEELHEAD DISTINCT POPULATION SEGMENT AND CRITICAL HABITAT

5.1 ESA Status

Based on results of NMFS' comprehensive status review of all West Coast steelhead populations (Busby et al. 1996), on August 9, 1996, NMFS proposed listing S-CCC steelhead populations as a threatened Evolutionarily Significant Unit (ESU) (61 FR 56138). An ESU is composed of a group of conspecific populations that are substantially reproductively–isolated from other conspecific populations, and that possess important elements of the evolutionary legacy of the species which are expressed genetically and phenotypically that have adaptive value (56 FR 224, Waples 1998, 1995, 1991a, 1991b). The S-CCC steelhead ESU was formally listed as threatened on August 18, 1997 (62 FR 43937). The original ESU boundaries during the first listing of 1997 were from the Pajaro River (Monterey County) south to (but not including) the Santa Maria River (San Luis Obispo County). During the time between the initial listing and a subsequent re-listing in 2006, NMFS adopted the DPS designation for S-CCC steelhead to replace the ESU designation to be consistent with the listing policies and practices of the U. S. Fish and Wildlife Service. A DPS designation (61 FR 4722) uses similar but slightly different criteria from the ESU designation for determining when a group of organisms constitutes a DPS under the ESA. A DPS is a population or group of populations that is discrete from other populations of the same taxon, and significant to its taxon. A group of organisms is discrete if it is "markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, and behavioral factors.'' While a group of organisms is discrete if it is "markedly separated from other populations of the same taxon" it does not have to exhibit reproductive isolation under the DPS designation.

Following a subsequent status review of West Coast steelhead populations in 2005 (Good et al. 2005), a final listing determination for the threatened S-CCC steelhead DPS was issued on January 5, 2006 (71 FR 834).

The final designation for the S-CCC steelhead DPS encompasses all naturally spawned steelhead between the Santa Maria River (inclusive) and the U.S.-Mexico border. Consequently, this DPS includes only those *O. mykiss* whose freshwater habitat occurs below impassible barriers, whether artificial or natural, and which exhibit an anadromous life history. Individuals that have originated in freshwater above impassable barriers and exhibit an anadromous life history are also considered as part of the DPS when they are within waters below the most downstream impassable barriers.

5.2 Designated Critical Habitat

The ESA requires NMFS to designate critical habitat for all listed species. Critical habitat is defined as specific areas where physical or biological features essential to the conservation (recovery) of the species exist and may require special management considerations or protection. These physical or biological features can be viewed as the set of habitat characteristics or conditions that are the end goal of many recovery actions.

Section 3 of the ESA (16 U.S.C. 1532(5)) defines critical habitat as:

- The specific areas within the geographical area occupied by the species, at the time it is listed on which are found those physical or biological features:
    - essential to the conservation of the species, and
    - which may require special management considerations or protection.
- The specific areas outside the geographical area occupied by the species at the time it is listed.

Critical habitat for S-CCC steelhead was initially designated in February 2000 (65 FR 7764). The critical habitat designation for the S-CCC steelhead DPS was reaffirmed on September 2, 2005 (70 FR 52488). A total of 1,240 miles of stream habitat and 3 square miles of estuarine habitat were designated as critical habitat from the 28 watersheds within the range of this DPS. Critical habitat for the S-CCC steelhead DPS includes most, but not all, occupied habitat from the Pajaro River in Monterey County to Arroyo Grande Creek in southern San Luis Obispo County, but excludes some occupied habitat based on economic considerations and all military lands with occupied habitat. The stream channels with designated critical habitat are listed in 70 FR 52488

When designating critical habitat, NMFS considers certain habitat features called "Primary Constituent Elements" (PCEs) that are essential to support one or more life history stage(s) of the listed species (50 CFR 424.12b). PCEs considered essential for the conservation of the S-CCC steelhead DPS are those sites and habitat components that support one or more life stages and contain physical or biological features essential to survival, growth, and reproduction. These PCEs include:

- Freshwater spawning sites with sufficient water quantity and quality as well as adequate substrate (i.e., spawning gravels of appropriate sizes) to support spawning, incubation and early development.
- Freshwater rearing sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and allow development and mobility; sufficient water quality to support growth and development; food and nutrient resources such as terrestrial and aquatic invertebrates and forage fish; and natural cover such as shade, submerged and overhanging large wood, log jams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- Freshwater migration corridors free of obstruction and excessive risk of predation with adequate water quantity to allow for juvenile and adult mobility; cover, shelter, and holding areas for juveniles and adults; and adequate water quality to allow for survival.

- Estuarine areas that provide uncontaminated water and substrates; food and nutrient sources to support growth and development; and connected shallow water areas and wetlands to conceal and shelter juveniles. Estuarine areas include coastal lagoons that are seasonally stable, predominantly freshwater-flooded habitats that remain disconnected from the marine environment except during high streamflow events, and tidally-influenced estuaries that provide a dynamic shallow water environment.
- Marine areas with sufficient water quality to support growth, development and mobility; food and nutrient resources such as marine invertebrates and forage fish; and nearshore marine habitats with adequate depth, cover and marine vegetation to provide shelter.

5.3 South-Central California Coast Steelhead Distinct Population Segment

5.3.1 Status

The following discussion was primarily taken from the 2007 SVWP BO, which addressed the status of the S-CCC steelhead population and its critical habitat relative to the species' probability of extinction and the conservation value of critical habitat. Several changes in condition, primarily those implemented pursuant to requirements of the BO, have occurred since this discussion was prepared. Additionally, the recovery plan for the S-CCC steelhead was finalized since the BO was prepared (NMFS 2013), which provides some additional discussion of the status of the species and its critical habitat, further detail of stressors on the S-CCC steelhead as well as on the Salinas River as it relates to the DPS. Overall, the following discussion still applies in its description of the general condition of the species and the known stressors and provides an adequate discussion for evaluation of the GWR Project on the DPS and the Salinas River and Reclamation Ditch populations.

In the BO, NMFS described a conceptual model of how the species is surviving given its life history strategy and the condition of its environment. The approach began with the identification of sub-populations within the DPS. Once that was established, NMFS assessed the viability of each sub-population in terms of its abundance, productivity, spatial distribution, and diversity. The recovery plan followed a similar conceptual approach that identified sub populations within biogeographic population groups (BPG) (NMFS 2013). The BPGs were defined based on differing physical characteristics which are considered to have led to life history and genetic adaptations that can enable the populations to persist in widely varying and distinctive habitat regimes encompassing the S-CCC DPS. The purpose of delineating the BPGs is to guide recovery efforts across the S-CCC steelhead Recovery Planning Area to ensure the preservation and recovery of the range of natural diversity of the S-CCC steelhead Recovery Planning Area.

NMFS then evaluated the threats to this viability by identifying stressors to the species, including stressors to primary constituent elements (PCE) of critical habitat, and the sources of those stressors. Analyses were combined to estimate the relative status (current risk of extinction) for each sub-population. The final step in the evaluation is to: 1) conduct a metapopulation analysis using the extinction risk profiles already generated, and 2) describe the current value of critical habitat for the species conservation.

5.3.2 Life History

A brief overview of steelhead life history is provided below. Further detailed information is available in the NMFS Updated Status of Federally Listed Evolutionary Significant Units (ESUs) of West Coast Salmon and Steelhead (Good et al. 2005) and the NMFS final rule listing the S-CCC steelhead DPS (71 FR 834).

Steelhead are anadromous fish, meaning they are born in fresh water, migrate to the ocean where most of their growth occurs, and then eventually return to fresh water to spawn. It is widely acknowledged that steelhead life history strategies are the most variable of all salmonids (Shapovalov and Taft 1954, Barnhart 1986, Busby et al. 1996, McEwan 2001). They usually spend 1 to 3 years in fresh water, 1 to 4 years in the ocean, and then return to fresh water to spawn (McEwan and Jackson 1996). Steelhead are iteroparous, capable of spawning multiple times in their lives, but of the steelhead that spawn multiple times, 70% to 85% spawn only twice (Barnhart 1986).

Adult steelhead migrate to fresh water between November and June, peaking in March. Spawning begins shortly after adult fish reach spawning areas. Steelhead typically select spawning areas at the downstream end of pools, in gravels ranging from approximately 0.5 to 4.5 inches in diameter (Pauley et al. 1986). Fry emerge from their gravel “nests” (redds) in 4 to 8 weeks, depending on temperature. After emergence, fry have poor swimming ability. They move into shallow, low velocity areas in side channels and along channel margins to escape high velocities and predators (Everest and Chapman 1972), and progressively move toward deeper water as they grow (Bjornn and Rieser 1991). Cover is an important habitat component for juvenile steelhead, both as a velocity refuge and as a means of avoiding predation (Shirvell 1990, Meehan and Bjornn 1991). Steelhead, however, tend to use riffles and other habitats not strongly associated with cover during summer rearing more than other salmonids. Young steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles.

After a period of one or more years juvenile steelhead undergo the biological process of "smoltification" in which juvenile salmonids become physiologically adapted for downstream migration and entry into saltwater. Juvenile fish that have undergone smoltification are called smolts. The fish's size and photoperiod are key factors determining the onset of smoltification (Schreck 1982, Raleigh 1984, Bjornn and Rieser 1991). Although smoltification may commence sometime in mid to late winter, juvenile steelhead generally become fully ready to make the migration sometime in spring. In California, the outmigration of steelhead smolts typically begins in March and ends in late May or June (Titus et al. 2002). Snider (1983) states that in the Carmel River, most juvenile steelhead migrate to the ocean between April and June. This is the typical time for the smolt migration of steelhead and salmon in coastal watersheds along the western United States (Busby et al. 1996, Weitkamp et al. 1995).

In addition to transforming into individuals capable of survival in the ocean, younger juveniles or those which have not entered the smolt stage may disperse downstream and rear in mainstem, estuarine, and lagoon habitats. This is thought to be an integral phase of salmonid life history at a time when physiological adaptation, foraging, and refugia from predators are critical (Healey 1982, Simenstad et al. 1982). Because rearing juvenile steelhead often migrate downstream in a search for available habitat (Bjornn 1971), significant percentages of the juvenile population can end up rearing in coastal lagoons and estuaries (Zedonis 1992, Shapovalov and Taft 1954).

5.3.3 Extinction Risk Profiles

The following information was used by NMFS in the SVWP BO as the foundation for determining whether the GWR Project will be expected to reduce appreciably the likelihood of both the survival and recovery of S-CCC steelhead by reducing, either directly or indirectly, the reproduction, numbers, or distribution of that species, or result in the destruction or adverse modification of critical habitat. Extinction risk was defined as the probability of S-CCC steelhead becoming extinct in the wild in the foreseeable future.

The extinction risk analysis was used by NMFS to address conditions of the S-CCC steelhead DPS in their assessment of the effects of the SVWP and ultimately the SVWP BO (NMFS 2007). The evaluation mimics that reported in the S-CCC steelhead recovery plan (NMFS 2013); both derived in part from NMFS (2006), as referenced in (NMFS 2013). Both evaluations have similar discussions of the status of the S-CCC steelhead. In the analysis, NMFS identified sub-populations within the DPS then assessed the population viability of each sub-population in terms of estimated abundance, population growth rate, spatial structure, and diversity. Threats are determined for each sub-population. Threats are defined as stressors that limit the viability of the population and the sources responsible for the creation of those stressors. The combined assessments of population viability and threats are considered the sub-population extinction risk profiles. The assessment establishes the link between threats and their effects on the sub-populations. Each sub-population is ultimately assessed in terms of metapopulation dynamics in order to establish the functional relationship of each sub-population to the overall S-CCC steelhead DPS and provide an extinction risk assessment at the DPS scale.

5.3.3.1 Sub-Populations

In its evaluation of the S-CCC steelhead status in the SVWP BO (NMFS 2007), NMFS defined sub-populations as local, randomly interbreeding groups of individual salmonids. The reason for identifying sub-populations within the S-CCC steelhead DPS is to account for potentially different extinction risks (Cooper and Mangel 1999) within the DPS and to support the overall analysis of risk to the species. The sub-population was defined based on the metapopulation concept described in Cooper and Mangel (1999), where a metapopulation is defined as a group of populations linked by dispersal such that the dispersal affects both the genetics of the sub-populations as well as their abundance and dynamics. It is further suggested in Meffe and Carroll (1997) that a deme is an appropriate conservation unit as they are likely to represent diversity elements within the population as a whole. Since the specific genetic makeup of DPS sub-populations is unknown, NMFS used the following criteria to define sub-populations:

a. Spatial Autonomy: This is expressed through either geographic separation and/or barriers to migration.
b. Ecological Setting: Differences in ecological conditions may include differences in climate (such as annual precipitation) or geology, etc.
c. Historical Context: Small groups or a few individuals may be considered a unique sub-population if they are likely descendants of a robust population that no longer exists (such as with the Nacimiento/San Antonio sub-population). Other individuals sighted sporadically in areas generally considered inhospitable, however (such as in the Estrella watershed), may be considered strays from another sub-population as it is unlikely they represent the vestige of a unique lineage.

These considerations should reflect some degree of local adaptation via differences in selective regimes (Busby et al. 1996, Meffe and Carroll 1997). However, whether they actually represent accurate biological breakpoints should be considered secondary to whether or not they provide a useful means of evaluating the relationships of population units within the DPS as a whole. Within the DPS, coastal drainages differ markedly in ecological setting from interior watersheds due primarily to their smaller size and proximity to coastal climatic influences. This difference combined with the physical distances between the mouths of the inland watersheds (e.g., the Pajaro and Salinas rivers) from those of the other watersheds, as well as the long migration distances within the rivers, represent the most pronounced split in population structure within the DPS. These two major divisions (coastal and interior) are further sub-divided into a total of 12 sub-populations (**Table 5-1 and Figure 5-1**).

Table 5-1 Summary of population viability assessments for the 12 sub-populations in the S-CCC steelhead DPS.

Sub-Population	Abundance	Population Growth Rate	Spatial Structure	Diversity
Carmel River	Intermediate	Negative Trend	Somewhat Reduced	Severely Altered
Big Sur	Intermediate	Stable or Variable	Somewhat Reduced	Retains Some Elements
San Simeon	Low Abundance	Stable or Variable	Highly Fragmented	Severely Altered
Morro Bay	Low Abundance	Negative Trend	Somewhat Reduced	Severely Altered
Pismo Beach	Low Abundance	Negative Trend	Somewhat Reduced	Severely Altered
Salsipuedes	Intermediate	Negative Trend	Somewhat Reduced	Severely Altered
Llagas	Intermediate	Stable or Variable	Highly Fragmented	Retains Some Elements
San Benito	Low Abundance	Negative Trend	Highly Fragmented	Severely Altered
Gabilan	Low Abundance	Negative Trend	Highly Fragmented	Severely Altered
Arroyo Seco	Low Abundance	Stable or Variable	Somewhat Reduced	Severely Altered
San Antonio/ Nacimiento	Low Abundance	Negative Trend	Highly Fragmented	Severely Altered
Upper Salinas	Low Abundance	Negative Trend	Highly Fragmented	Severely Altered
Lower Salinas (Note a)	Unoccupied	Unoccupied	Unoccupied	Unoccupied
Estrella	Unoccupied	Unoccupied	Unoccupied	Unoccupied

Notes:

NMFS assume the Lower Salinas has no sub-population of its own, but supports a lagoon and migration corridor which are occupied by steelhead from other sub-populations

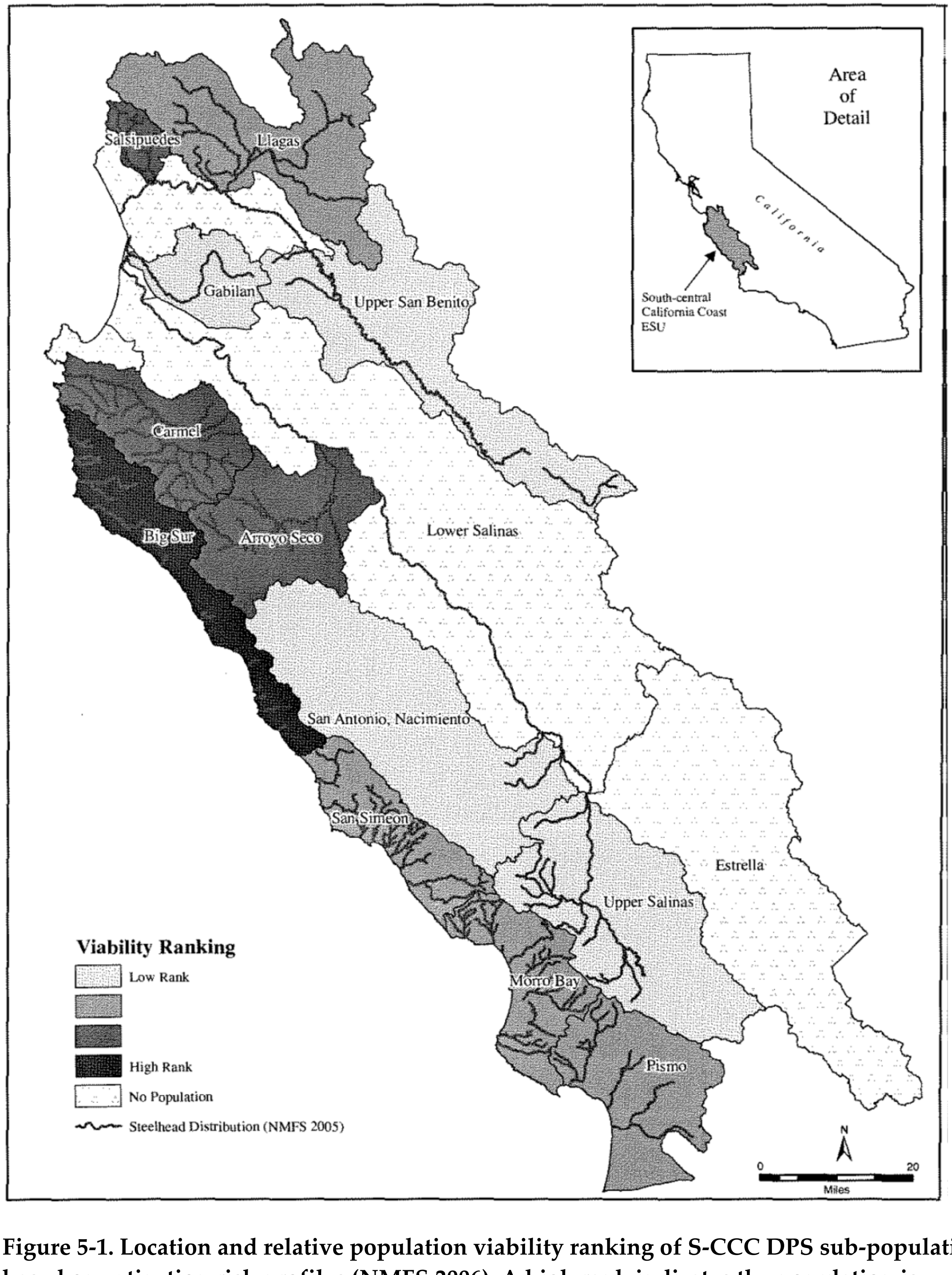


Figure 5-1. Location and relative population viability ranking of S-CCC DPS sub-populations based on extinction risk profiles (NMFS 2006). A high rank indicates the population is currently more viable than those with lower rank. (Source NMFS 2007).

5.3.3.2 *Extinction Risk Profiles*

NMFS (2007, 2013) provides a summary of the extinction risk profiles generated for the 12 sub-populations in the S-CCC steelhead DPS. The assessment is based on current understanding of each sub-population's viability and the threats to that viability. Assessments of abundance, population growth rate, spatial structure, and diversity are the constituent components of the population viability assessments. The threats assessment is based on descriptions of the physical stressors limiting production within sub-populations as well as the sources responsible for the stressors. The stressors are described in terms of their influence on the PCE of critical habitat. Supportive information for each component of the analysis was largely derived from interviews with local biologists, review of NMFS' critical habitat and fisheries resource databases, an independent database of fisheries references (CEMAR 2005), spatially-related information (such as land use), and best professional judgment (NMFS 2006). The purpose of these profiles is to provide a qualitative assessment of the status of the species in support the analysis of risk to the DPS posed by the effects of proposed actions.

Population Viability

NMFS (2007) evaluated S-CCC steelhead population viability for each sub-population using the four population viability criteria described in McElhany et al. (2000).

Abundance was defined as the estimated number of spawning adults in a given year and was characterized as high, intermediate, or low, relative to probable historic abundance. Population growth rate was defined as the sub-population's ability to replace itself given its intrinsic reproductive rate in the context of its environment. Population growth rate was described as either a positive trend, one that is near replacement value (or variable), or one that is negative. Spatial structure was defined as the geographic distribution of the species at any life stage. Consideration was given to the loss of an area's ability to support certain life stages, such as spawning and rearing, even if the species was still considered present (i.e., the area functions as a migration corridor). Spatial structure was characterized as widely distributed relative to historical condition, somewhat reduced, or very limited and/or highly fragmented. Diversity was defined as the genetic, morphologic, physiological, behavioral, or ecological variation that exists within a sub-population. The trajectory of these evolutionary traits is considered to be influenced by the environmental conditions that impose a selective regime on the sub-population. Since the actual genetic and other forms of diversity were often unknown, the diversity of habitats and their divergence from historical conditions were used as a surrogate as described above. Diversity was characterized either similar to historical (either traits or habitat), altered but retaining key elements, or severely altered from historic condition.

A viable salmon population (VSP) is defined as an independent population that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame (McElhany et al. 2000). The S-CCC Steelhead Recovery Domain Technical Recovery Team has identified the Salinas River system as one of the few populations within the S-CCC steelhead DPS with the potential to support a viable sub-population (Capelli 2006). NMFS (2007) concluded based on its analyses, that no sub-population in the DPS met the definition of VSP, and that only those in the Salinas, Pajaro, and Carmel basins have the potential to become fully viable as defined above. It is relevant to note that several of the potentially viable sub-populations, including the Upper Salinas, are among the lowest ranking sub-populations under current conditions.

Historical data on the S-CCC DPS are sparse. In the mid-1960s, CDFW (1965) estimated that the DPS-wide run size was about 17,750 adults. No comparable recent estimate exists at the DPS scale; however, estimates exist for five river systems (Pajaro, Salinas, Carmel, Little Sur, and Big Sur), indicating runs of fewer than 500 adults where previous runs had been on the order of 4,750 adults (CDFW 1965). Time-series data only exist for one basin (the Carmel River), and indicate a decline of 22% per year over the interval 1963 to 1993. More recent data indicate that the abundance of adult spawners in the Carmel River temporarily increased in the 1990s – possibly augmented by a four-year brood stock program during the 1987-1991 drought. Since the early 2000s, the adult run count at San Clemente Dam has generally been in a range of 200 to 500 adults, with an estimated equal number spawning downstream of San Clemente Dam (but not counted). Significant drought during Water Years 2012-2014 has resulted in conditions preventing or significantly constraining adults from entering the Carmel River system. The overall trend since counts began shows a decline, although the time series is too short to conclude whether or not this is a true reflection of population change (Good et al. 2005, Water Management District San Clemente Dam fish counter data).[18]

Sub-Population Threats

NMFS (2007) assessed the threats to each sub-population by considering threats as both stressors to the population via changes in the properly functioning condition of critical habitat PCEs, and as sources of stressors. A detailed description of the method of analysis is contained in NMFS (2006). A stressor was defined as the physical, chemical, or biological conditions that have the greatest influence on limiting the production of steelhead within the range of the sub-population.

The top four stressors for each sub-population are summarized in **Table 5-2** in order of severity. Sources were defined as the primary causative agents associated with each stressor. Sources acting within each sub-population are presented in order of severity in **Table 5-3. Figure 5-1** depicts the relative ranking of threats for all sub-populations within the DPS.

An independent population is defined as one in which exchanges with other populations have negligible influence on its extinction risk (Bjorkstedt et al. 2005).

[18] Historical counts at San Clemente Dam are found at http://www.mpwmd.net/fishcounter/fishcounter.htm.

Table 5-2 Summary of Threats assessments (stressors) for the 12 sub-populations in the S-CCC steelhead DPS.

Sub-population	Top Stressors			
	1	2	3	4
Carmel River	Summer Base Flow. Flow-related passage	Barriers, Flow-related passage	Degraded estuarine habitat	Channelization
Big Sur	Sedimentation	Flow-rela*ted* passage, Degraded estuarine habitat	None	None
San Simeon	Summer Base Flow	Sedimentation	Low DO	None
Morro Bay	Summer Base Flow	Habitat Degradation	Barriers	None
Pismo Beach	Summer Base Flow	Habitat Degradation	Barriers	None
Salsipuedes	Sedimentation	Barriers	Flow-related passage, Summer Base Flow	Channelization
Llagas	Flow-related passage	Barriers	Channelization	Summer Base Flow
San Benito	Flow-related passage	Flow-related passage, Summer Base Flow	None	None
Gabilan	External barriers, Flow-related passage	Barriers	Toxic contamination	Channelization
Arroyo Seco	Flow-related passage	Barriers	Summer Base Flow	None
San Antonio/ Nacimiento	Barriers	Competition	None	None
Upper Salinas[a]	Summer Base Flow, Flow-related passage	Summer Base Flow, Flow-related passage	Water temperature	Barriers
Lower Salinas[b]	Flow-related passage	Degraded estuarine habitat	Toxic contamination	Channelization

Notes:
a. Both summer base flow and flow-related passage barriers were listed as the top two stressors for the Upper Salinas sub-population because they were of equal priority.
b. Threats to the Lower Salinas were included because it serves a critical function to several sub-populations and is central to the NMFS (2007) analyses.

Table 5-3 Summary of Threats assessments (sources) for the 12 sub-populations in the S-CCC steelhead DPS

Sub-population	Sources			
	1	2	3	4
Carmel River	Groundwater and surface diversions	Large Dams	Lagoon Breaching	Urbanization
Big Sur	Historic logging and rural develop.	Groundwater and surface diversions	None	None
San Simeon	Groundwater and surface diversions	Agriculture, grazing, urbanization., roads	Grazing	None
Morro Bay	Groundwater and surface diversions	Agriculture, grazing, urbanization., roads	dams, roads	None
Pismo Beach	Groundwater and surface diversions	Agriculture, grazing, urbanization., roads	dams, roads	None
Salsipuedes	Agriculture	Seasonal Dams, diversion facilities, road crossings	Groundwater and surface diversions	Agriculture and urbanization
Llagas	Large Dams, Diversions	Large Dams, Summer Dams	Agriculture and urbanization	Large Dams, Diversions
San Benito	Gravel mining and road crossings	Groundwater and surface diversions	None	None
Gabilan	Groundwater and surface diversions	Culverts and Road Crossings (Passage Barriers)	Agriculture and urbanization	Flood Control
Arroyo Seco	Salinas River flows	Gravel mining, water diversion, and road crossings	Groundwater and surface diversions	None
San Antonio/Nacimiento	Large Dams	Introduced Trout	None	None
Upper Salinas	Groundwater and surface diversions	Large Dams	Groundwater and surface diversions and grazing	dams, roads
Lower Salinas	Dams, groundwater and surface diversions	Dams, diversions, and flood control	Agriculture and urbanization	Agriculture and urbanization

Sub-populations occupying the inland watersheds of the Pajaro and Salinas rivers show a strong pattern of flow-related passage issues as stressors to the populations. This suggests that freshwater migration PCE is typically impaired in this region. Our source analysis suggests there are a variety of factors contributing to this impairment, but most are related to water use in some way. Groundwater pumping, surface water diversions, and dams associated with agricultural and urban developments all potentially contribute to reductions in surface flows which can limit upstream migration of adult steelhead and downstream migration of smolts, depending on the time of year. Changes in channel configuration from channelization, flood control, and gravel mining, however, can also affect surface flows.

Reduced summer base flows impair the properly functioning condition of freshwater rearing PCE by reducing the amount of available rearing space, exacerbating high temperatures, and otherwise reducing the survival of steelhead fry, parr, and pre-smolts. The source analysis again reveals a strong pattern of water use. The same issues of groundwater pumping, surface water diversions, and dams associated with agricultural and urban developments that apply to the migration PCE, also apply to the rearing PCE, although the specifics may differ. For example, migration corridors are more likely influenced by water releases from major dams as well as aquifer depletion, whereas rearing habitats, being more often off of the mainstem, are likely more specifically influenced by lowering of groundwater levels.

5.3.4 Current DPS-Level Threats Assessment

The following is the threats assessment portion of the Extinction Risk Profiles, which was specific to each sub-population, this section addresses threats that are common to all sub-populations or affect steelhead primarily at the DPS scale.

5.3.4.1 Anthropogenic Influences

Habitat destruction and fragmentation have been linked to increased rates of species extinction over recent decades (Davies et al. 2001). A major cause of the decline of steelhead is the loss or decrease in quality and function of essential habitat features (i.e., PCEs of critical habitat). Most of this loss and degradation of habitat, including critical habitat, has resulted from anthropogenic watershed disturbances caused by water diversions, the influences of large dams, agricultural practices (including irrigation), urbanization, loss of wetland and riparian losses, roads, grazing, gravel mining, and logging. While individual components of this list of threats have waxed and waned over the last 100 years, the general trend has been one of increasing and intractable pressure on aquatic resources. This degradation of critical habitat is occurring because of the loss of essential habitat components necessary for steelhead persistence. Degradation of critical habitat has reduced its value for steelhead conservation and exacerbated the adverse effects of natural environmental variability such as drought, poor ocean conditions, and predation.

Water Use

Depletion and storage of natural flows have altered natural hydrological cycles in many California rivers and streams in general, and within streams providing habitat to S-CCC steelhead DPS steelhead in particular. Alteration of stream flows has increased juvenile salmonid mortality for a variety of reasons including: impaired migration from insufficient flows or habitat blockages; loss of rearing habitat due to dewatering and blockage; stranding of fish resulting from rapid flow fluctuations; entrainment of juveniles into unscreened or poorly screened diversions; and increased juvenile mortality resulting from increased water temperatures (Chapman and Bjornn 1969, Bergren and Filardo 1993,61 FR 56138).

Fishing Harvest

There are few good historical accounts of the abundance of steelhead harvested along the California coast (Jensen and Swartzel 1967). However, Shapovalov and Taft (1954) report that very few steelhead were caught by commercial salmon trollers at sea but considerable numbers were taken by sports anglers in Monterey Bay. There are also many anecdotal reports of recreational fishing and poaching of instream adults (Franklin 2005) which suggests a relatively high level of fishing pressure.

California regulations allow catch-and-release winter-run steelhead angling in many of the river basins occupied by the DPS, specifying that all wild steelhead must be released unharmed (NMFS 2003). The original draft of CDFG's 2000 Fishery Management and Evaluation Plan recommended complete closure of the Salinas system to protect steelhead there, but the final regulations did not implement this recommendation, allowing both summer trout angling and winter-run catch-and-release steelhead angling in selected parts of the system (NMFS 2003).

Artificial Propagation

Releasing large numbers of hatchery fish can pose threats to steelhead stocks through genetic impacts, competition for food and other resources, predation of hatchery fish on wild fish, and increased fishing pressure on wild stocks as a result of hatchery production (Waples 1991). The genetic impacts of artificial propagation programs are primarily caused by the straying of hatchery fish and the subsequent hybridization of hatchery and wild fish. Artificial propagation threatens the genetic integrity and diversity that protect overall productivity against changes in the environment (61 FR 56138).

5.3.4.2 Environmental Influences

Climate Change

The most relevant trend in climate change is the warming of the atmosphere from increased greenhouse gas emissions. The acceptance of global warming as a scientifically valid and anthropogenically driven phenomenon has been well established by the United Nations Framework Convention on Climate Change (UNFCCC), the Intergovernmental Panel on Climate Change, and others (Davies et al. 2001, UNFCCC 2006, and Watson et al. 2001). These changes are inseparably linked to the oceans, the biosphere, and the world's water cycle.

Changes in the distribution and abundance of a wide array of biota confirm a warming trend is in progress, and that it has great potential to affect species' survival (Davies et al. 2001, Schneider and Root 2002). In general, as the magnitude of climate fluctuations increases, the population extinction rate also increases (Good et al. 2005). Global warming is likely to manifest itself differently in different regions. For example, in California, the overall amount of precipitation may increase. Another impact predicted for this region by the California Energy Commission is an increase in critically dry years (Cayan et al. 2006). Many of the threats already identified for this DPS are related to lack of surface flow in streams. Future climate change may therefore substantially increase risk to the species by exacerbating dry conditions.

Ocean Conditions

Variability in ocean productivity has been shown to affect salmon production both positively and negatively. Beamish and Bouillion (1993) showed a strong correlation between North Pacific salmon production and marine environmental factors from 1925 to 1989. Beamish et al. (1997) noted decadal-scale changes in the production of Fraser River sockeye salmon that they attributed to changes in the productivity of the marine environment. They also reported the dramatic change in marine conditions occurring in 1976-77 (an El Nino year), when an oceanic warming trend began. These El Nino conditions, which occur every three to five years, negatively affect ocean productivity. Johnson (1988) noted increased adult mortality and decreased average size for Oregon Chinook salmon (*O. Tshawytscha*) and Coho salmon (*O. kisutch*) during the strong 1982-83 El Nino. Of greatest importance is not how steelhead perform during periods of high marine survival, but how prolonged periods of poor marine survival affect the viability of populations. Salmon populations have persisted over time, under pristine habitat conditions, through many such cycles in the past. It is less certain how they will fare in periods of poor ocean survival when their freshwater, estuary, and nearshore marine habitats are degraded (Good et al. 2005).

Reduced Marine-Derived Nutrient Transport

Reduction of marine-derived nutrients (MDN) to watersheds is a consequence of the past century of decline in salmon abundance (Gresh et al. 2000). MDN are nutrients that are accumulated in the biomass of salmonids while they are in the ocean and are then transported to their freshwater spawning sites. Salmonids may play a critical role in sustaining the quality of habitats essential to the survival of their own species. MDN (from salmon carcasses) has been shown to be vital for the growth of juvenile salmonids (Bilby et al. 1996, Bilby et al. 1998). The return of salmonids to rivers makes a significant contribution to the flora and fauna of both terrestrial and riverine ecosystems (Gresh et al. 2000). Evidence of the role of MDN and energy in ecosystems suggests this deficit may result in an ecosystem failure contributing to the downward spiral of salmonid abundance (Bilby et al. 1996). The loss of this nutrient source may perpetuate salmonid declines in an increasing synergistic fashion.

Marine Mammal Predation

Predation by marine mammals is not believed to be a major factor contributing to the decline of West Coast steelhead relative to the effects of fishing, habitat degradation, and hatchery practices. Harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus*) numbers have increased along the Pacific Coast (NMFS 1999). However, at the mouth of the Russian River in Sonoma County within the Central California Coast steelhead DPS, Hanson (1993) reported foraging behavior of California sea lions and harbor seals with respect to anadromous salmonids was minimal. Hanson (1993) also stated predation on salmonids appeared to be coincidental with the salmonid migrations rather than dependent upon them. Nevertheless, this type of predation may have substantial impacts in localized areas.

5.3.5 Metapopulation Analysis

A metapopulation analysis allows determination of whether project impacts increase the DPS' risk of extinction by evaluating the functional relationships of the sub-populations in the context of their individual extinction risks. A metapopulation is a population of sub-populations linked by immigration and dispersal such that both the genetics of the individual sub-populations and their dynamics (such as abundance) are affected (Cooper and Mangel 1999). These sub-populations are generally geographically separate units and often become more common as habitat fragmentation splits large populations into smaller units that maintain some gene flow (Meffe and Carroll 1997). For the purposes of this BA, the S-CCC steelhead DPS is considered to be a metapopulation comprising 12 sub-populations. A DPS is defined as a population that is: 1) markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, and behavioral factors; and 2) significant to its taxon (71 FR 834). This definition does not include resident *O. mykiss*, though non-anadromous rainbow trout typically share rearing habitat with steelhead and are probably not reproductively isolated. The role of these non-anadromous *O. mykiss* in the inland basins, represent source material for anadromous sub-populations that are likely to provide added resilience against extinction when the anadromous component is unable to successfully complete the migratory components of its life-cycle (NMFS 2004).

The following analysis demonstrates that the S-CCC steelhead DPS is suffering a significant decline in overall abundance and productivity, it is becoming increasingly fragmented, and that four sub-populations have become or are nearly extirpated. These population trends in conjunction with the large scale anthropogenic influences on habitat condition leads NMFS (2007, 2013) to the conclusion that this DPS continues to decline toward extinction.

5.3.5.1 Biogeographic Patterns

Degree of Isolation

Wild populations generally have some degree of genetic population structure based on biogeographic patterns that exist along a spectrum between complete genetic isolation and free genetic exchange. These biogeographic structures have important implications for genetic management (and by extension, extinction risk) because they are often altered by human actions, which may seriously affect fitness and local adaptation (Meffe and Carroll 1997). The spatial relationship between sub-populations in the S-CCC steelhead DPS is one of increasing isolation. This combined with declines in abundance is leading to the imminent loss of four of the 12 sub-populations.

For any population, replacement of individuals to sustain the population is achieved either by reproduction from within the population or from immigration from outside sources. For S-CCC steelhead sub-populations, sources of immigration may be strays from other sub-populations or contributions from resident fish. NMFS assessment concludes that no current sub-population has the requisite viability to function as a source population. Therefore, while some exchange of strays may occur at low levels, this function has been greatly diminished. This is likely to add additional risk to the DPS, as straying between sub-populations is an important factor in maintaining metapopulation structure (Hill et al. 2002).

Connectivity between sub-populations is an important factor influencing gene flow and recolonization potential (Good et al. 2005). The degree to which connectivity contributes to this exchange is a function of migration distance and the challenges to migration along the way. Garza et al. (2006) found a pattern of isolation by distance reflected in multiple genetic signatures for steelhead along the California coast. This strongly suggests that the greater the migration distance, the less reproductive interaction occurs between sub-populations. While challenges to migration do not preferentially deter straying, they do reduce the success of any adult attempting to migrate and, therefore, increase the degree of isolation.

Coastal sub-populations of S-CCC steelhead remain well connected because they are closer together and have somewhat higher abundance. The connections between sub-populations in the Pajaro and Salinas River systems, however, are far more tenuous, particularly in the upper basins (Upper Salinas and San Benito). This is because those sub-populations have a higher degree of geographic separation from the potential source populations along the coast, and they face greater challenges to successful migration related to impaired stream flows and degraded habitat in the mainstem channels. Reduced migration opportunities due to flow manipulations in the Salinas River are discussed further in the Environmental Baseline section.

Fragmentation

The anadromous components of four of the 12 sub-populations that make up the S-CCC steelhead DPS are at imminent risk of extirpation. The loss of sub-populations from an already diminished DPS can further reduce the DPS's ability to persist (Bjorkstedt et al. 2005). The four populations at highest risk of extirpation are: San Benito, Gabilan Creek, Nacimiento/San Antonio, and the Upper Salinas. This conclusion is based on the extinction risk profiles described above and on their degree of isolation as mentioned in the previous section. If these extirpations occur, they will represent a substantial reduction in the distribution of the DPS (as described below).

Importance of the Salinas Basin to the S-CCC steelhead DPS

Steelhead sub-populations of the Salinas basin play a significant role in the survival of the S-CCC DPS because: 1) they represent a large distributional component of the overall range of the DPS, 2) they inhabit ecologically distinct areas unique to the DPS, and 3) they exhibit unique life history traits. To be considered VSP, a DPS should contain multiple sub-populations, maintain wide geographic distribution, and contain sub-populations that display diverse life-histories and phenotypes (McElhany et al. 2000). These Salinas basin sub-populations contribute to all three of these viability criteria.

Distribution

The loss of the sub-populations in the Salinas basin would mean the removal of the largest area of streams currently occupied by any sub-population in the DPS. In terms of watershed acreage and stream miles, the Salinas River is the largest river in the DPS. The Salinas River comprises approximately 48%of the DPS in terms of acreage and approximately 48%of the DPS in terms of total stream miles. Currently, the Salinas River watershed comprises approximately 19%of the DPS in terms of miles of occupied spawning and/or rearing habitat (**Table 5-4**). Of the five larger watersheds in the DPS, the Salinas River has the most occupied habitat remaining. Without the Salinas River basin population, only smaller coastal populations and the Pajaro River basin populations would remain, and the total amount of occupied habitat in the DPS would be reduced by nearly 20%.

Table 5-4 Miles of occupied stream habitat within five of the larger watersheds of the S-CCC steelhead DPS. Data derived from NMFS Critical Habitat database (NMFS 2005b).

Watershed	Currently occupied habitat	Proportion of occupied habitat in the DPS
Salinas River	149 miles	19 percent
Pajaro River	144 miles	18 percent
Carmel River	92 miles	11 percent
Big Sur	36 miles	4 percent
Little Sur	15 miles	2 percent
Small Coastal Streams	368 miles	46 percent

Ecological Uniqueness

There are two general ecological habitat types in this DPS: coastal basins and two inland basins. The coastal ecoregion is represented by the Carmel, Big Sur, San Simeon, Morro, and Pismo sub-populations. The inland ecoregion is represented by the Salinas sub-populations and the Llagas and San Benito sub-populations of the Pajaro River. These areas are typically drier and warmer than the coastal region. They also have longer migration routes and differing hydrologic regimes. These generally different environmental conditions confer unique selective regimes that likely supported and may still support unique life history traits as described below. The San Benito, Nacimiento/San Antonio, and the Upper Salinas sub-populations are also three of the four populations at highest risk of extirpation in the DPS. If the Salinas River basin sub-populations were lost, the only remaining sub-populations in the interior ecoregion would be those of the Pajaro River basin. Extinction risk profiles suggest that habitat loss has been acute in the Pajaro River basin and that the sub-populations' abundance, distribution, growth rate, and genetics are in poor condition. The risk of losing the entire inland geographic area inhabited by S-CCC steelhead is high. Thus, as a substantial component of the inland ecoregion, the Salinas sub-populations are important to the conservation of ecological diversity of the S-CCC steelhead DPS.

Unique Life History Traits

S-CCC steelhead of the Salinas River Basin is likely to possess unique life history traits that have allowed them to persist in this ecoregion. Fish surviving in this environment would need to possess the ability to migrate longer distances under more variable hydrologic conditions than in shorter, wetter coastal areas. They would need the ability to survive warmer water temperatures that would prevail as well. And finally, they probably would display increased plasticity between anadromous and resident forms of *O. mykiss*, as this would permit them to better survive periodic drought conditions when lack of flows in the mainstem would prevent migration to and from the ocean. The retention of these traits within the DPS may take on added importance if climate conditions would increase the likelihood of serious droughts. Historically, different geographic and life history components that were minor producers during one climatic regime have dominated during others. Hilborn et al. (2003) used this observation to demonstrate that the bio-complexity of fish stocks is critical for maintaining their resilience to environmental change. NMFS (2007) considers this argument to be true for sub-populations of the Salinas River. Based on watershed size, location, ecological context, and overall status of S-CCC steelhead, a viable steelhead population in the Salinas River has the potential to lessen fragmentation in the distribution of S-CCC steelhead, contribute to the genetic diversity of the species, and ameliorate the overall extinction risk of the DPS.

5.3.6 Critical Habitat

The SVWP BO (NMFS 2007) and the S-CCC steelhead DPS Recovery Plan (NMFS 2013) provide the following applicable and detailed discussions of PCEs in the S-CCC steelhead DPS.

To assist in the designation of critical habitat, NMFS convened several Critical Habitat Analytical Review Teams (CHART). Each CHART was tasked with determining the relative conservation value of each area or watershed occupied by listed steelhead and/or Chinook salmon. The CHART scored each habitat area based on several factors related to the quantity and quality of the physical and biological features. Specific areas used for the steelhead DPSs were CALWATER Hydrologic Units (HU), which contain Hydrologic Sub-areas (HSAs). Each was considered in relation to adjacent HSAs and with respect to the population occupying the HSA. Based on a consideration of the raw scores for each HSA, and a consideration of that HSAs contribution to the overall population structure of the DPS, the CHART rated each HSA as having a high, medium, or low conservation value. The conservation value given each HSA is the relative importance of the HSA to conservation of the DPS. High-value HSAs were those deemed to have a high likelihood of promoting DPS conservation while low-value HSAs were expected to contribute to conservation in only a minor way.

NMFS developed a list of PCEs specific to salmon and steelhead and relevant to determining whether occupied stream reaches within an HSA fit the definition of critical habitat. These PCEs include sites essential to support one or more of the life stages of the DPS (i.e., sites for spawning, rearing, migration, and foraging). These sites in turn contain physical or biological features essential to the conservation of the DPS (for example, spawning gravels, water quality and quantity, side channels, forage species). Specific types of sites and the features associated with them include, but are not limited to the following:

1. Freshwater migration corridors free of obstruction and excessive predation with adequate water quantity to allow for juvenile and adult mobility; cover, shelter, and holding areas for juveniles and adults; and adequate water quality to allow for survival.
2. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation, and larval development.
3. Freshwater rearing sites with sufficient water quantity and floodplain connectivity to form and maintain physical habitat conditions and allow salmonid development and mobility; sufficient water quality to support growth and development; food and nutrient resources such as terrestrial and aquatic invertebrates and forage fish; and natural cover such as shade, submerged and overhanging large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
4. Estuarine areas that provide uncontaminated water and substrates; food and nutrient sources to support growth and development; and connected shallow water areas and wetlands to cover and shelter juveniles.

The CHART analysis identified most of the coastal drainages as having high conservation value, reflecting the relatively high productivity of the freshwater rearing PCE and its value in maintaining connectivity and a wide distribution. The inland HSAs were more evenly divided with the driest areas generally possessing the lowest conservation value. Notably, however, the HSAs containing the Arroyo Seco, Nacimiento/San Antonio, and Upper Salinas sub-populations had high conservation value to the DPS. This reflects the importance of freshwater migration, freshwater spawning, and freshwater rearing PCEs unique within the inland ecotype.

5.3.7 Conclusions

NMFS (2007) concluded that the S-CCC steelhead DPS continues to decline toward extinction. The ecological impacts on the DPS from human development have been steadily increasing over time, forcing the DPS toward an ever-increasing risk of extinction. If these trends persist, the most plausible result will be deterministic extinction. Deterministic extinctions occur with the cumulative loss or otherwise permanent change of a critical component in the species' environment that ultimately overwhelms the species' ability to survive and reproduce (Rieman et al. 1993). Habitat conditions in the S-CCC steelhead DPS have been increasingly degraded by a pattern of progressively intense anthropogenic encroachment on water resources, riparian habitat, and channel geometry. This pattern applies particularly to the two inland basins, and is exemplified by the increases in irrigated lands and urbanization in the Salinas Valley (as described in the Land and Water Use portion of the Environmental Baseline section below). Some of the coastal basins (i.e., Big Sur) are more isolated and, therefore, experience less of this trend and may have a higher likelihood of persistence. However, southern coastal sub-populations are experiencing threats similar to those of the interior basins. Overall, sub-populations have responded with declines in abundance, productivity, and increases in the degree of isolation and fragmentation; both within and between sub-populations. Diversity in life history traits has also been eroded as flow and habitat conditions have imposed selective regimes divergent from the historical context. This trend is most acute in the interior basins because they are the most isolated, have the most depleted populations, and face the greatest threats. However, the threats to the coastal populations are still significant and their severity is reflected in the generally poor population status of the coastal sub-populations.

6.0 ENVIRONMENTAL BASELINE

The Environmental Baseline provides the foundation upon which the effects analysis is built. By establishing the historical, current, and future condition of the species and the habitat in the Action Area, we describe and analyze the conditions to which we will add the effects of the project under consultation. This description of the historical condition of the ecosystem provides a context for subsequent trends, and it is also useful in describing the properly functioning condition of critical habitat and the viable state of steelhead populations. Current conditions in the Action Area include a description of the impacts of all the activities that have contributed to the current status of critical habitat and the species sub-populations. Our ability to understand factors contributing to the baseline condition is also important for predicting future conditions. By anticipating what the status of habitat and sub-populations would be, given a projection of all relevant factors into the future without the GWR Project, we establish the basis for evaluating the effects of the GWR Project on critical habitat and the species in the effects analysis by adding these effects to the anticipated future status.

6.1 Salinas River

6.1.1 Historical Habitat Conditions

The following section describes the unaltered condition (i.e., prior to European settlement and development of the basin) of the major ecological components of the Salinas River as perceived by NMFS (2007, 2013). This provides a context for the description of current baseline conditions that follows. It also helps to define the properly functioning condition of habitat, including critical habitat, within the Action Area. NMFS (2007) considers the natural conditions under which the species evolved to represent the ecological conditions that would sustain the long term survival of steelhead in the basin.

6.1.1.1 Mainstem Salinas River and Tributaries

The mainstem Salinas River is a migration corridor for adult steelhead migrating upstream from the ocean to tributary spawning areas. Spawning and rearing habitats are located in tributary streams. Kelts, smolts, and rearing juveniles use the mainstem Salinas River to migrate up and downstream to the ocean or lagoon.

Peak discharges from the Nacimiento and San Antonio rivers likely transported and sorted sediment throughout the lower Salinas River. Aerial photography taken before the dams were constructed indicates that seasonal high flows and natural floods caused flushing and scouring of the Salinas River channel, and the lack of dry season flow prevented excess growth of vegetation in the channel (ENTRIX and EDAW 2002). The expansive flood-prone width of the channel was not levied. There was likely mature vegetation in the flood-prone channel and other riparian vegetation that stabilized sandbars, provided zones of lowered flow velocity creating resting areas for migrating adult steelhead, and general cover for migrating steelhead. Under historic conditions, it is also likely there were higher sandbars, deeper pools, and during winter months, more water in the channel for a longer period of time. These conditions likely provided sufficient migration conditions necessary to maintain the Salinas River steelhead sub-populations.

The frequency and duration of flow events that facilitated adult steelhead upstream passage and smolt emigration were variable and directly dependent upon the frequency and intensity of precipitation in the Salinas watershed. The Salinas River was torrential in character (Snyder 1913); it had a very large flood discharge during the rainy season and was practically dry during the summer, except in the lower portion. During the dry season, its low velocity current shifted course over broad stretches of wind-blown sand, entirely disappearing at times and again rising to the surface (Snyder 1913). After the advent of winter rains, however, it presented "a broad expanse of seething water which often threatened everything before it" (Snyder 1913).

The Nacimiento, San Antonio, and Arroyo Seco rivers were the three principal spawning areas and comprised some of the best spawning and rearing habitats in the watershed (Snyder 1913, Titus et al. 2002, Good et al. 2005). NMFS (2005c) has estimated about 435 miles of spawning and rearing habitat were present in the watershed (circa early 1900s). Steelhead were probably able to access spawning and rearing habitat throughout the Salinas River watershed more easily under historic conditions given that many recent passage impediments (e.g., road crossings, instream gravel mining sites, inadequate flows, and stream diversions) did not exist during the nineteenth and early twentieth century.

6.1.1.2 Salinas River Lagoon

The Salinas River flows through the Salinas River Lagoon before entering the Pacific Ocean. Unless otherwise noted, the following information is provided by the Draft Salinas River Lagoon Management and Enhancement Plan (The Habitat Restoration Group et al. 1992). Historical information (NMFS 2013) indicates the floodplain adjacent to the Salinas River and the Salinas River Lagoon appeared to support extensive areas of wetland-type vegetation, with riparian woodland vegetation bordering the channel in the vicinity of the present river mouth. Historically, the Salinas River Lagoon likely provided rearing habitat for juvenile steelhead year round. In 1910, the area of open water in the Salinas River Lagoon was approximately 340 acres. The Salinas River turned to the north adjacent to Mulligan Hill, joined with the mouth of Elkhorn Slough, where it emptied into Monterey Bay. Historical accounts of the area describe the lower Salinas Valley as supporting shallow lakes, sloughs, marsh vegetation, and willow thickets. A series of north-south oriented lakes occurred east of the outlets to the Monterey Bay. This freshwater marsh ecosystem, including the lower Salinas River was likely an integral component of a larger wetland complex that included Elkhorn Slough and the Pajaro River mouth.

6.1.2 Development of land and water use

The historical habitat conditions in the Salinas River watershed have changed over time. Much of the change is due to the development of land and water use. The following discussion of these changes is used to describe the factors contributing to the current condition of habitat within the Action Area.

6.1.2.1 *Mainstem Salinas River*

As of 1904, only a comparatively small portion of the fertile lands of the Salinas Valley were being irrigated (Hamlin 1904). As the area developed, agriculture became the primary land use. Since the late 1940s, irrigated acreage within the Salinas Valley has increased substantially, with steady increases in the 1940s and 1950s, and more rapid increases in the 1960s and 1970s (EDAW 2001). As the agricultural and urban areas have expanded, so have the water needs of the Salinas Valley (ENTRIX and EDAW 2002).

Recharge to the groundwater basin occurs primarily from precipitation, return flows from irrigated lands, and stream recharge from the Arroyo Seco and Salinas rivers. Average precipitation in the Salinas Valley ranges from 15 to 60 inches in the mountain ranges on either side of the Salinas Valley, and 10 to 15 inches within the Salinas Valley itself. Most of the precipitation occurs in winter, from November through March. Historically, groundwater elevations in the Salinas Valley have been declining due to heavy dependence on the basin's aquifer for agricultural and urban purposes. Declining groundwater levels, basin overdraft, and seawater intrusion are a serious concern to farmers, municipalities in the Basin, MCWRA, and the SWRCB. Overdraft and seawater intrusion were first documented in the Salinas Valley in 1946, in a report published by the then-named State Department of Public Works, Division of Water Resources (Bulletin No. 52).

The Nacimiento and San Antonio dams were constructed to help remedy this problem. Beginning operations in 1957 and 1967, respectively, these dams were designed to provide elevated flows to increase aquifer recharge during the growing season, April through October. The dams also provide flood control benefits. The Nacimiento and San Antonio reservoirs have been operated to optimize Salinas River groundwater recharge by storing winter runoff for subsequent release during the irrigation season, when the potential for recharge is highest. The two reservoirs are operated to minimize Salinas River outflow to the ocean (ENTRIX and EDAW 2002). Nevertheless, seawater intrusion continues because the rainfall in the Salinas Valley does not sufficiently recharge aquifers to meet current groundwater demands, which exceed natural recharge rates and recharge provided by the dams.

As shown in the Salinas Valley Historical Benefits Analysis -Final Report (Montgomery Watson 1998), annual seawater intrusion has historically averaged 11,000 AFY, while basin overdraft has averaged approximately 19,000 AFY, during the 1949 to 1994 hydrologic period. Given the hydrologic conditions described above, and prior to the pumping of groundwater for agricultural and urban purposes and dam operations, there was likely a better connectivity between groundwater and surface flows. This would have resulted in greater availability of persistent stream flows following the first rainfall event, the channel refilling quicker between rainfall events, and a more frequently wetted and deeper channel.

The lower 24 miles of the Salinas River has an extensive levee system, constructed by the Corps and private landowners. These levees in combination with sediment deposition have reduced the river's channel capacity (Grice Engineering and Geology, Inc. [GEG] 1998). Since 1952, MCWRA, the Corps, and private landowners have periodically cleared the lower Salinas River channel (GEG 1998). Contrary to the landowner's intent, these activities exacerbated channel capacity and sediment transport problems. By widening low flow channels and spreading water across a larger area, water velocities are decreased, a condition that promotes sediment deposition (Mount 1995).

The riparian vegetation of the lower Salinas River has been modified due to agriculture, flood control levees, vegetation removal by landowners along the river, urban activities, and periods of drought. Riparian vegetation is now limited to small patches and narrow strips along the river banks, mostly between the flood control levees (White and Broderick 1992).

6.1.2.2 Salinas River Lagoon

From the late 1800s to the late 1950s, major changes occurred in the Salinas River Lagoon. A program for drainage operations and reclamation was established as early as 1877. By 1910, extensive areas, primarily wetlands, had been reclaimed as large areas north and south of the lower Salinas Valley were already under cultivation by 1901. Following a series of storms during winter 1909 to 1910, the river changed course, creating a river mouth at its present location. The river segment that formerly ran to Elkhorn Slough is now referred to as the Old Salinas River (Old Salinas River) channel. The Old Salinas River still connects the Salinas River Lagoon to Elkhorn Slough, but it has been modified by agricultural activity, maintenance dredging, and hydraulic structures. The entrance to the Old Salinas River from the present-day Salinas River Lagoon is currently blocked by a levee with a manual slide gate. The Old Salinas River is a trapezoidal drainage ditch with minimal riparian vegetation and a number of partial barriers and tide gates.

Between 1910 and 1990, the area of open water in the Salinas River Lagoon decreased from about 340 acres to about 130 acres. The diversion of the river mouth and wetlands reclamation also dramatically altered the freshwater fish community of the Salinas River/Elkhorn Slough complex. In addition to these changes to the size and location of the Salinas River Lagoon, the construction and operation of the Nacimiento and San Antonio dams have reduced freshwater inflow to the Salinas River Lagoon (ENTRIX and EDAW 2002). The diversion of effluent from the Alisal and Salinas Wastewater Treatment Plants in 1983 and 1989, respectively, also reduced freshwater inflow into the Salinas River Lagoon.

The Salinas River Lagoon is now a repository for irrigation return flow laden with toxic contaminants including a variety of pesticides (Routh 1972). For example, the Blanco Drain is an eight-mile long unlined channel that drains approximately 6,000 irrigated acres west of Salinas to the Salinas River (EDAW 2001). It originates just south of the city of Salinas and flows north approximately parallel to the Salinas River before flowing into the upper most portion of the

Salinas River Lagoon (Larson 2004). Historically a freshwater wetland, the system was channelized to drain storm and agricultural runoff (Kozlowski et al. 2004).

Mechanical breaching of the sandbar to prevent flooding of agricultural root zones and fields has been carried out without a Corps permit since approximately 1910. MCWRA became the responsible agency for the sandbar breaching in the mid-1960s. MCWRA has applied for a 10-year permit from the Corps to conduct breaching; NMFS and USFWS have prepared biological opinions for the action however the Corps has yet to issue a permit. During lower flows, lagoon water surface elevation management is accomplished by adjusting flows through a slide gate to the Old Salinas River which empties into Moss Landing Harbor.

Salinas River Lagoon and Estuary

During the dry season when the Lagoon is not open to the ocean, the Lagoon flows into the Old Salinas River Channel. MCWRA controls the water surface elevations using a slide gate separating the Lagoon from the Old Salinas River Channel on the northern side of the Salinas River Lagoon. The tidal influence of the ocean also exerts its influence on water levels through surface / groundwater interaction. During and after large storm events when the sand bar at the Salinas River Lagoon is naturally or artificially breached, the Lagoon flows directly into the Monterey Bay. In addition to dry season flow from the Lagoon when the sand bar is present separating the Lagoon from the ocean, the Old Salinas River Channel also receives inflow from local drainage areas (primarily, surface runoff and tile drain water from agricultural land) and the Tembladero Slough before flowing into Moss Landing Harbor and thence to the Elkhorn Slough and/or Monterey Bay. Because of the flat topography in the Old Salinas River Channel, existing low dry season flows (such as those proposed for diversion) in the Old Salinas River Channel water bodies result in consistently low velocity flows with ebbing and receding tidally influenced flows within and between water bodies, such as the Tembladero Slough. The quantity of inland surface water inflows might be expected to have effects on water surface elevations; however, in the absence of precipitation, changes in inland surface flows have not been documented to effect water levels (Casagrande and Watson 2006, Nicol et al. 2010, and Inman et al. 2014). Instead, ocean tidal cycles tend to dominate surface water elevation changes in the Old Salinas River Channel and lower Tembladero Slough during periods with no precipitation.

In this discussion, Old Salinas River Channel, or Old Salinas River Channel, is assumed to terminate at the Potrero Tide Gate at its northern end. In some literature, maps, and studies the channel continues to be referenced as the Old Salinas River between the Potrero Tide Gate and the Moss Landing Harbor, further to the north. The Potrero Tide Gate causes a distinct hydrologic change between the portion north of and the portion south of the Potrero Tide Gate. The hydrologic conditions in the portion of the channel north of the Potrero Tide Gate to the Moss Landing Harbor are consistent with the Moss Landing Harbor; therefore, in this analysis, this northern portion of the Old Salinas River Channel is described as part of the Moss Landing Harbor.

Dry season water levels in the Old Salinas River Channel (Tembladero Slough to Moss Landing Harbor) and the lower Tembladero Slough are controlled by the operation of the Potrero Tide Gate (that separates the Old Salinas River Channel from Moss Landing Harbor) and the tidal influence. Water surface elevations rise with rising tides and fall with receding tides (Nicole et al. 2010 and Inman et al. 2014). The Old Salinas River Channel receives some surface water flow from surrounding land runoff and agricultural tile drainage; however, most of its inflows are from the Lagoon, the Harbor, and the Tembladero Slough. Water levels in this channel may also be affected by subsurface (surface / groundwater) interaction, in particular by the ocean, and potentially by saturated upper-soils in adjacent agricultural land. During the dry season, inland surface water inflows are almost exclusively agricultural irrigation runoff and tile drainage that are, by nature, unpredictable and high in pollutants. Agricultural runoff/drainage can vary significantly day to day and by season based on agricultural irrigation schedules of land within the watershed. Despite the variability of the surface flows throughout the dry season, the lower watershed areas in the Old Salinas River Channel see extremely stable average water surface elevations (beyond the tidal fluctuations) in times with no precipitation.

6.1.3 Current and Future Status of Habitat in the Action Area

This section establishes the current and future condition of steelhead habitat in the Action Area and is the foundation for adding the effects of the GWR Project in the Effects of the Action section. The factors affecting current and future conditions can help:

(1) Present a clear picture of what factors are responsible for the current status of the S-CCC steelhead DPS and their critical habitat in the Action Area;

(2) Analyze factors that are likely to cause ongoing and future impacts to the status of the species and habitat in the Action Area; and

(3) Add expected project impacts to non-project related impacts that are part of the environmental baseline. These three items in turn are important for determining how the population is likely to respond to the GWR Project.

The following factors are responsible for the current status of the S-CCC steelhead DPS and its critical habitat within the Action Area:

- Reduction in spawning and rearing habitat due to major dams including Salinas Dam, Nacimiento Dam and San Antonio Dam.
- Reduction in migratory opportunities due to altered flow regime due to storage reservoirs and groundwater pumping that delays or precludes suitable flow conditions during periods of recharge or diversion.
- Reduction in estuarine rearing habitat due to artificial breaching and artificial management of lagoon elevation, reduced freshwater inflow degraded water quality and urban encroachment
- Reduction in migratory habitat due to channelization and flood control

Collectively these factors have severely degraded steelhead migration, spawning, and rearing habitat PCEs in the Salinas River Basin, and are largely responsible for the decline of steelhead in the Salinas River watersheds. Steelhead migration habitat has been degraded by dams and their operations, which preclude access to spawning and rearing habitats and limit stream flows. Flood control efforts have scoured the mainstem and reduced resting and hiding cover, while also contributing to reduced migration at low flows. Road crossings in the watershed create partial or complete migration barriers. Spawning and rearing habitat has been degraded by dam operations that reduce the amount of habitat space available and/or may disrupt redds (or gravel nests). Lagoon management has created conditions in which few, if any, steelhead can successfully rear in the Salinas River Lagoon. Agriculture contributes pollutant concentrations (including nutrients and toxic contaminants), reduces dissolved oxygen levels, and increases temperatures to the lower river and Salinas River Lagoon. Fish planting has increased the competition wild steelhead face for food, and may degrade their genetic viability. Many of these conditions are expected to continue into the future. The project would ameliorate two of these conditions: 1) agriculture pollutant loads on the lower Salinas Valley watersheds, and 2) increase stream flows related to higher groundwater levels afforded by reduced groundwater pumping in the CSIP area (which primarily overlies the Pressure Subarea of the SVGB).

6.1.3.1 *Migration Habitat-Salinas*

Steelhead use of upper Salinas River tributaries is dependent upon the presence of a migration corridor in the Action Area of the mainstem Salinas River (Titus et al. 2002). One of the main limitations to migration within the Salinas River Basin is the limited availability of adequate flows and impaired channel conditions coupled with the long distances (over 110 miles to the upper tributaries) to suitable spawning and rearing grounds. The number of days within the migration period where flows are adequate for migration is highly variable from year to year, and groundwater pumping has shortened this window. In addition, levees, channel clean outs, road crossings, and removal of riparian vegetation have reduced the availability, and quality, of migration habitat for steelhead.

Increased flows in the reach resulting from the flow prescriptions for the SVWP (NMFS 2007, NMFS 2005c, MCWRA 2005 a, c, d, 2006a) have improved conditions for migration within the reach. The prescribed flows also target improvement in rearing conditions within Salinas River Lagoon.

Water Withdrawals from the Salinas River and SVGB

The predominant land use within the Salinas Valley is irrigated agriculture. Pumping of water from shallow wells for agricultural and urban purposes has lowered groundwater levels to below mean sea level and contributed to the intrusion of seawater into coastal aquifers. As groundwater supplies have become intruded with seawater, pumping has shifted to deeper aquifers. Lack of groundwater to surface water flows also increases average temperatures in the surface water (NMFS 2013).

The aquifers in the lower Salinas River have been severely depleted (EDAW 2001). As a result surface flows are more readily absorbed into the ground, a phenomenon that can reduce the total surface flow available for steelhead migration. The Nacimiento and San Antonio dams, which were built to store winter flows for release during spring, summer, and fall, further reduce surface flows needed to support steelhead migrations. As the result of the combination of pumping and reservoir storage, the flow of the Salinas River to the Salinas River Lagoon and ocean has been reduced from 533,000 AFY (Simpson 1946) to a current estimate of less than 240,000 AFY (EDAW 2001) and water temperatures have increased during periods important to steelhead migration and rearing. Summer rearing and ultimately survival of spawning have been essentially eliminated from the lower reaches of the Salinas River.

6.1.3.2 Spawning and Rearing Habitat

Most spawning and rearing habitat in the Salinas River Basin occurs in tributary streams. In order to spawn and hatch successfully, steelhead need clean gravel substrates, appropriate water flow and quality through the gravels to carry oxygen to their eggs and flush away wastes, and refuge from predators. Rearing steelhead need cool clean water and habitat complexity (pools and riffles) providing food and refuge from predators. No spawning habitat exists in the Salinas River and Reclamation Ditch portions of the Action Area. Marginal steelhead rearing habitat occurs within Salinas River Lagoon.

Salinas River Lagoon

A review of recent Salinas River Lagoon sand bar breaches (HES 2003, HES 2004, Casagrande and Watson 2003) and other information indicates that periodic breaching has likely caused a number of adverse effects to steelhead and their rearing habitat. These likely effects include: the loss of available freshwater rearing habitat, degradation of water quality in the Salinas River Lagoon, forced entry of juveniles into the ocean, and premature entry of adult steelhead to the river when upstream flows are not available. These adverse effects from breaching have likely been occurring for nearly 100 years. Previous surveys have failed to document more than one juvenile steelhead rearing in the Salinas River Lagoon going back to 1990 (HES 2001, HES 2003, HES 2004, HES 2005). The following habitat conditions are likely responsible for the absence of large numbers of steelhead in the Salinas River Lagoon.

The Salinas River Lagoon has marginal water quality conditions such as: high temperature, transient low dissolved oxygen, and high turbidity (MCWRA 2005c, HES 2014). Limited opportunities exist for juvenile steelhead to enter the Salinas River Lagoon, and habitat has been lost. The Salinas River Lagoon is more turbid than many coastal lagoons (HES 2004). Under existing conditions, NMFS expects few juvenile steelhead to utilize the Salinas River Lagoon for rearing because rearing space and cover are limited, and water quality is poor due to pollutants in urban and agricultural runoff during the dry season and after the first storm of each wet season.

Should steelhead enter the Old Salinas River when the slide gate is open, they will find themselves in a trapezoidal drainage ditch with little to no riparian vegetation or other shade or cover. The Old Salinas River is five miles long and shallow, with four potential steelhead passage impediments: a gated tidal barrier, two road culverts, and the slide gate between the Salinas River Lagoon and the Old Salinas River (ENTRIX 2001).

An additional potential passage impediment may be insufficient water depth in portions of the channel during low flow periods (ENTRIX 2001). Any juveniles that enter the Old Salinas River are subject to mortality from poor water quality, lack of flow during low tides, and heavy predation pressure.

The lower Salinas River system, from the Salinas River Lagoon to the Gonzales Road crossing, is listed as impaired on the CWA section 303(d) list for a variety of water quality stressors including pesticides, nutrients, salinity, and sedimentation. Agriculture is listed as the primary potential source of all these contaminants. Many of the agricultural crops in the area receive significant use of nitrogen compounds and organophosphates such as chlorpyrifos and diazinon. The Blanco Drain is a constant source of these pollutants to the Salinas River Lagoon and the lower river. The SVWP BO (NMFS 2007) calls for eliminating the discharge of pollutants from Blanco Drain because it is likely that water quality conditions are causing toxicity to the prey base of steelhead as well as direct effects to steelhead based upon toxicity data (NMFS 2005c). Alternative means of elimination referenced in the BO include "diverting the water to the regional wastewater treatment plant for recycling", which is the approach being pursued via the federal actions evaluated in this BA.

6.1.3.3 Temperature Considerations

Water temperature is measured at two locations in the Salinas River: at the Blanco Road Bridge, three miles upstream of the Salinas River Diversion Facility, and at the Salinas River Diversion Facility. Data collected during 2011 show that the general trend within the monitoring period showed increasing water temperatures from spring to summer and decreasing temperatures from summer to fall. For the protection of steelhead, the maximum weekly average temperatures are 67.8ºF (19.6ºC). Temperatures recorded at the Spreckels gage range from 50ºF to 82ºF (10 ºC to 27.9ºC), with an average of 63ºF (17.4ºC) (California Regional Water Quality Control Board 2008).

Water temperatures in this stream are highly variable and dependent on reservoir releases, air temperature, and reservoir storage. In general, water released through the reservoir outlet is at a relatively constant temperature of 52°F to 54°F (11.1°C to 12.2 ° C). The water warms rapidly as it moves downstream, generally in proportion to fluctuation in daily air temperature. At minimum release levels (25 to 30 cfs), water temperature can increase to as much as 73°F (22.8° C) within 5 miles of the Nacimiento dam, and 75°F (23.9° C) within 10 miles of the dam. During the summer conservation release period (with flows of 300 cfs or more), water temperature is generally maintained at less than 64°F (17.8°C) within 5 miles of the dam, and 68°F (20° C) or less within 10 miles of the dam (Monterey County Water Resources Agency 2001).

In addition, diurnal water temperature fluctuations are common. Data collected at the Chualar gage indicate an average difference of 4.5°F and a maximum difference of 8°F between maximum and minimum daily temperature in April (Monterey County Water Resources Agency 2001). In May there is as much as a 22°F daily swing in temperature and the average change is 16°F (Monterey County Water Resources Agency 2001).

6.1.3.4 Water Quality

The CCRWQCB Water Quality Control Plan for the Central Coast Basin (Basin Plan) designates beneficial uses of the Salinas River below Spreckels as including municipal and domestic supply, agricultural supply, non-contact water recreation, wildlife habitat, warm and cold water fish habitat, freshwater replenishment (of the Salinas River Lagoon) and commercial or sport fishing. The Salinas River is listed as an impaired water body pursuant to Section 303(d) of the Clean Water Act for chlorides, pesticides, Escherichia coli (E. coli), fecal coliform, nitrate, total dissolved solids, turbidity and other factors.

6.1.4 Status of Critical Habitat

The following streams in the Salinas watershed have been designated Critical Habitat for S-CCC steelhead: the Salinas River from the mouth upstream to 7.5 miles below Santa Margarita Lake, Arroyo Seco, Nacimiento and San Antonio rivers (below the dams), and upper Salinas River tributaries including San Marcos Creek, Summit Creek, Sheepcamp Creek, Willow Creek, Jack Creek, Paso Robles Creek, Santa Rita Creek, Graves Creek, Atascadero Creek, Tassajera Creek, Santa Margarita Creek, and Trout Creek (70 FR 52488). The historical function of the Salinas River Lagoon likely provided rearing habitat for juvenile steelhead year round (The Habitat Restoration Group et al. 1992), and the historical function of the mainstem Salinas River likely provided sufficient migration opportunities for adults and smolts to maintain the Salinas River steelhead sub-populations. The Salinas Sub-basin contains 12 HSAs, seven of which are occupied by steelhead. The Action Area, and/or areas supporting sub-populations influenced by the Action Area, contains six HSAs: Neponset, Chualar, Soledad, Upper Salinas Valley, Arroyo Seco and Paso Robles. The S-CCC steelhead DPS CHART rated the Arroyo Seco and Paso Robles as having "high" conservation values while the remaining four HSAs were rated as having "low" conservation values. Migration corridors within these low value HSAs, however, were given high conservation value ratings because steelhead must migrate through these areas to reach the high value HSAs.

A multitude of anthropogenic activities have diminished the functional value of critical habitat PCEs in the Action Area for the S-CCC steelhead DPS, as described above. The existing proportions of each habitat type (spawning, rearing, migration, and estuarine) within the Action Area are shown in **Table 5-6** with indications of habitat quality as described by the NMFS S-CCC steelhead DPS CHART.

This degradation has prevented designated critical habitat within the Action Area from functioning properly (e.g., inadequate flows, increased water temperatures, degraded habitat, lack of access to suitable habitat and degraded lagoon rearing habitat). The evidence leads to the conclusion that this degradation is primarily responsible for the concurrent decline in steelhead abundance and viability in the Salinas River watershed.

In July 2016, Hagar Environmental Science provided a memorandum analyzing the potential suitability of rearing habitat, and the likelihood of steelhead to occur, in the Salinas River Lagoon (Lagoon) and the Old Salinas River channel (Old Salinas River). See Appendix L [HES memorandum, July 19, 2016]. The memorandum concludes:

> *[W]hile the Lagoon and Old Salinas River Channel downstream of Tembladero Slough may provide rearing habitat for juvenile steelhead, I would not expect to find them there in years when the SRDF is not operational, i.e. in low rainfall years. Such years are characterized by lack of flow to transport juvenile steelhead downstream to the Lagoon, both in the Arroyo Seco tributary and the mainstem Salinas River at Spreckels. Further, since most juvenile steelhead leave the Arroyo Seco in smolt condition and since smolts are expected to migrate through the estuary to the ocean, abundance of rearing juvenile steelhead in the Lagoon and Old Salinas River is never expected to be high, even in years with high rainfall.*

These conclusions are important because they document that under current conditions there is a very low likelihood of presence of individual S-CCC steelhead, in particular during times of the year when MRWPCA proposes to construct the diversion facilities, and when MCWRA would have the maximum needs for diverting surface waters from the Blanco Drain.

6.2 Reclamation Ditch

6.2.1 Historical Habitat Conditions

Reclamation Ditch is a man-made drainage built to collect and drain surface runoff generated in the watershed that previously contained an extensive system of interconnected sub-tidal lakes and swamps that formerly existed between Salinas and Castroville. These include Merritt Lake, Espinosa Lake, Santa Rita Slough, Vierra Lake, Fontes Lake, Boronda Lake, Markley Swamp, and Mill Lake (Casagrande and Watson 2006a,b). The lakes naturally had poor drainage and were only connected during periods of high runoff. The majority of runoff in the basin was historically generated in the Gabilan and Alisal Creek sub-watersheds (Casagrande and Watson 2006a,b).

6.2.2 Development of land and water use

The Reclamation Ditch was built between 1917 and 1920. It includes the outlet of Carr Lake and a network of channels draining much of the City of Salinas as well as many of the former lakes and sloughs. Urban runoff from the City of Salinas drains into various channels of the Reclamation Ditch system via approximately 54 stormwater outfalls. The whole system drains into Tembladero Slough (an extended brackish, sub-tidal slough), then the Old Salinas River, and ultimately into Moss Landing Harbor through the Potrero Tide Gates (Casagrande and Watson 2006a,b).

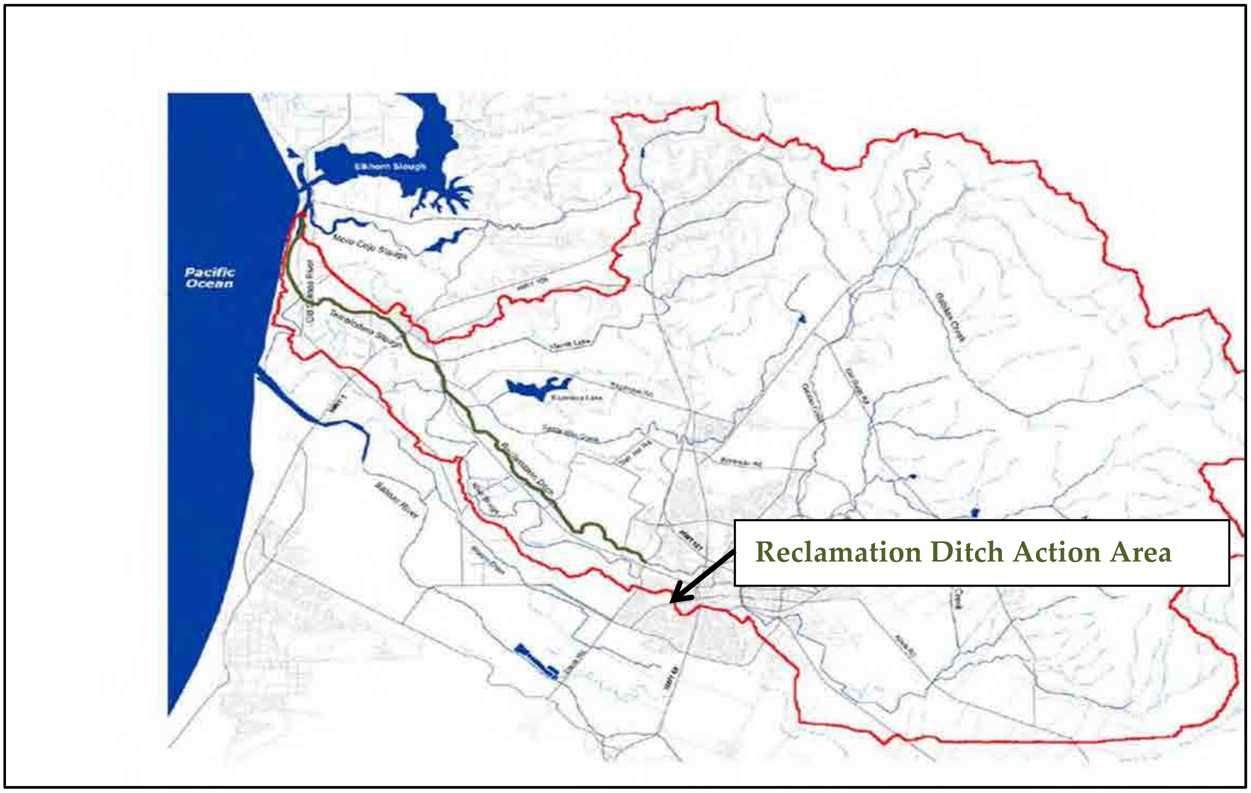


Figure 6-1. Reclamation Ditch watershed (delineated in red) and Action Area (delineated in green).

The watershed also contains the City of Salinas and portions of Castroville and Prunedale. Summer flows are predominantly agricultural tile drainage. Winter flows include storm runoff from throughout the basin (Schaaf & Wheeler 2015c).

Most of the lakes are now farmed, but still flood regularly during winter storm events and are used for detention flood storage. Following the de-watering of the original lakebeds, land subsidence of up to several feet was observed resulting in poor natural drainage of surface waters. Surface water pump stations have been installed and operated to allow continued agricultural use of these areas.

The streams of the Gabilan subwatershed are ephemeral in the upper-most sections, perennial or near-perennial in certain reaches mid-way down the range, and then again ephemeral in the lowest parts of the subwatershed as the streams begin to flow over old alluvium at the foot of the range (Casagrande and Watson 2006a,b). Upon entering the broad system of alluvial plains that is the Salinas Valley, most of the streams are ephemeral, sparsely vegetated, relatively small ditches. As they near the Cities of Salinas and Castroville, the ditches converge into wider ditches with perennial standing water in the dry season and storm runoff in the wet season. Water in the dry season is derived from urban runoff, agricultural tailwater, and permitted discharges. Finally, within a few kilometers of the coast, the ditches flow into Tembladero Slough.

Channel conditions vary widely in the Reclamation Ditch watershed (Casagrande and Watson 2006a,b). At the highest elevations in the Gabilan Range the streams are mostly ephemeral with narrow channels and gentle to moderate gradient. Channel substrate is predominantly gravel and cobble and dominant streamside vegetation is primarily oak savanna with grazed riparian woodland with mixed oak, gray and coulter pines at the highest elevations. Also, there are several seasonal ranch ponds scattered throughout this area, some of which are on-stream. Adjacent land uses are predominantly cattle ranching with State Park lands at the highest elevations (Casagrande and Watson 2006a,b).

In the steep mountain canyons of the Gabilan Range portion of the watershed, streams are typically narrow and of steep gradient (> 4%). Channel substrate is primarily cobble/boulder. Streams generally flow year-round, especially in the mid to lower elevations of this zone. Riparian vegetation is dense, usually consisting of big-leaf maples, tan oaks, white alder, and sycamore trees. The dense vegetation helps keep the water temperatures cold throughout the year (Casagrande and Watson 2006a,b). Adjacent land use is ranching (Casagrande 2001). The presence of pools, large woody debris, such as root wads and downed trees, in addition to cool water temperatures and well-oxygenated flow create suitable habitat conditions for fish (HES 2001).

In the foothills and alluvial fans of the Gabilan Range, streams are usually ephemeral in some locations with moderate slope (2-4%), smaller average substrate sizes, and shift in riparian species composition from maple and tan oak to willow, box elder, and cottonwood. Riparian vegetation is still commonly found throughout much of the foothill stream reaches, although some reaches have lost a substantial portion of their streamside vegetation (Casagrande and Watson 2006a,b). The adjacent land uses are predominantly ranching with some areas developed for row crop agriculture (Casagrande and Watson 2006a,b).

Between the foothill zone and the city of Salinas, the stream channels are modified by human development to a greater degree. Some of these still support significant amounts of native riparian vegetation but have been channelized to some extent, thus eliminating the streams ability to fully access the adjacent floodplain during high runoff events. These stream reaches have a gentle slope (< 2%), predominantly sand substrate, and in most areas lack summer flow. Adjacent land use is row-crop agriculture, residential/urban areas, and ranching lands (Casagrande 2001). Some of these stream reaches support native warmwater fish and amphibians. Other stream reaches in this zone have steep banks that are either un-vegetated or support only introduced annual weeds. Such conditions are generally of low habitat quality for riparian-associated organisms, due to the lack of overhead cover, in-channel complexity, and sources of woody/plant debris. The steep unvegetated banks are also more susceptible to erosion, particularly during high flows. Such bank erosion is a source of sediment that later accumulates in stream channels further downstream.

Most of the stream channels of lower valley bottom have been converted into ditches or drainage canals (**Figure 6-2**). These ditches generally have steep side slopes without native riparian vegetation or access to a floodplain, a substrate of primarily fine-grained sediment (mostly silts and clays), and an undefined low-flow channel. The lack of pools and in-stream complexity limits the amount of shelter or overwintering habitat for fish and amphibian species. Sections of the ditch system are occasionally lined with riprap to protect against erosion. Their dry-season flow today is artificially perennial from local urban and agricultural runoff sources (Casagrande and Watson 2006a,b). These channels are generally maintained as a drainage canal without tree canopy. The adjacent agricultural lands are used for growing table crops (leafy greens, berries, and artichokes). The growers prevent vegetation from establishing along the Reclamation Ditch banks to discourage birds and rodents from nesting near their fields (Schaaf & Wheeler 2014a). Within the City of Salinas, the Reclamation Ditch is an urban watercourse with steep sides and numerous pipe culverts or bridges with lined inverts (Schaaf & Wheeler 2014, Casagrande and Watson 2006a,b). The Reclamation Ditch generally has low gradient though at some locations, particularly bridges, there is a local increase in gradient that present impediments to fish migration (**Figure 6-3**).

Figure 6-2. Typical ditch-like channel conditions in Action Area of Reclamation Ditch.

Figure 6-3. Photos of Reclamation Ditch and Tembladero Slough including fish passage impediments.

Downstream of the Highway 183 crossing, the Reclamation Ditch becomes known as Tembladero Slough (**Figure 6-3**). At this point the slope flattens significantly, lowering flow velocity and allowing increased sediment deposition (Schaaf & Wheeler 2014)a. Tembladero Slough is a broad, gentle sloped (< 2%), sinuous channel with slow-moving, perennial flows and fresh water with salinity levels generally lower than 1.5 parts per thousand (ppt) (Casagrande and Watson 2006a,b). Riparian vegetation, which is managed by use of herbicides, is sparse, occurring in clusters. Where vegetation is present, it is usually annual weeds along with an occasional clump of willows, tules and/or watercress (Casagrande and Watson 2006a,b).

Tembladero Slough is tidally influenced from the Old Salinas River channel up to Highway 183 in Castroville (Schaaf & Wheeler 2014). Tembladero Slough joins with the Old Salinas River channel, which carries the controlled outflow from the Salinas River Lagoon, and together they form a back-beach swale that runs behind the dunes toward Moss Landing Harbor. The Tembladero-Old Salinas River confluence is just downstream of Molera Road and the Old Salinas River channel flows down through the Potrero Road tide gates to Moss Landing Harbor. This reach also has a gentle slope and meandering channel but is tidally influenced and has brackish water and salt concentration fluctuations due to the tidal cycle (Casagrande and Watson 2006a,b). The banks support vegetation tolerant of saltwater, such as pickleweed and/or salt grass. Channel substrate is fine silts and clays.

The Potrero Road tide gates are installed on the Old Salinas River channel just upstream of Moss Landing Harbor. The tide gates consist of ten box culverts each with a flap gate on the downstream side. During periods of high stream flow and low tide, the gates are opened by the differential water pressure. When the tide is high, the gates close, impeding the flow of the tide up the Old Salinas River channel. Under conditions of simultaneous high outflows and high spring tides, the gates can impede outflows and increase stage in Tembladero Slough.

6.2.3 Streamflow

The flow regime varies significantly in different parts of the watershed. The hydrology of the study area has been dramatically altered compared to natural historical conditions described previously. The impervious area has increased significantly with the expansion of the cities of Salinas and Castroville. A comparison of flow at the Gabilan Creek Gage **(Table 6-1)** just upstream of Salinas with flow at the San Jon Road, downstream of Salinas (**Table 6-2)** shows that in the middle to lower sections of the watershed, there is less standing water in the dry season, and more runoff in the wet season. The entire system is highly episodic, with little or no flow for most of the time, interrupted occasionally by large runoff events during the wet season (Casagrande and Watson 2006a,b) which is substantially different from flow conditions observed in the Salinas and Carmel Rivers **(Figure 6-4)**. Sources contributing to the stream flow vary seasonally, and include, urban runoff, agricultural tile drain water, and consistent year round discharge in the dry season and stormwater/urban runoff in the wet season (CCoWS 2014).

Table 6-1 Summary of Daily Mean Discharge (cfs) by Month for USGS Flow Data, Station 11152600, Gabilan Creek near Salinas, California, for the Period of Record (October 1970 to February 1986, June 2002 to October 2014).

Month	Minimum	Average (cfs)	Maximum
Oct	0	0.11	11
Nov	0	0.54	120
Dec	0	2.54	200
Jan	0	6.23	194
Feb	0	10.55	279
Mar	0	13.22	159
Apr	0	9.64	298
May	0	2.20	41
Jun	0	0.90	20
Jul	0	0.39	6.1
Aug	0	0.21	5.7
Sep	0	0.11	3.3

Table 6-2 Summary of Daily Mean Discharge (cfs) by Month for USGS Flow Data, Station 11152650, Reclamation Ditch at San Jon Road, for the Period of Record (October 1970 to February 1986, June 2002 to December 2013).

Month	Minimum	Average (cfs)	Maximum
Oct	0.10	6.32	163
Nov	0.03	11.6	263
Dec	0.00	16.9	310
Jan	0.20	27.8	450
Feb	0.29	32.2	401
Mar	0.61	36.6	524
Apr	1.10	22.2	473
May	0.63	8.02	91
Jun	0.27	6.10	34
Jul	0.23	5.76	30
Aug	0.38	6.06	31
Sep	0.63	5.19	58

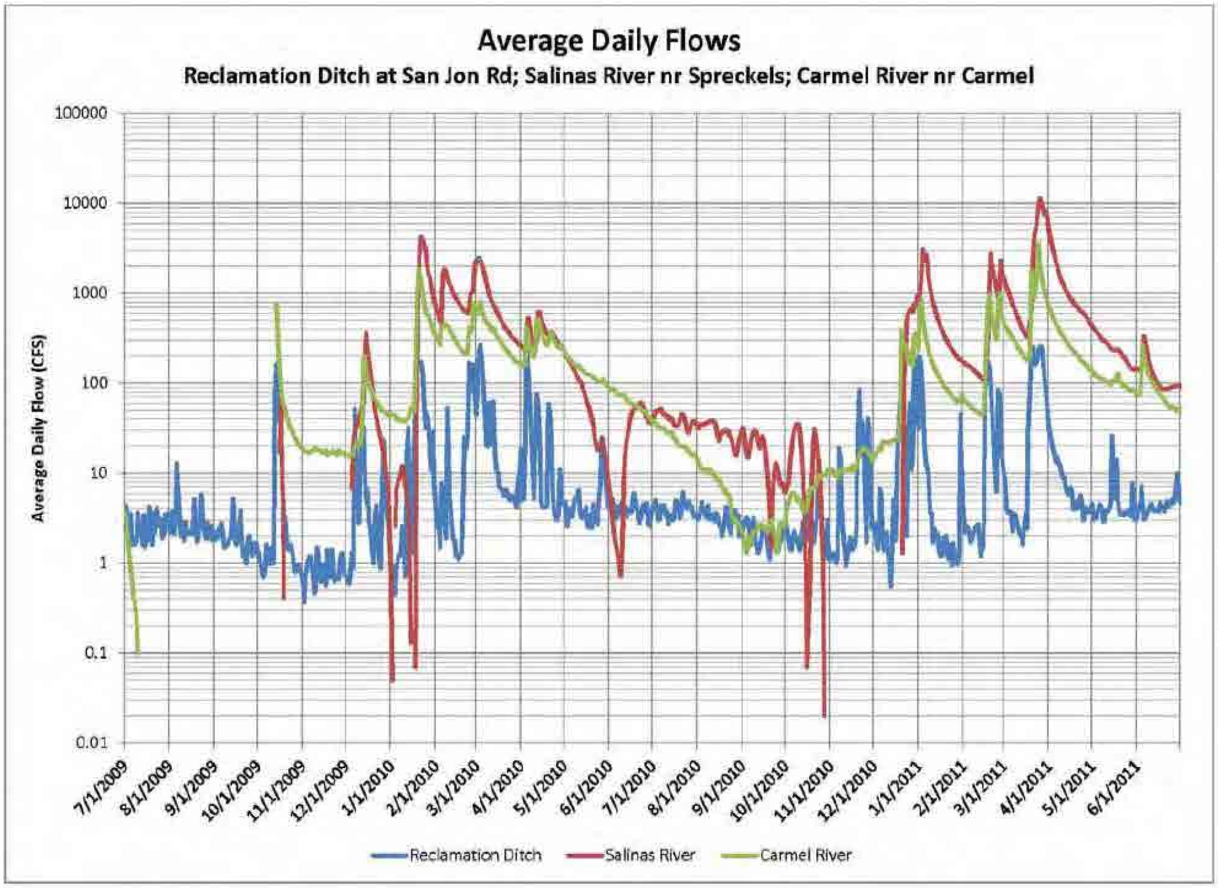


Figure 6-4. Comparison of flow conditions associated with storm events between Reclamation Ditch and the Salinas and Carmel Rivers showing the immediate, short duration response of high flow events in Reclamation Ditch (WY 2009—2011).

The USGS streamflow gage at San Jon Road (Station 11152650, Reclamation Ditch near Salinas, CA) is located just downstream of the Davis Road proposed diversion site and is relevant for this project. The period of record is 28 years and is split into October 1970 to February 1986 and June 2002 to the present. Measured daily mean discharge at the San Jon Road location ranges from 0 cubic feet per second (cfs) to over 500 cfs and is highest in December through April (**Table 6-2**). This seasonal pattern is typical of the Mediterranean climate of Central California.

The Reclamation Ditch is perennial downstream of agricultural and urban development. According to USGS records, flow west of Salinas at the San Jon Road gage only ceased on three days between 1971 and 1985, and on those days, standing water was probably still present throughout most of the Reclamation Ditch (Schaaf & Wheeler 2014a). The presence of standing water is reflective of historical conditions, since the area was a system of lakes, while the presence of dry-season flow is a consequence of dry-season urban discharges and agricultural tailwater discharge. Average annual runoff at the San Jon Road gage has declined by almost a third in recent years as water conservation practices have reduced the amount of agricultural irrigation (Schaaf & Wheeler 2014a).

There are no current instream flow requirements for fisheries or aquatic life in the Reclamation Ditch watershed. The GWR Project EIR included an evaluation of fish passage constraints, including a detailed analysis of passage constraints at the USGS San Jon gage weir located downstream of the Reclamation Ditch diversion and at the Laurel Road culvert upstream of the diversion. To improve the accuracy of fish passage analyses in the Draft EIR, Schaaf & Wheeler (2015d) conducted flow modeling and analysis (using FishXing v3.0) to determine the range of flows at these the structures that would pose obstacles to fish passage, and whether the GWR Project would reduce the likelihood of fish passage, and to understand the range of flows at which withdrawals should be curtailed to maintain fish passage. There are no other known prior studies that methodically document passage obstacles or barriers in the watershed and no studies of instream flow needs for fish species, including steelhead.

6.2.4 Water Quality

The water quality in the Reclamation Ditch is generally poor, containing high levels of nitrates and pesticides and low levels of dissolved oxygen. The Reclamation Ditch (and all of its tributary streams) are on the California Listing of Water Quality Limited Stream Segments for ammonia, fecal coliform, pesticides, nitrate, toxicity, dissolved oxygen, and other parameters, as reported under Section 303(d) of the Federal Clean Water Act (CCRWQCB 2011). The CCRWQCB Water Quality Control Plan for the Central Coast Basin (Basin Plan) designated beneficial uses of the Reclamation Ditch as including water contact recreation, non-contact water recreation, wildlife habitat, warm water fish habitat and commercial or sport fishing. Tembladero Slough is designated as having additional beneficial uses of estuarine habitat, rare/threatened/endangered species, and spawning/reproduction/early development habitat (CCRWQCB 2011).

Water quality in Reclamation Ditch has been sampled and monitored for the past 15 years under various programs, including the Central Coast Ambient Monitoring Program (CCAMP) under the RWQCB, the Central Coast Watershed Studies (CCoWS) program of the Watershed Institute at California State University Monterey Bay, and the Cooperative Monitoring Program under the Conditional Waiver of Waste Discharges from Irrigated Lands (Schaaf & Wheeler 2014a). Many of these parameters can be at levels that result in toxicity to aquatic life. CCRWQCB Order No. R3-2012-0011 (Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands) found that:

> ... toxicity resulting from agricultural discharges of pesticides has severely impacted aquatic life in Central Coast streams ... Twenty-two sites in the region, 13 of which are located in the lower Salinas/Tembladero watershed area, and the remainder in the lower Santa Maria area, have been toxic in 95% (215) of the 227 samples evaluated.

The Reclamation Ditch and Tembladero Slough are not designated for use as municipal or domestic water supply, so Total Maximum Daily Loads (TMDL) for pollutants had to be established by the CCRWQCB. The CC RWQCB adopted order R3-2013-0008 to establish certain

TMDLs for the lower Salinas River Basin in 2013. A summary of the key parameters for the Reclamation Ditch are shown in **Table 6-3.**

Table 6-3 Water Quality Parameters, Reclamation Ditch below Carr Lake

Parameter	Units	Mean	Max	Standard
Ammonia as N, Unionized	mg/L	0.029	0.25	0.025
Ammonia as NH3	mg/L	0.61	6	0.025
Chloride	mg/L	106.41	200	150
Chlorophyll a, water column	mg/L	0.016	0.15	0.015
Chlorpyrifos	mg/L	0.0016	0.055	0.00025
Coliform, Fecal	MPN/100 ml	17,954	160,001	400
Coliform, Total	MPN/100 ml	53,966	160,001	1000
Diazinon	mg/L	0.1	3.16	0.00016
Dissolved Solids, Total	mg/L	641.83	1,080.00	1000
Nitrate as N	mg/L	13	69.1	8
OrthoPhosphate as P	mg/L	0.65	12.9	0.3
Oxygen, Dissolved	mg/L	0.93	6.58	> 5.0
Suspended Solids, Total	mg/L	69.46	385	500
Turbidity	NTU	141.51	1,454.00	10

6.2.4.1 *Salinity in the Tembladero Slough*

Tembladero Slough and Old Salinas River channel, situated at the downstream reach of the Reclamation Ditch Action Area, are tidally influenced, with a well-defined halocline (higher salinity at the bottom of the channel[19]). The tidal effects are dampened by the tide (flap) gates on the Old Salinas River at Potrero Road, but brackish water still passes through the gates. The upstream migration of the saline layer is controlled, in part, by freshwater inflows that provide dilution at low flows and which push the salt water downstream at higher flows. The estuary typically sees seasonal increases in salinity, with peak levels occurring in late summer before the on-set of winter rains. Students in the Central Coast Watershed Studies Program at CSUMB studied salinity in the Tembladero Slough on several days in November 2010 and again in November 2014. Calendar year 2010 was a wet year, and also the first year that the Salinas River Diversion Facility (SRDF) was in operation. Releases from San Antonio and Nacimiento Reservoirs were increased for re-diversion at the SRDF, and while the facility was operating a minimum of 2 cfs was released to the Salinas River Lagoon, which is tributary to the Old Salinas River Channel. In 2010, the lagoon opened to the ocean on December 25 (after the 2010 sampling period was completed), and stayed open until September 21, 2011. Conversely, the 2014 sampling period came at the end of an extended drought, with record low rainfall during the period 2012-2015. The Salinas River Lagoon was last open to the ocean on January 27, 2013.

[19] Central Coast Watershed Studies Program, 2010 and 2014 reports on Spatial and Temporal Variations on Streamflow and Water Quality in the Tembladero Slough.

The SRDF was not operated during the summers of 2014 and 2015, so there were no upstream reservoir releases augmenting flows into the Salinas River Lagoon and the Old Salinas River.

The 2010 study found salinities at the lower end of the Tembladero Slough ranging from 1 to 15 parts per thousand (ppt). In 2014, salinities at that location ranged from 1 to 20 ppt. Seawater has salinity of about 35 ppt, so while there was a definite increase in salinity due to the prolonged drought, the Slough remained a brackish estuary. There were rainfall events during both the 2010 and 2014 sampling periods, and the post-rainfall sampling showed similar low salinities (under 1 ppt) in both years. The 2014 study extended the water sampling upstream into the Reclamation Ditch, and found that increased salinity extended as far upstream as Haro Road in Castroville, and that the halocline ended downstream of the town (salinity levels were uniform across the depth of the channel). Additional information about salinity in the downstream waterbodies is provided in Appendix D-4 [MCWRA's response to NMFS' protests on Water Right Applications #32263A, #32263B, and #32263C].

6.2.5 Current and Future Status of Critical Habitat and S-CCC steelhead in Reclamation Ditch watershed

Although the Reclamation Ditch watershed has been designated as critical habitat for S-CCC steelhead, there are no indications that steelhead have routinely used or even periodically used the watershed. Two PCEs occur within the Action Area of Reclamation Ditch. Reclamation Ditch Potrero Slough up to Davis Road would need to support adult and juvenile/smolt migration to and from the potential spawning and rearing reaches upstream of the Ditch. Juvenile rearing habitat potentially occurs within the estuary of Old Salinas River channel, downstream of Reclamation Ditch, however neither spawning nor rearing PCEs occur within the stream portion of the Action Area. Per above, water quality, including warm temperatures and toxic substances in combination with poor quality substrate and lack of riparian vegetation and cover render Reclamation Ditch as strictly a Migratory Corridor.

NMFS considers that Gabilan Creek contains a sub-population of S-CCC steelhead (NMFS 2013), although historically, only one steelhead has been recorded in the Reclamation Ditch watershed (HES 2015). Resident *O. mykiss* occur in the upper Gabilan Creek watershed. The only suitable S-CCC steelhead spawning and rearing habitat potentially available in the Reclamation Ditch watershed is in the upper, undeveloped reach of Gabilan Creek in the hills north of Salinas (Casagrande and Watson 2006a). Potential spawning habitat has been identified within the upper foothill and mountainous reaches of the Gabilan Range based on availability of suitable substrate (gravel/cobble) and perennial flow (Casagrande and Watson 2006a). Suitable habitat conditions for rainbow trout/steelhead are also likely to exist in the upper reaches of Alisal, Towne, and Mud Creeks (Casagrande and Watson 2006a). The extent and quality of such habitat has not been quantified.

The lower reach of the Gabilan Creek watershed is adversely impacted with fine sediment and water diversions, and upstream passage is heavily restricted by downstream fish passage barriers (Casagrande 2010). The major threats to the Gabilan sub-population include passage barriers, flow-related passage, toxic contamination and channelization (NMFS 2013). In its lower reaches, Gabilan Creek is a seasonal stream, flowing only after rain events and during wet winters and springs. Upon entering the city, Gabilan Creek passes through a series of bridges and culverts and is surrounded by mostly suburban and commercial development and some green space. This reach of the creek receives urban stormwater runoff. Gabilan Creek's confluence with the Reclamation Ditch occurs in what is the bed of normally-dry Carr Lake in central Salinas, just downstream of a set of twin culverts beneath Laurel Road (**Figure 6-5**).

Figure 6-5. Photos of passage barriers downstream of Gabilan Creek.

In 2015, Schaaf and Wheeler (2015d) evaluated passage flow requirements at Laurel Road (**Figure 6-6**). They determined that the flow thresholds for upstream and downstream passage at Laurel Road are approximately 180 and 110 cfs, respectively. According to flow data obtained from the USGS gage (USGS 11152600) on Gabilan Creek at Old Stage Road, approximately 3.5 miles north of the Laurel Road crossing, flows at that location are sporadic, and were only recorded to exceed 180 cfs on one occasion in the record (2007 – 2014).

Figure 6-6: Image of the Laurel Road culverts, downstream end, on September 4, 2014.

The Reclamation Ditch stream channel conditions are primarily ditches or drainage canals that generally have steep side slopes without native riparian vegetation (HES 2015a). Salmonid spawning and rearing habitat is absent from Reclamation Ditch (i.e., downstream of Carr Lake). Access to the upper watershed is unlikely, due to several passage barriers between the San Jon Road and upper Gabilan Creek[20]. See **Figures 6-5 and 6-6.**

[20] Schaaf and Wheeler Consulting Engineers determined that flows in excess of 180 cfs at Gabilan Creek at Old Stage Road would be required for fish passage to enter Gabilan Creek from Reclamation Ditch.

The GWR Project includes mitigation measures that will maintain and potentially improve access to Carr Lake, although potentially suitable steelhead spawning and rearing habitat is well upstream of Carr Lake. There are no known potential habitat improvement activities addressing steelhead habitat within the watershed that would improve habitat within the accessible reaches of the watershed or provide access to the potential spawning and rearing reaches. The GWR Project will also ameliorate some existing toxic water quality conditions in the Reclamation Ditch and Blanco Drain Action Areas.

As described above in section 6.1 Salinas River (subsection 6.1.4 , Status of Critical Habitat), the Old Salinas River channel, prior to it flowing into the Moss Landing Harbor, is the lowest (most downstream) portion of the Reclamation Ditch watershed. S-CCC steelhead are not expected to be found in the Old Salinas River Channel in low rainfall years (i.e., when the Salinas River Diversion Facility is not operating) and use of the lagoon Old Salinas River Channel by rearing juvenile steelhead is rare, even in years with high rainfall (HES 2016; see Appendix L).

7.0 EFFECTS OF THE PROPOSED ACTION

This section discusses the direct and indirect effects of the proposed action[21] on threatened S-CCC steelhead and its designated critical habitat from the GWR Project. The analysis in the EIR prepared in 2015 was based on the water rights application that overstates the potential effects on the S-CCC as it does not include the commitment by the local agencies to implement the terms and conditions of the protest resolution on the SWRCB Water Right Applications #32263A and #32263B that occurred in June 2016. The effects analysis is based on a prioritization of effects, giving most attention to those having the greatest potential consequences to the S-CCC steelhead and its habitat. For the more substantial effects, this section identifies which PCE of critical habitat will likely be affected and how the PCE will be affected given its baseline condition. For this project, the effects of flows on migration habitat received the highest priority. This BA quantifies these effects using flow models developed by Schaaf and Wheeler Consulting Engineers (2014 through 2016).

The analysis presented in this BA categorizes effects based on the deconstruction of the GWR Project and relationship to instream flows or construction and maintenance-related effects. Because flow-related effects are the most significant due to their long-term consequences, this section identifies which PCE of critical habitat will be affected, how the PCEs are likely to be affected given their baseline conditions, and how those changes affect the conservation value of critical habitat in the Action Area. This document then addresses effects at the larger scale of populations and critical habitat within the Action Area given baseline conditions.

7.1 Impact Analysis Overview

7.1.1 Approach to Analysis

The impact assessment addresses direct effects on S-CCC steelhead in the Salinas River and Reclamation Ditch. The quantitative assessment of potential flow-related impacts included evaluation of: (1) changes in monthly long-term flows (exceedance probability distributions based on hydrologic record of 82 years for the Salinas River and 28 years for the Reclamation Ditch) using occurrence (>10% of the time) of a 10% or more reduction in simulated diversion scenario flow conditions, relative to a baseline condition as indicators of impact; and (2) differences in occurrence of suitable fish passage conditions using percent reduction in current daily flows from suitable to unsuitable relative to meeting specified S-CCC steelhead passage thresholds as summarized in the following sections. Qualitative interpretation of flow changes, relative to general habitat conditions and water quality is also considered in the analysis.

Flow conditions resultant from the GWR Project were modeled to assess impacts within the Salinas River and Reclamation Ditch relative to the base flow condition. The modeling assumptions results are summarized in Appendix D-4 and F. Detailed hydrologic assumptions

[21] No interrelated or interdependent effects are associated with the GWR Project.

associated with development of these results were provided by Schaaf and Wheeler. The EIR in Appendix I contains more detailed analysis of the GWR Project.

7.1.2 Analytical Methods

The S-CCC steelhead impact assessment for the Salinas River relies on historic hydrologic data obtained from the USGS streamflow gage near Spreckels, approximately 3 river miles above the SIWTF, with assumptions regarding stormwater outfall and Salinas Treatment Facility outflow. By adjusting the data based on these assumptions, the historical data effectively became a baseline hydrologic modeling output against which potential alterations in flow associated with implementation the GWR Project could be compared. Specifically, the diversion assumptions are applied to the estimated (modeled) baseline flows to obtain a specific set of estimated (modeled) flows associated with each of the diversion scenarios. These "modeled flows" provide a quantitative basis from which to assess the potential impacts of the GWR Project on S-CCC steelhead passage in the Salinas River Action Area. Detailed discussion of development of the modeled flows is presented in Schaaf and Wheeler.

Raw model output included estimated daily flow for an 82-year period of record, which were conditioned to aggregate data in meaningful ways for the S-CCC steelhead evaluation. Daily estimated flow data were used to develop exceedance probability distributions (exceedance curves) by month. These exceedance probability distributions were developed from ranked and sorted data, and show the percentage of time (probability) that a given value is exceeded. These curves show the general long-term differences in flow between an evaluated diversion associated with the GWR Project and the baseline conditions.

The assessment for the Reclamation Ditch relies on historic hydrologic data from the USGS streamflow gage at San Jon Road, approximately 3 river miles below Davis Road, and modeled flow results. All of the assumptions (e.g., hydrologic conditions, climatic conditions, upstream storage conditions, etc.) are the same for both the with-project and without-project flow estimates, except assumptions associated with each modeled diversion scenario. The period of record is 28 years and is split into October 1970 to February 1986 and June 2002 to 2013. Data for the period 1970-1986 was maximum daily flow while the data from 2002-2013 was mean daily flow; therefore, only the 2002-2013 data were used in this analysis.

7.1.3 Areas of No Impact

Construction and operation of the following GWR Project components would not be located adjacent to water bodies and would have no effect on fish resources: the AWTF, SVWP modifications, product water conveyance pipelines and booster stations, and injection well facilities (**Table 3-9**).

7.2 Salinas River

7.2.1 Flow-Related Effects

7.2.1.1 Stream Flow Analysis

A quantitative analysis of the Project's effects on the Salinas River was performed by modeling the daily river flows under the baseline condition and under project conditions. The change in river flows can then be analyzed for effects on in-stream habitat by comparing relative occurrence of target flows as defined by NMFS (2007) for juvenile and smolt migration downstream and adult migration upstream.

Baseline conditions are based on historic flow data that were obtained from the USGS Spreckels gage (Station 11152500) and from data collected at the Salinas Industrial Wastewater Treatment Facility outflow to the percolation ponds and at the Salinas stormwater outfall. (**Table 7-1**)

Table 7-1 Relative Locations of Facilities in this Analysis by River Mile

Description	(Salinas River)
USGS Gage 11152500, Spreckels	13.2
Salinas Stormwater Outfall	11.2
Davis Road	10.9
SIWTF Ponds	9.2 -10.7
Blanco Road	7.5
Blanco Drain	5.1
SRDF	4.8
Analysis Point	4.7

Flows in the Salinas River were calculated using a daily time step model and aggregated on a monthly basis, using schematic presented in **Figure 7-1** as represented in the following equations:

Current Condition: $Q_{Current} = Q_{Spreckels} + Q_{Storm} + Q_{SIWTF} + Q_{BD} - Q_{SRDF}$

Project Condition: QProject = QCurrent - QStormCapture - QSIWTF - QBD Capture

Where:

$Q_{Current}$ is the estimated river flow below the SRDF

$Q_{Spreckels}$ is the USGS gaged flow in the Salinas River at Spreckels

Q_{Storm} is the stormwater discharge from Salinas (estimated by Schaaf & Wheeler)

Q_{SIWTF} is the seepage from the SIWTF ponds to the Salinas River (estimate by Todd Groundwater, with percolation rates confirmed by Water Management District)

Q_{BD} is the Blanco Drain discharge to the Salinas River (estimated by Schaaf & Wheeler)

Q_{SRDF}	is the recorded diversions at the SRDF (2010-2013 only)
$Q_{StormCapture}$	is the estimated stormwater capture at TP I
$Q_{BD\_Capture}$	is the estimated diversion from the Blanco Drain
$Q_{Project}$	is the estimated river flow below the SRDF under project conditions

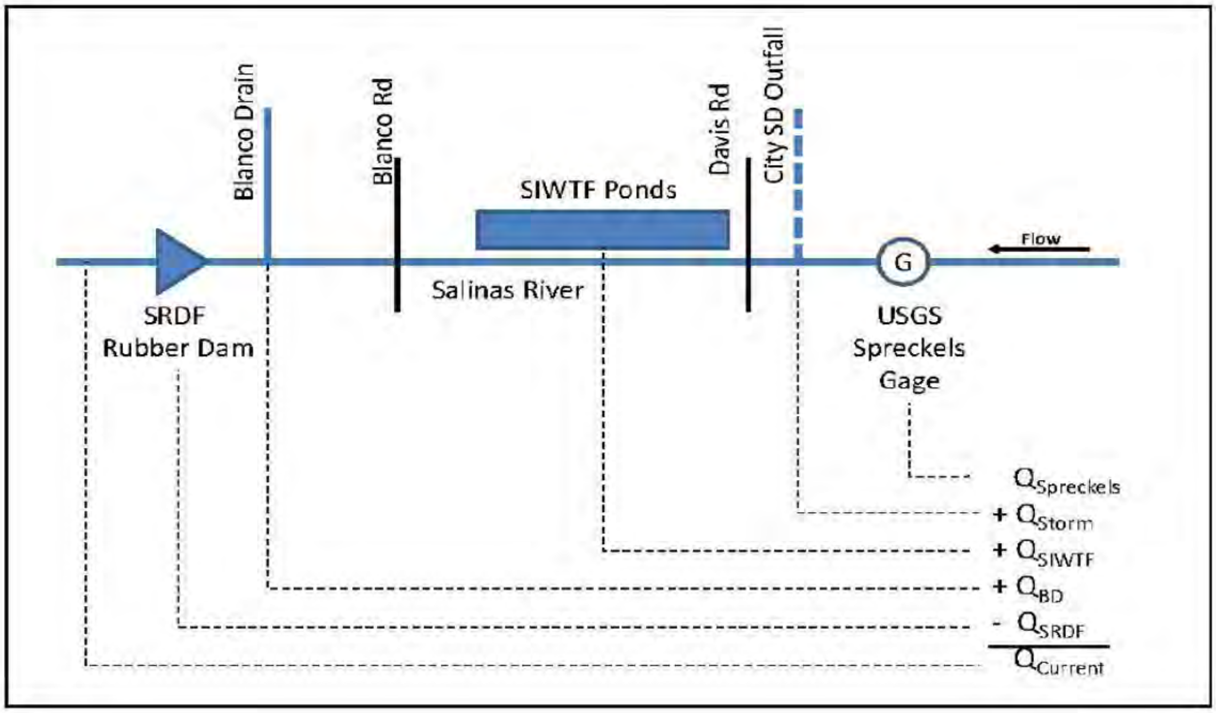


Figure 7-1. Schematic of the Salinas River Action Area showing points used in calculation of GWR Project effects on flow.

Monthly water balances for the various percolation facilities at the SIWTF were estimated for baseline and GWR Project conditions by Todd Groundwater (2015). The calculations accounted for rainfall, evaporation and percolation at the aeration pond, Ponds 1, 2 and 3, the drying beds and the rapid infiltration basins. Measurements of river flow and quality in fall 2013 indicated that about 3.0 cfs of pond percolation was flowing via subsurface flow paths into the river. Under GWR Project operation, Ponds 1, 2 and 3 would be mostly full in winter and spring and be dry in summer and fall. The change in monthly seepage into the river would therefore probably range from 0 to 3 cfs. The impact analysis here assumes a worst-case change of 3.0 cfs year-round, which would require lining the ponds to prevent percolation or diverting flows to the RTP year round.

Daily calculations were performed for the period October 1, 1931 to December 31, 2013 for baseline and GWR Project related conditions:

- Baseline =: Current condition (no diversions)

- GWR Project =: Divert Ag. Wash Water and Stormwater at TPI, and 6.0 cfs at Blanco Drain

This methodology does not consider other inflows (agricultural tile drainage and seepage from other wastewater treatment facilities) and losses (evaporation and seepage into the shallow aquifer) between the Spreckels gage and the SRDF. However, these other inflows and losses are not affected by the GWR Project, so their omission does not affect the comparison of the current condition model to the project condition models.

The modeled average annual flow totals are provided in **Table 7-2**, below. As can be seen, the proposed diversions account for less than 2% of the average annual flow downstream of the SRDF. Assuming that pond percolation would continue for more than six months per year, the reduction in average annual flow downstream of the SRDF would be less than 1%.

Table 7-2 Modeled Average Annual Flows

Case	Reduction (AFY)	Net Flow Below SRDF (AFY)	Percent of Environmental Baseline
Baseline Condition	0	301,916	100%
Divert at TP1 plus 6.0 cfs at Blanco Drain	5,017	296,899	98.34%

In 2002, the MCWRA developed the Salinas Valley Water Project (SVWP) in an effort to reduce Salinas Valley's dependence on groundwater through balancing the rate of groundwater withdrawal and recharge. The SVWP is comprised of operational changes to the Nacimiento and San Antonio Dams, modifications to the Nacimiento Dam, and construction and operation of the SRDF. During evaluation of potential environmental impacts of the SVWP, NMFS developed a Flow Prescription to minimize impacts to S-CCC steelhead and their critical habitat. This Flow Prescription relies on triggers based on a combination of reservoir conditions and stream flow to initiate and provide fish passage flows to facilitate the upstream migration of adult steelhead between February 1 and March 31 (MCWRA 2005). In 2007, NMFS issued a BO regarding the potential effects of the construction and operation of the SRDF on threatened S-CCC steelhead and their critical habitat in accordance with Section 7 of the ESA of 1973 (NMFS 2007 SVWP BO).

Essentially, the flow prescription in the NMFS 2007 SVWP BO was based on results of a critical riffle evaluation similar to the standard operating procedure (SOP) prescribed by CDFW (2013) and Thompson (1972), but using modified depth and location criteria. The analysis used increased minimum depth criteria for adult steelhead passage (**Table 7-3**) (1.0 ft) as compared to the 0.6 ft depth criteria used by MCWRA in its EIR for the project. The location of the critical depth in relation to the riffle transect was restricted to the riffle crest instead of the entire cross section of the riffle. As a result, the flow criteria identified for fish passage at Spreckels (closest location to the GWR Project area) was estimated at 150 cfs.

Table 7-3 Adult and juvenile/smolt critical depth and width passage criteria and associated flows prescribed by NMFS (2007) for the Salinas River

Life Stage	Required Flow Depth	Channel Width	Threshold Flow
NMFS (2007)			
Adult Immigration	1.0 ft	10 ft across riffle crest	150 cfs
Adult Immigration	NA	NA	260 cfs
Juvenile and Smolt Emigratoin	1.0 ft	10 ft across riffle crest	< 150 cfs

Additionally, minimum flow conditions required for downstream migration of smolts was determined based on historic frequency of flows when emigration was considered by NMFS to occur rather than the physical conditions at the critical riffles that influence fish passage, as determined using the MCWRA 2001 results obtained per implementing the SOP for evaluation of fish passage at critical riffles.

Flow prescriptions were also established for inflow to Salinas River Lagoon. The flow prescription was crafted to maintain passage conditions between the Salinas River Diversion (RM 4.8) and the lagoon and or maintain suitable habitat conditions within the lagoon when migration upstream is unlikely.

Evaluation of flow related effects of the GWR Project on S-CCC steelhead life stages that occur within the Action Area and on pertinent habitat conditions, including PCEs is therefore based on meeting the flow conditions prescribed by NMFS (2007). Those conditions and associated life stages and timing are presented in **Table 7-4** and represent the criteria used to evaluate effects of the GWR Project on S-CCC steelhead within the Action Area of the Salinas River.

The Action Area of the Salinas River is primarily a migratory corridor for upstream and downstream movement of adult and juvenile/smolt steelhead. Increased flows in the reach resulting from the flow prescriptions for the SVWP (NMFS 2007) have improved conditions for migration within the reach. The prescribed flows also target improvement in rearing conditions within Salinas River Lagoon.

7.2.1.2 Adult Migration

As described above, the GWR Project reduces inflow to the Salinas River within the Action Area by diverting City of Salinas stormwater (RM 11.2) and Salinas Treatment Facility inflow (RM 9.2-10.7) as well as from Blanco Drain (RM 5.1). Under GWR Project, diversion from Blanco Drain is assumed to be a maximum of 6 cfs and the total maximum diversion for all sources combined is 9.0 cfs. The effect of GWR Project on Salinas River flow was analyzed at RM 4.7.

Substantial flow reductions, as indicated by reductions of 10%or more, occur more frequently at lower flows simply because small reductions in flow represent a large percentage of the total flow when a 10%reduction in flow would not necessarily result in a substantial loss of migratory habitat or a substantial reduction in passage potential. Therefore, as discussed above, evaluating only the percentage of time when flow reductions of 10% or more occur may confound the analysis.

Table 7-4 S-CCC Steelhead Life Stage Flow Thresholds for Migratory Passage in the Salinas River

Life stage	Time Period*	Flow (in cfs) Required Downstream of Spreckels Gage for Migratory Passage	Source Document	Notes**
Smolt Outmigration	March through June	N/A	NMFS 2007, Page 23	In California, the outmigration of steelhead smolts typically begins in March and ends in late May or June (Titus et al. 2002).
	April through June	N/A	NMFS 2007, Page 23	Snider (1983) states that in the Carmel River, most juvenile steelhead migrate to the ocean between April and June.
	March through June	N/A	NMFS 2007, Page 74	We have assumed that properly functioning habitat conditions for this phase of the steelhead life history include substantial sustained flows for several weeks during the period of migration (late March through early June).
	March through June	150 cfs	NMFS 2007 Page 66	NMFS does not specify a smolt migration threshold flow, so the adult threshold flow of 150 cfs is considered the smolt migration threshold using the passage criteria reported in the BO.
	Year-Round with peak emigration from April through June	56	MCWRA 2001, Section 5.6	If a depth criteria of 0.4 feet is substituted in the analysis of passage transects in the Salinas River the resulting minimum passage flow estimates for downstream migration of post-spawning adults and smolts would be 112 cfs upstream of Spreckels and 56 cfs downstream of Spreckels.
		50		If it is also assumed that the 0.4 foot depth criteria were achieved over a continuous 8 foot channel width rather than 10% of the channel width, the minimum passage flow estimate would be further reduced to 59 cfs upstream of Spreckels and 50 cfs downstream of Spreckels.
	March 15 through April	300 cfs	NMFS 2007, Page 23	Based on triggers as prescribed in BO
	January through June	N/A	MCWRA 2013b, Page 3-118	Steelhead smolts may immigrate to the ocean from January through June on the receding limb of the winter hydrograph.
	December 15 through March 31	N/A	MCWRA 2013b, Page 3-119	Seaward migration of juveniles may end earlier as compared to the other coastal drainages, because a greater amount of flow is required to provide safe passage conditions in the broad, sandy Salinas riverbed and the migration from rearing habitat in the tributaries is greater than 50 miles. NMFS (2003, p. 24) noted December 15 to March 31 as the juvenile steelhead migration season, which likely considers the above factors.
	March through June	N/A	MCWRA 2013b, Page 3-128-129	Steelhead smolt migration typically begins in March and ends in late-May or June, depending on flow and passage conditions.
	Jan 15 through May	N/A	MCWRA 2013b, Page 3-134	Downstream juvenile/kelt migration (mid-January through the end of May).
Adult Immigration	December 1 through April 15	72	MCWRA 2001, Section 5.6	Based on the Thompson criteria, a flow of about 72 cfs would meet the minimum migration needs for steelhead in the Lower Salinas downstream of Spreckels and a flow of 154 cfs would meet the minimum migration criteria upstream of Spreckels. Less flow is required downstream of Spreckels since the channel is narrower and more confined in this reach.
		60		Using the less restrictive width criterion of 8 feet instead of 25%, minimum passage flow estimates for adult steelhead in the Salinas River would be 94 cfs upstream of Spreckels and 60 cfs downstream of Spreckels.
	January through May	N/A	Moyle 2002, Page 80	Adult steelhead return from the ocean to enter watersheds to spawn in SCC stream between January and May (Boughton et al. 2006)

Table 7-4 S-CCC Steelhead Life Stage Flow Thresholds for Migratory Passage in the Salinas River

Life stage	Time Period*	Flow (in cfs) Required Downstream of Spreckels Gage for Migratory Passage	Source Document	Notes**
Adult Immigration (continued)	December through April	N/A	MCWRA 2013b, Page 3-118	NMFS indicates that adult steelhead in this region migrate upstream primarily from December to April (NMFS 2007)
	November through June	N/A	NMFS 2007, Page 23	Adult steelhead migrate to fresh water between November and June, peaking in March.
	December through April	N/A	NMFS 2007, Page 69 - 70	Although the exact timing of adult upstream migration in the Salinas River is not known, data from other Central California coastal streams indicate that adult steelhead in this area migrate upstream primarily from December through April
	December through April	150 cfs	NMFS 2007, Page 66	As described in the environmental baseline (Section V.C.2), NMFS (2005c) examined the issue of adult passage flows and determined that at least 150 cfs is needed to facilitate Safe and efficient upstream passage of steelhead at Spreckels.
	February to March 15	260 cfs	NMFS 2007 Page 10	Adult steelhead upstream migration triggers will be in effect from February 1 through March 31. When flow triggers occur, MCWRA intends to facilitate upstream migration of adult steelhead by insuring flows of 260 cfs at the Salinas River near Chualar USGS gage.
* Time periods provided represent the widest range indicated by the source document. For example, if a source document indicates a time period beginning sometime in March and ending in late May or June, the time period selected includes March through June				
** Time periods are selected based on source documents evaluated (e.g., NMFS 2007, MCWRA 2013b), although the source documents may cite additional sources.				

A more direct assessment of diversion effects on steelhead migration evaluates the reduction in suitable fish passage conditions due to GWR Project. Therefore, each of the identified passage flow indicator values was evaluated. Specifically, the number and percentage of days in each month (over the entire 82-year period of record) was identified when GWR Project resulted in reducing flow from above to below a migratory flow threshold (**Table 7-5**). Suitable migration flows were reduced below each of the passage flow indicator values less than 5%of the time under GWR Project (except in December when reduction in meeting the 260 cfs criteria was 23%), relative to the baseline.

Overall occurrence of suitable adult steelhead migration conditions (i.e., meeting SVWP flow prescription, NMFS 2007) were reduced by less than 3%for both the 150 cfs and 260 cfs thresholds (**Table 7-5 and Figure 7-2**). The 150 cfs threshold was reduced a total of 59 days (0.5%) out of the 12,434 days modeled during the upstream migration period (December-April). Percent reductions in meeting the 150 cfs threshold ranged from 0.2% in December to 0.8%in February. The net change in days meeting the 150 cfs threshold (i.e., reduction in days meeting the threshold under existing conditions) was 1.2% overall (58 out of 4,841 days). Net reduction ranged from 0.73% in December to 1.74%in January.

Similarly, the 260 cfs threshold was reduced 107 days out of the 12,434 days modeled during the upstream migration period (December-April). The percent occurrence of 260 cfs or greater flows during the upstream migration period was reduced 0.9%, from 34.4 to 33.5%. Percent reductions ranged from 0.2% in January to 3.0% in December. The net change in days meeting the 260 cfs threshold was 2.5% overall (107 out of 4,223 days). Net reduction ranged from 0.6 percent in March to 22.3% in December.

7.2.1.3 Juvenile/Smolt Migration

Overall occurrence of suitable juvenile steelhead migration conditions (i.e., occurrence of threshold flows) were reduced less than 1% for both the 150 cfs and the 300 cfs thresholds (**Table 7-5**). The 150 cfs threshold was reduced a total of 37 days out of the 10,004 days modeled during the downstream migration period (March-June). In comparison to existing conditions, the percent occurrence of 150 cfs or greater flows during the upstream migration period was reduced 0.4%, from 29.7 to 29.3%. Percent reductions ranged from 0.2% in June to 0.4% in March, April and May. The net change in days meeting the 150 cfs threshold (i.e., reduction in days meeting the threshold under existing conditions) was 1.25% overall (37 out of 2,969 days). Net reduction ranged from 0.73% in March to 3.9% in June.

Similarly, the 300 cfs threshold was reduced 23 days out of the 5,002 days modeled. The percent occurrence of 300 cfs or greater flows during the upstream migration period was reduced 0.5%, from 39.0 to 38.6%. The net change in days meeting the 300 cfs threshold was 0.46% overall (23 out of 5,002 days).

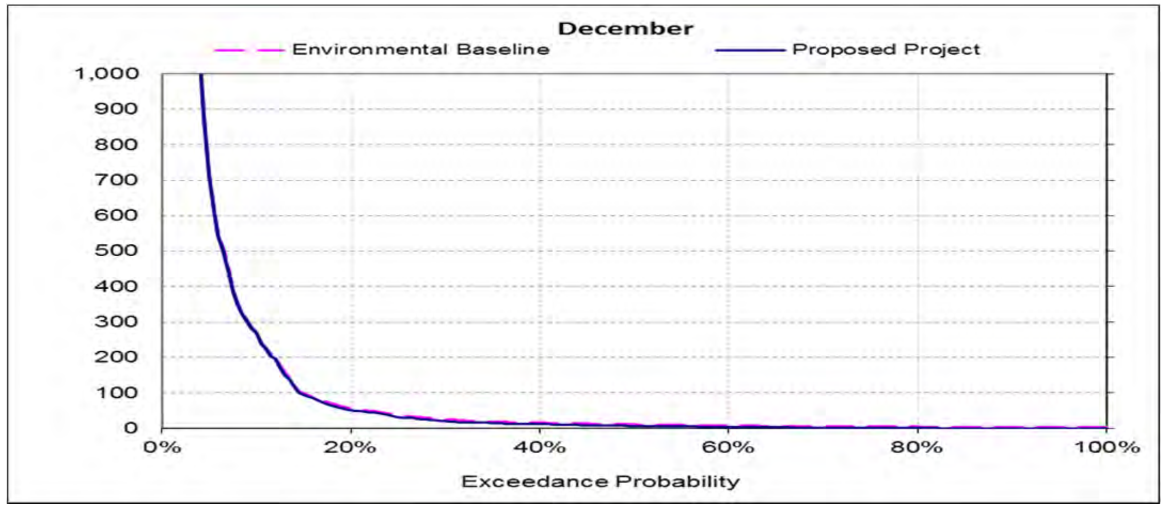
7.2.1.4 Juvenile Rearing

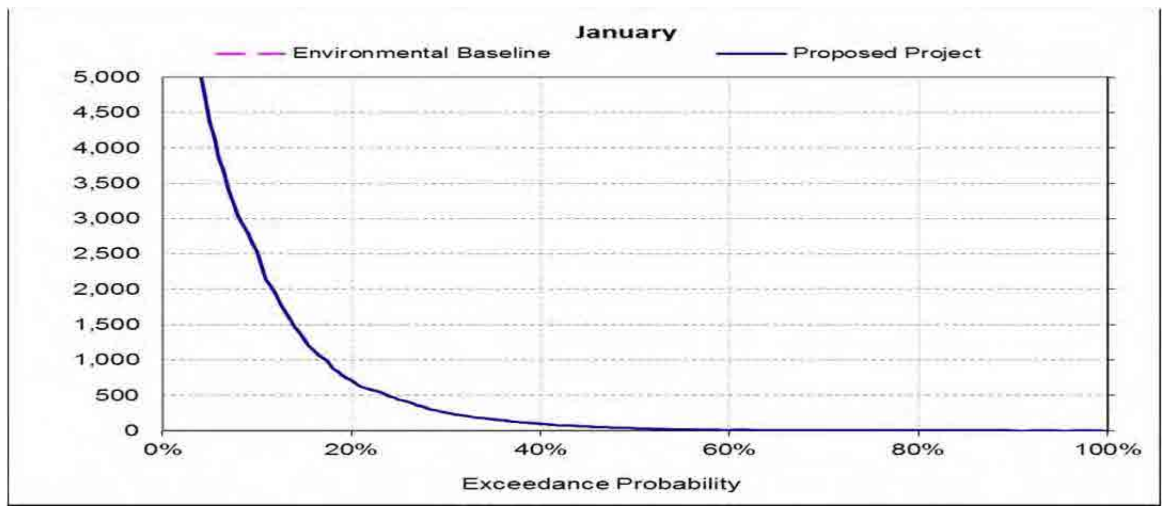
Juvenile rearing is extremely uncommon within the Action Area of the Salinas River. See Appendix L. NMFS (2007) notes that juvenile S-CCC steelhead could occasionally occur within the vicinity of the SRDF. However, poor water quality including warm temperatures and a variety of contaminants derived from Blanco Drain and other agricultural drainage flows, render this reach to essentially a migratory corridor.

Similarly, Salinas River Lagoon is considered poor steelhead rearing habitat. Occasional captures of juvenile steelhead have been reported in the lagoon. However, the Salinas River Lagoon also is primarily a migration corridor for adult and juvenile/smolt migrants.

Table 7-5 Predicted Changes to Steelhead Passage Flow Thresholds in the Salinas River Resulting from GWR Project

Life stage/ Period	Number of days meeting threshold		Percent of potential migration period meeting threshold		Change in percentage of potential migration period meeting threshold (%)	Reduction in number of days meeting threshold relative to baseline	Reduction in threshold occurrence relative to baseline (%)
	Baseline	GWR Project	Baseline	GWR Project			
Adult Upstream Migration							
260 cfs threshold							
Dec	342	265	13.3	10.3	3	77	22.51
Jan	758	753	29.8	29.6	0.2	5	0.66
Feb	1,074	1,064	46.4	45.9	0.4	10	0.93
Mar	1,203	1,196	47.3	47	0.3	7	0.58
Apr	846	838	34.4	34.1	0.3	8	0.95
All	4,223	4,116	34	33.1	0.9	107	2.53
150 cfs threshold							
Dec	342	337	13.3	13.1	0.2	5	1.46
Jan	919	903	36.2	35.5	0.6	16	1.74
Feb	1,220	1,202	52.7	51.9	0.8	18	1.48
Mar	1,363	1,353	53.6	53.2	0.4	10	0.73
Apr	997	987	40.5	40.1	0.4	10	1.00
All	4,841	4,782	38.9	38.5	0.5	59	1.22
Juvenile Downstream Migration							
150 cfs threshold							
Mar	1,363	1,353	53.6	53.2	0.4	10	0.73
Apr	997	987	40.5	40.1	0.4	10	1.00
May	455	444	17.9	17.5	0.4	11	2.42
June	154	148	6.3	6.0	0.2	6	3.90
All	2,969	2,932	29.7	29.3	0.4	37	1.25
300 cfs threshold							
Mar	1,156	1,144	45.5	45.0	0.5	12	0.24
Apr	797	786	32.4	32.0	0.4	11	0.22
All	1,953	1,930	39.0	38.6	0.5	23	0.46


December
Environmental Baseline
Proposed Project
1,000
900
800
700
600
500
400
300
200
100
0
0%
20%
40%
60%
80%
100%
Exceedance Probability


January
Environmental Baseline
Proposed Project
5,000
4,500
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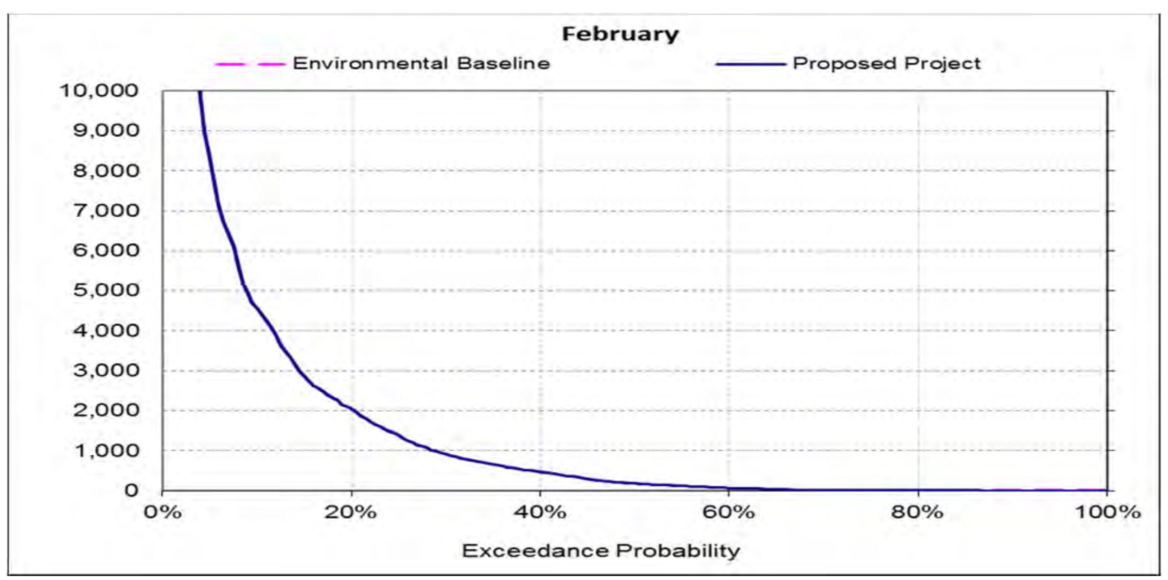
Exceedance Probability


February
Environmental Baseline
Proposed Project
10,000
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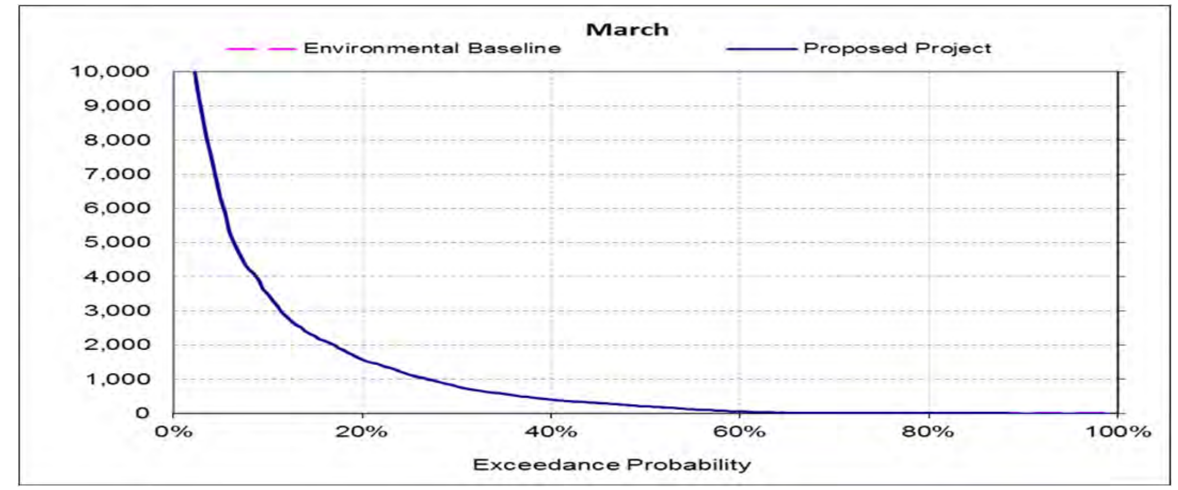
Exceedance Probability


March
Environmental Baseline
Proposed Project
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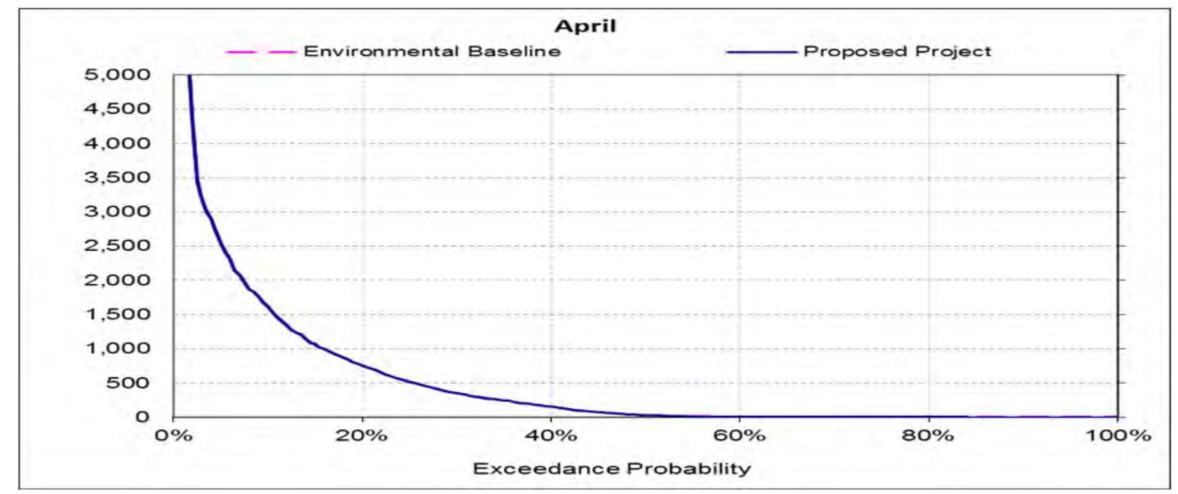
Exceedance Probability


April
Environmental Baseline
Proposed Project
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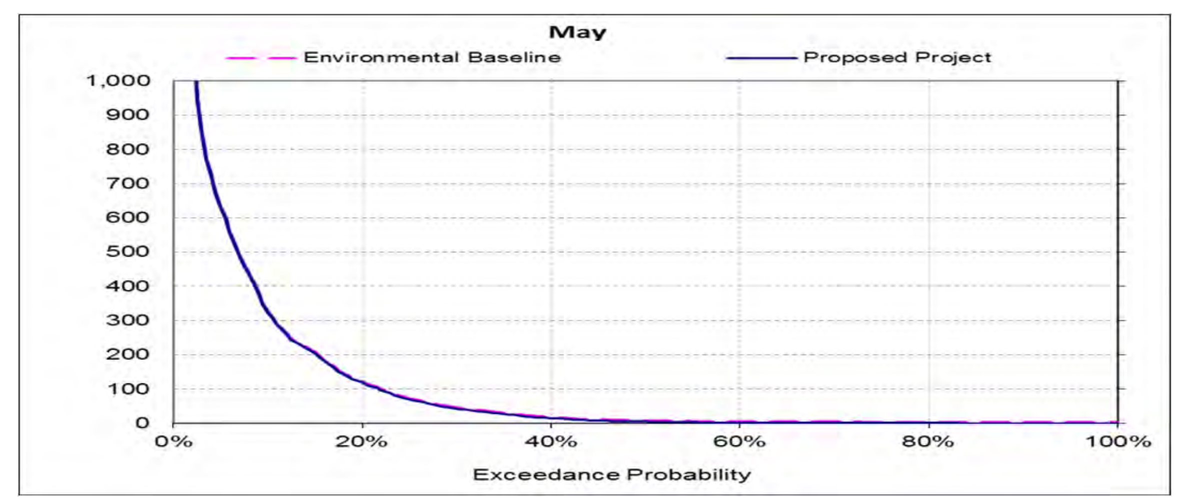
Exceedance Probability


May
Environmental Baseline
Proposed Project
1,000
900
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100%
Exceedance Probability

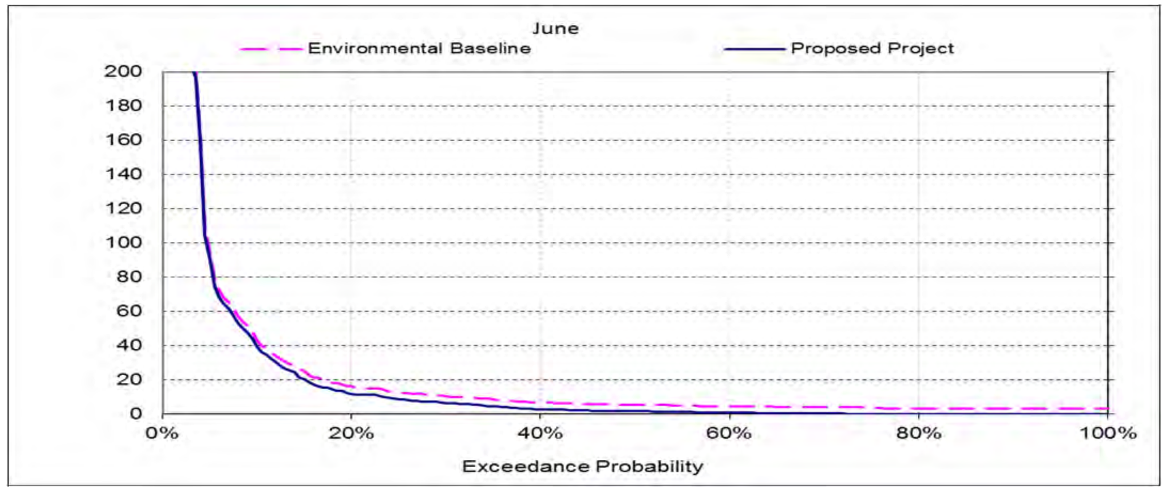


Figure 7-2. Comparisons of monthly flow exceedance probability distributions of modeled daily flows for the environmental baseline and the GWR Project for the December through June migration periods.

7.2.2 Salinas River Lagoon

7.2.2.1 Lagoon Maintenance Flows

During development of flow bypass requirements for the SVWP, NMFS addressed the influence of the various factors affecting the lagoon, primarily those affecting rearing habitat conditions. They addressed breaching and freshwater inflow noting that in late spring, summer, and fall, habitat quality depends primarily on the timing of sandbar formation and on the quantity and quality of freshwater inflows to the lagoon after sandbar formation (Smith 1990).

Agricultural crops in areas adjacent to the lagoon are planted as low as 5.5 ft. NGVD with roots extending one to two feet below the ground. Direct flood hazards to adjacent farmland occur when lagoon water surface elevations exceed about 6.0 ft. NGVD (Habitat Restoration Group et al. 1992). Currently, MCWRA is managing water elevations in the lagoon to remain at depths of approximately two to three feet. Hagar (2005) calculated the Salinas River lagoon volume for various stage heights. According to Hagar (2005), two feet of depth corresponds to 492.4 ac-ft. of lagoon volume. Increasing the stage height to four feet would increase the volume to 878.3 AF, nearly doubling the available juvenile steelhead rearing habitat. Increasing the stage height to four feet will not cause flooding of surrounding farmlands nor should it interfere with the root zone of adjacent crops.

Additional freshwater inflows to the lagoon would improve water circulation, decrease salinity, decrease water temperatures, and dilute pollutant concentrations (including pesticides and nutrients) (Habitat Restoration Group et al. 1992). In late spring, summer, and fall, habitat quality depends primarily on the timing of sandbar formation and on the quantity and quality of freshwater inflows to the lagoon after sandbar formation (Smith 1990). Smith (1990) found that adequate inflows to Pescadero, San Gregorio, and Waddell Creeks after bar formation resulted in rapid conversion of the lagoons to unstratified fresh water, relatively cool water temperatures, high dissolved oxygen levels and high invertebrate abundance.

Dillon (2005) as reported in NMFS (2005c) reviewed two water quality reports that analyzed pesticide concentrations in agricultural drain water discharged via the Blanco Drain to the Salinas River. In order to protect juvenile steelhead rearing in the lagoon, Dillon (2005) showed Blanco Drain would need to be either: 1) diluted at least six times in order to not harm steelhead through reduction of their prey base (which leads to a reduced growth rate and increased mortality); 2) have zero runoff from Blanco Drain to the Salinas River; or 3) divert and treat the Blanco Drain runoff before returning it to the Salinas River.

Flows to the lagoon will need to continue after the critical temperature threshold (26°C) is reached to maintain water quality for juvenile steelhead. Flows need to be sufficient to maintain the lagoon elevation at a minimum of four feet NGVD throughout the summer and fall, until the first storm of the season; and to dilute pesticide drainage from Blanco Drain to a level non-toxic to steelhead and their prey base. Additionally, the rate of water exchange through the lagoon will need to be sufficient to avoid eutrophication of the lagoon water and prevent rearing juvenile steelhead from being subjected to hypoxia, hyperoxia and/or hypercapnia2. Therefore, dissolved oxygen concentrations need to remain above 7 mg/liter and dissolved carbon dioxide levels need to remain below 10 mg/liter.

To pursue improvement of rearing conditions within the lagoon, NMFS prescribed flow bypass conditions for the project along with implementation of lagoon monitoring program to adaptively manage the lagoon as needed. A separate, ongoing consultation was established addressing lagoon management activities requiring Corps permitting. Management requirements beyond those prescribing flow in the SVWP BO, are subject to that consultation. The requirements and issues addressed by the SVWP BO are per the following (NMFS 2007, 2005c)

April through July Juvenile Passage to Lagoon

- A minimum of 150 cfs from Spreckels through the diversion impoundment;
- a minimum of 45 cfs when the river mouth is open, and 15 cfs when the river mouth is closed, from the diversion impoundment to the lagoon;
- flows occur from April 1 until water temperature at the diversion reaches 26°C for three consecutive days, during wet and normal years.

June through December Lagoon Maintenance Flows

- Flows to the lagoon continue after temperature threshold is met;
- flows maintain a four-foot water elevation in the lagoon during summer and fall;
- flows maintain DO concentrations above 7 mg/l and CO_2 levels below 10 mg/l in the lagoon;

The combined diversions of all three proposed source waters in the Salinas River watershed (Salinas urban runoff, agricultural wash water, and Blanco Drain) would reduce flows in the Salinas River at Blanco Drain by less than 1% total on an annual average basis, and would not affect water levels in the Lagoon, which is maintained by a weir on the outlet to the Old Salinas River. USGS data and county gage data demonstrate that even with the Salinas River dry during the driest year on record (2014), the water levels in the Lagoon were consistent with historic water levels. **Table 7-6**, below, shows the average monthly water level in the Lagoon during 2013 and 2014. Note that even when the Salinas Treatment Facility ponds were dry (July to November 2014), the average lagoon water levels were comparable to the previous year when the ponds were full.

Table 7-6 Salinas River Lagoon Stage (ft)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2013	9.7	10.2	10.3	10.3	10.5	10.3	10.3	10.4	10.4	10.1	10.1	10.1
2014	10.1	10.3	10.7	10.4	10.3	10.3	10.6	10.5	9.7	9.5	10.0	11.8

Notes: 1. CDEC Station SLG, maintained by MCWRA, datum not specified 2. Lagoon was open to the ocean from 12/12/2013 to 1/28/2013, and remained closed through September 2015 or later. Daily average flow at Spreckels gage was 0 cfs from 11/11/2013 to 12/12/2014. 3. SRDF operated 4/8/2013 to 11/8/2013, but not in 2014. 4. Salinas Treatment Facility flows diverted to MRWPCA 4/2/2014 to 11/26/2014. Ponds were empty by 7/1/2014.

The proposed agricultural wash water, Salinas stormwater, and the Blanco Drain diversions upstream of the SRDF would reduce some inputs to the Salinas River and Lagoon. The highest reduction in Salinas River flow within the Action Area would occur when SVWP is not operating and groundwater recharge releases are not being made from Nacimiento and San Antonio Reservoirs. During such infrequent periods, estimated flow downstream of Blanco Drain to the Lagoon would primarily be derived from agricultural runoff within the lower 5-plus miles of the river. Schaaf and Wheeler (2016) (**Table 7.7**, Appendix E) conservatively estimated inflow to the Lagoon during the late-spring through summer would range from 1.1 to 1.7 cfs, which is nearly equivalent to the minimum bypass required during this period when the SVWP is in operation and subject to NMFS flow prescription (NMFS 2007, 2005)[22].

Due to the very small percentage change in total Lagoon inflows resulting from the GWR Project (less than 1%), Lagoon elevations would not decrease due to the reductions in flow entering Old Salinas River and no measurable salinity changes to the Lagoon would occur. Removal of Blanco Drain flow would however improve water quality and potential rearing conditions in the Lagoon by reducing the pollutant load and decreasing the amount of water required to dilute pollutants.

Table 7-7 Estimated In-Flows to the Salinas River from Areas below Blanco Road

	Blanco Drain		Scaled to Areas Below Blanco Rd.		
Month	Applied Irrigation + Precipitation	17 percent return	Average Return Flow Rate	17 percent return	Average Return Flow Rate
	AF	AF	cfs	AF	CFS
January	1,229	209	3.4	77	1.2
February	1,314	223	4	82	1.5
March	1,446	246	4	90	1.5
April	1,481	252	4.2	92	1.5
May	1,323	225	3.7	83	1.4
June	1,613	274	4.6	100	1.7
July	1,629	277	4.5	102	1.7
August	1,436	244	4	89	1.5
September	1,080	184	3.1	67	1.1
October	989	168	2.7	62	1
November	782	133	2.2	49	0.8
December	1,088	185	3	68	1.1
Totals	15,410	2,620		961	

[22] Per NMFS (2005c), flow at Spreckles USGS gage was considered to accurately indicate flows to the Salinas River Lagoon and to the River Diversion Facility Impoundment between April 1 and June 30.

7.3 Reclamation Ditch

7.3.1 Flow-Related Effects

The EIR's analysis of the GWR Project effects on steelhead in the Reclamation Ditch watershed focused on fish passage constraints, primarily at the San Jon weir (**Figure 7-3**). The analysis also addressed effects on the tidally influenced reaches of the Action Area, and on water quality within the Reclamation Ditch Action Area. Baseline conditions used in the analysis of the Reclamation Ditch are based on historic flow data obtained at the USGS San Jon Road gage (Station 11152650). The GWR Project condition evaluated in the EIR was based upon the seasonal flow by-pass rates in the water right application. The GWR Project will implement fish passage mitigation measure BF-2a per the approved MMRP and the proposed terms and conditions agreed upon by the agencies as reflected in a letter from NMFS to SWRCB dated August 23, 2016 confirming dismissal of NMFS's water rights protest. The final water right permit includes the additional conditions agreed upon by NMFS, which requires the diversion to cease during periods when migratory fish passage may occur. Based on the analysis conducted in the EIR, input from NMFS during the consultation and water rights process, and additional analysis conducted during the SWRCB's water rights process, the GWR Project may affect, but would not be likely to adversely affect fish passage and downstream habitat.

7.3.2 Fish Passage Analysis

The effect of the GWR Project on fish passage in Reclamation Ditch included an iterative sequence of the determination and applicability of passage flow requirements (passage thresholds). As discussed below, HES (2015a,b) estimated passage thresholds that they considered to have a 30% margin of error. NMFS (2015) considered these threshold estimates unuseable for evaluating project effects on fish passage and recommended a more robust evaluation of passage flow requirements primarily for the San Jon Road impediment. As a result, a more rigorous and accurate evaluation was conducted by Schaaf and Wheeler (2015). The analysis indicated that the effect of the range in estimated passage thresholds did not make a substantive difference in an analysis of the GWR Project effects on fish passage at San Jon Road.

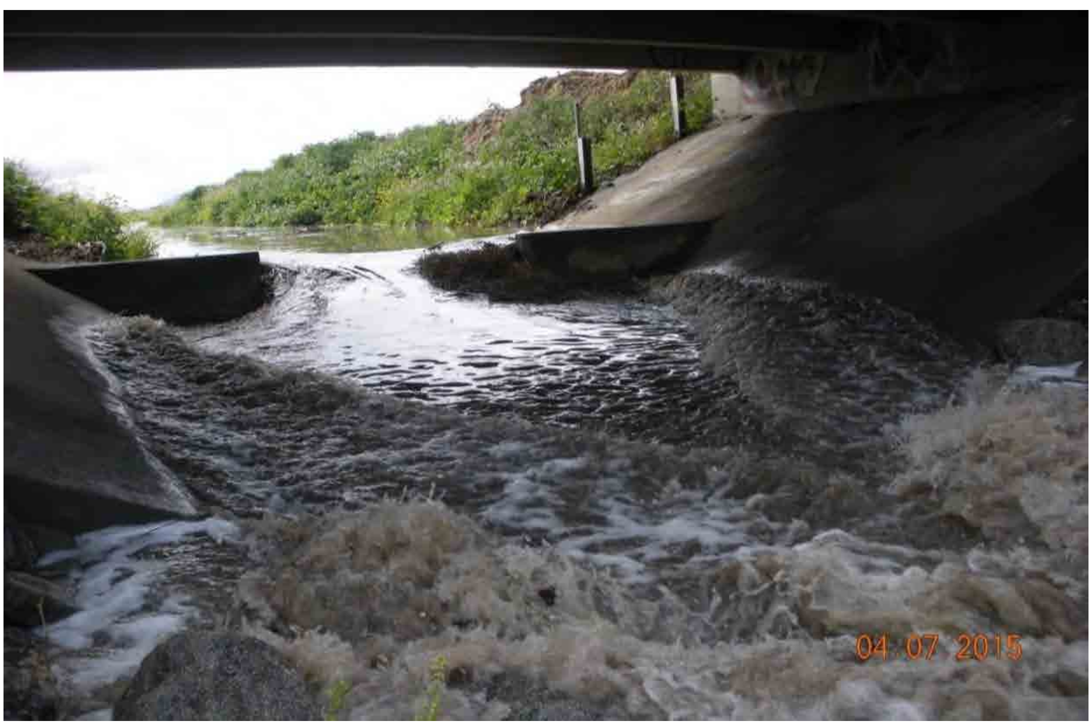


Figure 7-3. Field images of flow through the San Jon Road weir at flow rates of (upper image) 30 cfs and (lower image) 65 cfs

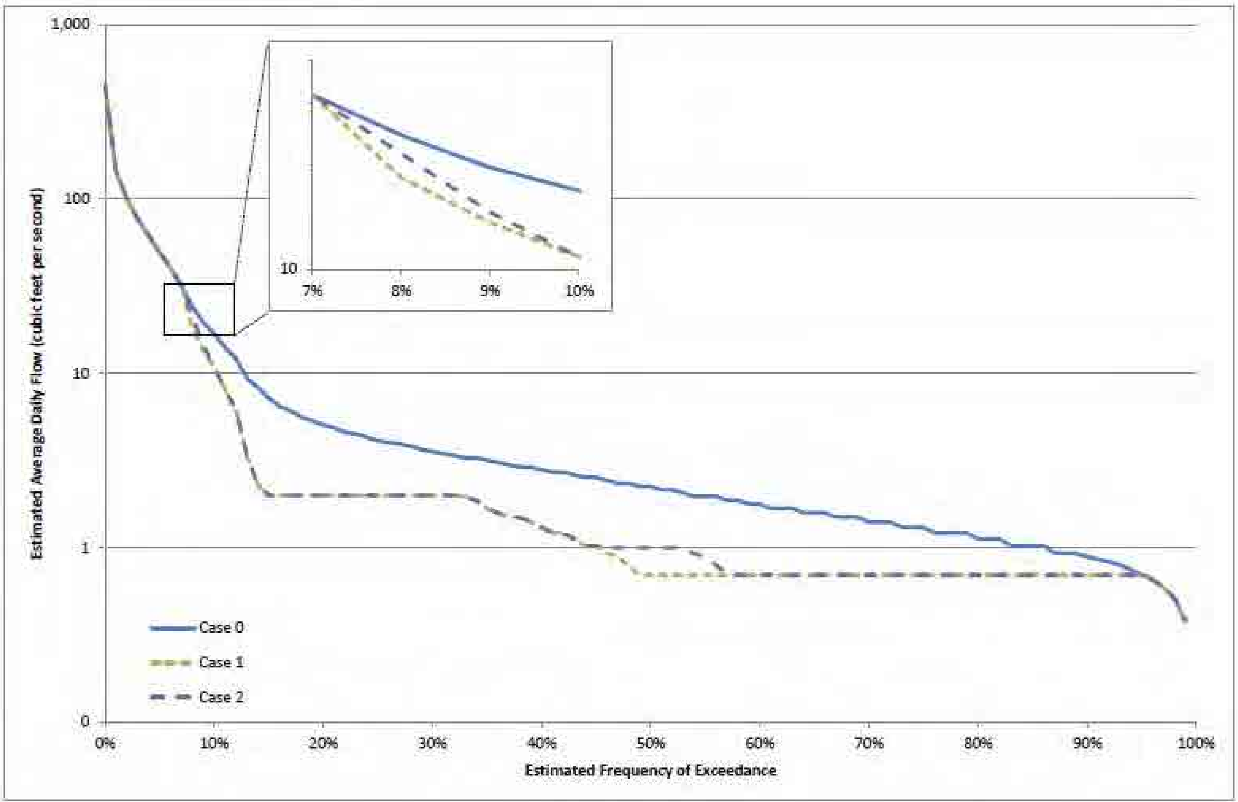
HES (2015a,b) evaluated the effect of GWR Project diversions at Davis Road on S-CCC steelhead by determining the flows required to provide suitable fish passage conditions at San Jon weir and Boranda Road for upstream adult passage (December—April) and downstream smolt passage (March—May). The analysis included estimating the flow required to sustain suitable conditions for the targeted life stages. The flow requirements, or flow passage thresholds, were estimated based on using channel geometry measurements and Manning's equation to make an approximation of minimum passage flow needs. Based on maintaining flow depths for the passage of adult and juvenile salmonids (0.6 ft and 0.4 ft respectively), the passage flow threshold estimates were 78 cfs for upstream passage and 31 cfs for downstream passage at San Jon Road and 32 cfs and 11 cfs respectively at Boronda Road **(Table 7-8).**

Table 7-8 Minimum Passage Flow Estimates (in cfs) for Steelhead Migration in Reclamation Ditch Downstream of Davis Road

Location	Adult	Smolt
San Jon Road (USGS gage weir)	78 cfs	31 cfs
Boronda Road critical riffle	32 cfs	11 cfs

Source: HES (2015)

The flow by-pass conditions proposed in the water right application and analyzed in the EIR (as discussed in Appendix Q of the EIR), the Reclamation Ditch diversion had the potential to reduce the number of fish passage opportunities downstream of the proposed diversion site. However, the final water right permit requires that the diversion cease when in-stream flows reach 30 cfs on a rising hydrograph (allowing upstream migration to occur up to and past the diversion point under all circumstances), and that it not restart until in-stream flows decline to 20 cfs on a falling hydrograph (allowing for no reductions in out-migration opportunities). This permit condition prevents any reduction in fish migration opportunities, as shown in Figure 7-4 (Flow Exceedance graph from the Water Availability Analysis). As can be seen, there is no reduction in the occurance of passage flows above 30 cfs. The reduction of flows between 10 cfs and 20 cfs occurs on rising hydragraphs when out-migration is not occuring.



Case 0: Current condition, Reclamation Ditch at Davis Rd.
Case 1: Project condition; Up to 6 cfs diversion, seasonal bypass of 0.7 cfs (Jun-Nov) / 2.0 cfs (Dec-May), cease diverting per EIR conditions
Case 2: Project condition; Up to 6 cfs diversion, seasonal bypass of 1.0 cfs (June)/ 0.7 cfs (Jul-Nov)/ 2.0 cfs (DEC-May), cease diverting per NMFS agreement

Figure 7-4. Flow Frequency Analysis Reclamation Ditch at Davis Rd. Daily Flow Data

7.3.3 Water Quality

A benefit of the proposed GWR Project is that it can accept waters of marginal quality as source water because of the proposed routing through the sanitary sewer collection system to the MRWPCA Regional Treatment Plant and then to the existing tertiary treatment or the proposed advanced treatment system. Water diverted from the Reclamation Ditch will remove a portion of the current pollutant load from the streams (**Table 7-9**). The water quality within the streams may not noticeably improve, particularly in the summer months when the source flows are mainly agricultural tile drainage. The reduction in pollutant-loaded flows should have a positive effect on the water quality in the Moss Landing Harbor below Potrero Road tide gates and in the Monterey Bay.

Pollutant removal was estimated by Schaaf and Wheeler (2015) using the conversion formula 1 mg/L = 2.7 pounds/ac-ft. The tables below show the estimated pollutant removal due to diverting 6 cfs at Davis Road in a year when 1,611 AFY can be diverted due to higher, more sustained flow conditions over extended time periods. The current annual average flow total and load is included for comparison.

Table 7-9 Estimated Pollutant Removal at Davis Road, 6 cfs capacity (Source: Schaaf & Wheeler, 2015)

Pollutant	Concentration.	Flow	Load	Flow	Load
	(mg/L)	(AFY)	(lb./yr.)	(AFY)	(lb./yr.)
Ammonia as N, Unionized	0.029	7,640	597	1,611	126
Ammonia as NH3	0.61	7,640	12,581	1,611	2,653
Chloride	106.41	7,640	2,195,025	1,611	462,852
Chlorophyll a, water column	0.016	7,640	332	1,611	70
Chlorpyrifos	0.0016	7,640	32	1,611	7
Diazinon	0.1	7,640	2,058	1,611	434
Dissolved Solids Total	641.83	7640	13,239,724	1 611	2,791,780
Nitrate as N	1,300	7640	268,084	1 611	56,529
OrthoPhosphate as P	0.65	7,640	13,327	1,611	2,810
Suspended Solids, Total	69.46	7,640	1,432,718	1,611	302,108

The Proposed Project will divert a larger portion of the available flows from Reclamation Ditch in the summer months (June to October), which may result in increased salinity near the water surface, and/or longer periods of salinity accumulation in the Tembladero Slough before seasonal flushing by winter runoff. Diversions from the Reclamation Ditch would be most needed by the Project during dry years when irrigation demands are highest. Due to the tidal influence, water levels in the Tembladero Slough would not be noticeably affected by the project, so wetland species would not see a loss of wetted habitat, only an increase in the duration of periods of higher salinity that would remain within the normal range of salinities currently experienced by aquatic species in the system. Information prepared during the SWRCB water rights protest process also demonstrated that water quality downstream would not be adversely affect by the Reclamation Ditch diversion.

7.3.4 Downstream Effects to Lagoon and Estuary

The proposed diversions in the Reclamation Ditch watershed would not result in any changes to water surface elevation in, or flows to or from, the Salinas River Lagoon due to the operation of the slide gate between the lagoon and the Old Salinas River, and the relative elevations and flows of the two water bodies (i.e., flow from Tembladero Slough moves north in the Old Salinas River towards Moss Landing Harbor, not south toward the Salinas River Lagoon, although some backwatering occurs on the tidal cycle). Technical analysis prepared for the Final EIR in Master Response #4 contains a description of the downstream effects of the GWR Project on the lagoon and estuaries (see Consolidated Final EIR, Volume III, Section 3.4). Additional supplemental information on this issue can be found in Appendices D-4, E, F, and G.

7.4 Carmel River

While outside of the scope of this consultation, the GWR Project likely will have beneficial, indirect effects on the Carmel River S-CCC steelhead population. Analysis of the indirect effects of the GWR Project on the Carmel River and its steelhead population and designated critical habitat is based on estimated magnitude and timing of reduced pumping from the Carmel River alluvial aquifer. Water Management District has developed estimates of the potential increase in the amount of habitat that would be reestablished in the Carmel River as a result of the reduced pumping, including estimates of potential increases in juvenile and adult steelhead production. The results of the evaluations are presented as the basis for discussion of indirect of effects of the GWR Project on Carmel River steelhead (Water Management District 2008[23], 2015).

Implementation of the GWR Project would facilitate Cal-Am's ability to reduce pumping from the Carmel River Aquifer by approximately 3,500 AFY. The result of the reduction in pumping is an increase in surface flow in the Carmel River from near RM 14.5 to the Carmel River Lagoon. However, these inferred, secondary benefits cannot be predicted to any degree of certainty or magnitude. Water Management District (2008) concluded that the first two levels of diversion cuts would likely be insufficient to permanently re-water very much habitat, year round in all water years. The full amount of benefits are not expected to be realized until a new water source is established, which allows Cal-Am to completely cease its illegal diversion.

7.5 Construction Effects

7.5.1 Habitat Modification Due to Construction of Diversion Facilities.

Construction of the proposed Reclamation Ditch diversion could indirectly result in habitat modifications for endangered or threatened fish species as a result of construction activities and dewatering the construction sites.

Construction of diversion structures at the following sites could result in indirect temporary modifications to potential steelhead fish habitat in the Reclamation Ditch. As previously indicated, the Reclamation Ditch watershed has the potential to support steelhead trout as potential salmonid habitat exists upstream of the proposed diversion sites.

Construction at the Blanco Drain Diversion site is addressed below. No direct effects to habitat would occur due to Blanco Drain Diversion construction because no habitat for fisheries exists at the site. There would be no construction impacts at the other GWR Project sites as none are located adjacent to water bodies, and there would be no improvements constructed within an aquatic habitat at those sites.

7.5.2 Source Water Diversion and Storage Sites

7.5.2.1 Reclamation Ditch

Potential construction-related effects to steelhead would be avoided and reduced to less than adverse levels by implementation of Mitigation Measures BF-1a and BF-1b[24] that would limit

[23] Testimony of Kevan Urquhart Monterey Peninsula Water Management District, July 23 - 25, 2008.
[24] MRPWCA adopted the GWR Project MMRP on October 8, 2015 thereby committing to implementing these mitigation measures.

construction to periods when migratory steelhead would not be present and that would require implementation of best management practices (BMPs).

Dewatering the channel by the coffer dam would represent a short-term temporary impact to aquatic habitat and aquatic species within the construction area, including potential steelhead migration habitat. This would be a potentially significant impact if dewatering occurred during steelhead migration periods. A dewatering plan has been prepared and submitted to the SWRCB and the Regional Water Quality Control Board as part of the Clean Water Act, Section 401 Water Quality Certification application (Appendix H). The SWRCB and/or Regional Board must approve the plan and issue a Water Quality Certification prior to implementation of construction of the source water diversion facilities at this site.

7.5.2.2 Blanco Drain

No fish species have been observed in Blanco Drain. It is highly unlikely that steelhead would occur within Blanco Drain due to the configuration of the outlet to the Salinas River, which poses a complete barrier to fish passage, and the extremely poor water quality in the drain. None the less, in order to assure construction of the Blanco Drain facility do not harm or otherwise adversely affect steelhead, potential construction-related effects to steelhead would be avoided and reduced to less adverse levels by implementation of Mitigation Measures BF-1a and BF-1b[25]. These measures would limit construction to periods when migratory steelhead would not be present and that would require implementation of best management practices (BMPs). As stated above, a dewatering plan has been prepared and submitted to the SWRCB and the Regional Water Quality Control Board as part of the Clean Water Act, Section 401 Water Quality Certification application (Appendix H). The SWRCB and/or Regional Board must approve the plan and issue a Water Quality Certification prior to implementation of construction of the source water diversion facilities at this site.

[25] Ibid.

8.0 CUMULATIVE EFFECTS

8.1 Identification of Cumulative Projects

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the Action Area considered in this BA. Future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation pursuant to Section 7 of the ESA.

The geographic scope for cumulative impact analysis of biological fisheries resources consists of the Reclamation Ditch, Salinas River and Carmel River watersheds. The fisheries cumulative analysis focuses on the cumulative projects that could adversely affect surface water flows and water quality in addition to the GWR Project. A list of relevant projects provided in the EIR (MRWPCA/DD&A 2015) was reviewed to identify projects that would meet the conditions identified above. No projects were considered potential cumulative projects under the ESA.

9.0 CONCLUSIONS AND DETERMINATIONS

This section contains the conclusions and determinations regarding whether the Proposed Action is likely to adversely affect S-CCC steelhead or its designated critical habitats within the Action Area. The conclusions in this BA are based on the best scientific and commercial data available, and NMFS and CDFW requirements and guidance, and are intended to assist NMFS in reaching its determinations regarding project-related effects to listed fish species during the formal ESA consultation process.

Three possible determinations exist regarding a proposed action's effects on listed fish species or their designated critical habitats under the ESA (USFWS and NMFS 1998). These determinations are as follows:

No effect – "*No effect*" is the appropriate conclusion when it is determined that the proposed action will not affect a listed fish species or designated critical habitat.

May affect, but is not likely to adversely affect – "*May affect, but is not likely to adversely affect*" is the appropriate conclusion when effects on ESA protected species are expected to be discountable, insignificant, or completely beneficial. "*Insignificant effects relate to the size of the impact, and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur (USFWS and NMFS 1998).*"

May affect, is likely to adversely affect – *"May affect, is likely to adversely affect"* is the appropriate conclusion if any adverse effect to listed fish species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant or beneficial. In fact, in the event the overall effect of the proposed action is beneficial to an ESA-protected species, but also is likely to cause some adverse effects, then the proposed action "*is likely to adversely affect*" the listed fish species. If incidental take is anticipated to occur as a result of the proposed action, an "*is likely to adversely affect*" determination should be made (USFWS and NMFS 1998).

The analyses presented in Section 7.0 of this BA were conducted to assist NMFS in making these determinations and in determining whether the Proposed Action will cause "…*some deterioration in the species' pre-action condition" (National Wildlife Federation v. NMFS*, 524 F.3d 917, 930 (9th Cir. 2008)).

9.1 South-Central California Coast Steelhead

The evaluations in this BA of the effects of the Proposed Action include an evaluation of whether S-CCC steelhead in the Action Area have the ability to tolerate changes in the magnitudes of stressors operative under the Environmental Baseline. These evaluations suggest that S-CCC steelhead is not in "a state of precarious survival" and may have the capacity to tolerate some incremental adverse effects without tipping the population "into a state of likely extinction".

However: 1) the applicability of the criteria addressing extinction risk is questionable; and 2) issues surrounding the VSP parameters of "abundance, population growth and diversity", especially regarding Reclamation Ditch or the Gabilan Creek sub-population confound the ability to make conclusions regarding viability of steelhead in the Action Area. As such, the determination of the effect of the GWR Project on the S-CCC steelhead population viability **should focus on the difference** in viability parameters **with and without the project.**

9.1.1 Salinas River and Reclamation Ditch

Relative to the Environmental Baseline, the Proposed Action affecting steelhead and its critical habitat within the Salinas River and Reclamation Ditch watersheds will not result in any substantial increase in the magnitude of the effect of any stressor, or in the exposure of steelhead to any new identified stressors. Thus, the Proposed Action will not: 1) result in an increase in probable risks to individuals that are likely to be exposed to the Proposed Action's effects on the environment; 2) change the risks to those individuals sufficiently to increase extinction risk (or reduce the probability of persistence); or 3) change the extinction risk (or probability of persistence) of Salinas River or Reclamation Ditch steelhead populations sufficiently to increase the extinction risk (or reduce the probability of persistence) of the DPS that is comprised, in part of the these waters' populations.

The GWR Project will maintain or improve water quality in both Reclamation Ditch and downstream environs, and in the Salinas River and downstream environs such that the potential for improving conditions within the lagoon and estuarine environs of these watersheds is enhanced. Poor lagoon and estuarine conditions, including water quality, have been identified by NMFS (2013) as major stressors to the S-CCC steelhead population in the Lower Salinas River (includes Reclamation Ditch/ Gabilan Creek and Salinas River). Additionally, avoiding reductions in flow conditions ascribed by NMFS (2007) as providing suitable migration opportunities in the Lower Salinas River and implementation of the GWR Project mitigation measures that result in avoidance of reduction in opportunity for migrations in Reclamation Ditch remove the potential for flow related adverse effects on S-CCC steelhead and its designated critical habitat within Salinas River and Reclamation ditch.

As part of the SWRCB process for the water rights permits for the Blanco Drain and Reclamation Ditch, the local agencies, NMFS, and CDFW have agreed upon terms and conditions to be included in the permits to further reduce any impacts to the S-CCC steelhead, which are provided in Appendix M. Pursuant to these terms and conditions, the GWR Project would include operational requirements for diverting water from Blanco Drain and from the Reclamation Ditch. For the Blanco Drain diversion, the water right permit will include a requirement to bypass 2 cfs of flows from the Blanco Drain to the Salinas River Lagoon between April 1 and October 31, under specific conditions. This continued inflow of water to the river will be provided to ensure that lagoon levels do not decline substantially and that periodic flushing flows will continue in the Old Salinas River which currently receives flow from the lagoon on a regular basis. In most conditions, the diversions of water that currently flow to the Salinas River were determined to likely improve aquatic habitat conditions in the Lower Salinas

River by reducing pollutant loads. Additionally, design features of the Proposed Action from the avoidance and minimization measures included in the approved Mitigation, Monitoring, and Reporting Plan (MMRP) have been incorporated into the Project which will further reduce the effects of the Proposed Action to the S-CCC steelhead. See Appendix C. In addition, the proposed design of the Reclamation Ditch diversion has been reviewed and approved by the fish passage engineer at NMFS and determined to be protective of fish passage conditions. See Appendix N.

9.1.2 Carmel River

Although the potential effects on the Carmel River are outside the scope of this consultation, it is important to note that the Proposed Action would result in an indirect, beneficial effect on S-CCC steelhead and its designated critical habitat in the Carmel River and on the DPS by improving habitat conditions within the Carmel River. Potential indirect benefits include 1) decrease in probable risks to individuals (i.e., individuals migrating, spawning and rearing downstream of RM 14.5; 2) improvement to the probability of persistence of steelhead in the Carmel River BPG; and 3) contribution to decreasing the risk of extinction of the overall S-CCC population. The Proposed Action likely will result in a positive effect to the PCEs or stressors resulting in a risk reduction to S-CCC steelhead and related steelhead critical habitat in the Carmel River BPG.[26]

9.2 Critical Habitat

The Proposed Action will not result in any substantial adverse changes to designated critical habitat PCEs or their management for S-CCC steelhead. No substantial increases in the intensity, frequency, and duration of stressors to S-CCC steelhead designated critical habitats in the Action Area under the Environmental Baseline will occur under the Proposed Action.

9.3 Determinations

Determinations of effects take into account both the magnitudes and probabilities of occurrence of effects to listed fish species and their designated critical habitats resulting from the Proposed Action. Stressors and their magnitudes to steelhead under both the Environmental Baseline and the Proposed Action are presented in **Table 9-1**. Relative to the Environmental Baseline, the Proposed Action will not result in any substantial increases in the magnitudes of effects, or probabilities of occurrence, of stressors to listed species, and will not result in any substantial changes to designated critical habitat PCEs or their management for S-CCC steelhead in the Action Area. This BA therefore concludes that the Proposed Action "*may affect, but is not likely to adversely affect*" S-CCC steelhead and its designated critical habitat.

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[26] NMFS Draft EIR comment letter commends the Proposed Project for addressing the unauthorized pumping of the Carmel River and adverse impacts on S-CCC steelhead in the Carmel River. NMFS states support of the use of recycled water to reduce Cal-Am's diversions from the Carmel River system by up to 3,500 AFY. See Final EIR Letter E Comments and Responses.

Table 9-1 Steelhead stressors and associated relative magnitudes in the Salinas River and Reclamation Ditch under the Environmental Baseline and the Proposed Action.

Stressor	Salinas River and Reclamation Ditch	
Environmental Baseline Relative Magnitude	**Environmental Baseline Relative Magnitude**	**Proposed Action Relative Magnitude**
Flow-Dependent Habitat Conditions		
• Spawning Habitat Availability	Medium	Medium
• Flow Fluctuations and Redd Dewatering	Low	Low
• Fry and Juvenile Rearing Habitat Availability	Medium	Medium
• Fry and Juvenile Stranding and Isolation	Low	Low
Water Quality	Medium	Medium
Water Temperature	High	High
Passage Impediments/Barriers		
San Antonio Dam	Very High	Very High
Nacimiento Dam	Very High	Very High
Salinas Dam	Very High	Very High
St Jon Gage	Medium/High	Medium/High
Boronda Road	Low	Low
Laurel Road	Medium/High	Medium/High
Physical Habitat Alteration		
Natural River Morphology and Function	Medium/High	Medium/High
Floodplain Habitat Availability	Medium	Medium
Riparian Habitat and Instream Cover (riparian vegetation, instream woody material)	High	High
Estuary/Lagoon	Medium	Medium
Hatchery Effects genetic considerations	Low	Low
Angling and Poaching	Low	Low
Predation	Low	Low
Non-native Species	Medium	Medium

10.0 ESSENTIAL FISH HABITAT

An assessment of the GWR Project effects on essential fish habitat (EFH) within the Action Area showed that starry flounder (*Platichthys stellatus*) EFH would not be adversely affected.

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH is the aquatic habitat (water and substrate) necessary for fish to spawn, breed, feed, or grow to maturity (50 CFR Part 227, March 19, 1988) that will allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem. The following important components of EFH must be adequate for spawning, rearing, and migration:

- Substrate composition
- Water quality
- Water quantity, depth, and velocity
- Channel gradient and stability
- Food
- Cover and habitat complexity
- Space
- Access and passage
- Habitat connectivity

Review of digital maps prepared by NMFS depicting EFH showed the presence of Pacific Coast Groundfish EFH in the Action Area. The Pacific Coast Groundfish Fishery Management Plan (PFMC 2014) has designated EFH for 80-plus species of Groundfish, which taken together include all waters from the high-water line, and the upriver extent of saltwater intrusion in river mouths along the coast from Washington to California. The Groundfish EFH evaluation within the Action Area addresses starry flounder (*Platichthys stellatus*).

10.1 Starry Flounder

The starry flounder is managed by the Pacific Coast Groundfish Fishery Management Plan of the Pacific Fishery Management Council. "Composite habitats" most important for the starry flounder are estuarine habitats (for all life stages), nonrocky shelf habitats (for juveniles and adults), and shallow coastal habitats (for eggs and larvae), as defined by the fishery management plan (PFMC 2014).

Before the late 1980s, the starry flounder was common in both the commercial and recreational fisheries of northern and central California (CDFG 2001). Historically, most of the commercial catch was made by bottom trawl, but during the 1980s, many starry flounders were also taken by gill and trammel nets in central California. During the late 1980s, commercial landings declined sharply and remained at relatively low levels through the 1990s. From 1992 through 1999, landings averaged only 62,225 pounds, ranging from a low of 25,353 pounds in 1995 to a high of 100,309 pounds in 1999. This is in contrast to annual landings of more than a million pounds during the 1970s and half a million pounds in the 1980s. The recreational catch of starry flounders is from piers, boats, and shore, usually in estuarine and adjacent coastal waters. The estimated annual recreational catch for this species in California from 1981 to 1989 averaged 40,000 fish. The recreational catches, like commercial landings, declined dramatically during the 1990s. Catch estimates from 1993 through 1999 averaged 6,000 fish per year, and ranged from a high in 1998 of 15,000 fish to lows in 1994 and 1996 of 3,000 fish. Ralston (2005) estimated starry flounder catches in the California trawl and sport fisheries from 1993 to 2004 to range between 20 and 67 metric tons (mt) (**Table 10-1**)

Table 10-1 Estimated landings of starry flounder in California trawl and sport fisheries, 1993—2004.

Year	Trawl (mt)	Sport (mt)
1993	30	6.8
1994	17.3	3.8
1995	15	3.8
1996	27.8	3
1997	45.8	3
1998	61.5	6
1999	48	3.8
2000	28.5	5.3
2001	49.5	9
2002	30	5.3
2003	29.3	6.8
2004	29.3	6.8

Starry flounders range from Korea and Japan north to the Bering and Chukchi seas and the coast of Alaska to southern California, although they are uncommon south of Point Conception. The starry flounder is primarily a coastal species, living on sand and mud bottoms and avoiding rocky areas. Though found to depths of 900 feet, this species is much more common in shallower waters. Starry flounders are frequently found in bays and estuaries and are tolerant of brackish and fresh water. Tagging studies have not demonstrated extensive migrations, although there is some movement along the shore. Seasonal inshore-offshore movements of these fish have been observed, likely related to spawning.

The distribution of the starry flounder tends to shift with growth. Young juveniles are commonly found in fresh or brackish water; older juveniles range from brackish to marine water; and adults tend to live in shallow marine waters within and outside San Francisco Bay before returning to estuaries to spawn (Reclamation 2008).

Starry flounder has been found in the Salinas River Lagoon (HES 2015). Starry flounder are common to Elkhorn Slough (Brown 2002, Yoklavich et al. 1991), but numbers appear to be declining (Brown 2002).

10.1.1 Life History

Most spawning by the starry flounder occurs in shallow waters near the mouths of rivers and estuaries during the winter. In central California, December and January are the peak months of spawning. Hatching occurs from 3 to 15 days after spawning depending on temperature. Metamorphosis from larvae to juvenile occurs 39 to 75 days after hatching. Females grow faster and reach larger sizes than do males. In central California, most males are sexually mature at 2 years and an average 14.5 inches, and most females mature at 3 years and 16 inches. The maximum size reported is 36 inches.

Eggs and larvae of the starry flounder are epipelagic, while juveniles and adults are demersal. Larvae are approximately 2 mm long at hatching and they start settling to the bottom after two months at approximately 7 mm in length. Metamorphosis to the benthic juvenile form occurs at 10 to 12 mm and sexually immature juveniles range in size from 10 mm to 45 cm, depending on sex (Orcutt 1950). Transforming larvae and juveniles depend on ocean currents to keep them in rearing areas near estuarine areas and the lower reaches of major coastal rivers (Goals Project 2000). Starry flounder tend to rear for up to two years in estuarine areas before moving to shallow coastal marine waters. Adults can occur in estuaries or their freshwater sources year-round (e.g., San Francisco Bay and estuary, Puget Sound). Starry flounder have been observed in Salinas River Lagoon during spring and fall surveys (Hagar 2015a,b 2014). Females begin maturing at 24 cm and three years, but some may not mature until 45 cm and four to six years. Males begin maturing at two years and 22 cm, but some may not reach maturity until four years and 36 cm (Orcutt 1950). Maximum age is reported as 21 years and maximum length is 915 mm.

Starry flounder larvae feed on planktonic organisms, while young juveniles feed primarily on copepods and amphipods. As they grow, their diet changes. Five-inch fish have developed jaws and teeth that allow them to crush small clams and pull worms from their burrows. Sand dollars, brittle stars, and fish are included in the diets of larger starry flounders. Wading and diving seabirds such as herons and cormorants, as well as marine mammals such as harbor seals, feed on juvenile starry flounders in estuaries.

10.1.2 Habitat Requirements

Starry flounder is considered a euryhaline fish but are commonly observed in freshwater portions of the estuaries. Starry flounder have been observed in inland waters with salinity ranging from about 0.06 to 9.0 ppt, a variation from freshwater to brackish water with salinity about one-quarter that of the ocean. Starry flounder generally prefer tidal, low-gradient areas that have sandy or muddy bottoms (PFMC 2014). Most found in fresh water are young of the year (YOY). Abundances may be lower during dry years, but young are more likely to be found farther upstream, The smallest fish are generally found farthest upstream, and seek areas with higher salinity as they grow (PFMC 2014). Thus, from April to June, most YOY are living in salinities of less than 2 ppt, but by July and August they have shifted to salinities of 10 to 15 ppt. Water temperatures may also influence distribution because starry flounder are usually found at 50 to 68°F. Starry flounders less than about 8 inches in length encountered in freshwater are likely mostly migrants from salt water, rather than fish that have reared there (Moyle 2002).

In the San Francisco estuary, some smaller flounders may have originated from spawning within the estuary, but most are apparently carried into San Francisco Bay from nearshore ocean waters by strong tidal currents along the bottom (PFMC 2014). These currents are strongest during years of high outflow from the rivers; consequently, juvenile starry flounder tend to be most abundant in the estuary during wet years (Moyle 2002). Higher abundances may be related to the greater extent of low-salinity rearing areas and the greater abundance of food organisms preferred by small flounder. Summertime abundance of YOY starry flounder in San Francisco Bay, for example, is closely related to discharge into the bay during the previous winter (Reclamation 2008).

10.1.3 Population Decline

No studies have been conducted to determine the population size of the starry flounder, but commercial landing and recreational catch trends suggest that the California population is now at extremely low levels. Reasons for the decline are uncertain, but fishing pressure is likely a factor. Moyle (2002) suggests that the decline may be related to changing estuarine conditions or to changes in fishing regulations that reduce catch. State Water Project and Central Valley Project fish salvage facilities in the Delta recorded average monthly salvage records for the starry flounder for the period from 1981 to 2002 as 187 fish per month at the CVP pumps and 77 at the SWP pumps (Reclamation 2008).

The large population decline suggested by fishery trends is substantiated by a fishery independent trawl survey conducted by CDFG in the San Francisco estuary from 1980 through 1995. Results of this survey show abundance of age-0 and age-1+ starry flounder dropping dramatically during the late 1980s and remained at low levels through the 1990s (Reclamation 2008). Recruitment is determined largely by survival of larval and juvenile fish. Given the importance of bays and estuaries to the young of this species, the continued environmental health of these areas may be the most important factor in maintaining healthy populations of starry flounder.

10.2 EFH Evaluation

Starry flounder EFH within the Action Area is restricted to the estuarine environs of Salinas River Lagoon and the Elkhorn Slough complex. The potential effect of the project on habitat conditions within these areas was assessed by evaluating the proposed water diversions effects on hydrology and water quality within the estuaries relative to existing conditions. The evaluation focused on project incurred changes in water surface elevation and salinity. Water surface elevation is related to depth, area of inundation and dynamics (tidal). Changes in water surface elevations would indicate potential changes in habitat associated with littoral areas of the estuaries (e.g., shallow water habitat, cover, and complexity). Changes in salinity could affect vegetation and food production as well as, habitat availability.

Results of the analysis of Project effects on water surface elevation and salinity (Schaaf and Wheeler 2015e, MRWPCA and MCWRA 2015) show that the Project will not adversely affect EFH (see Appendix G). Analysis reported in the EIR evaluation found that implementation of all proposed source water diversions would not result in measurable or detectable water level changes in the Salinas River Lagoon, Old Salinas River Channel, Moss Landing Harbor, Elkhorn Slough, Moro Cojo Slough, and Monterey Bay/Pacific Ocean. The EIR reports that stable water surface elevations would be maintained and thus proposed changes to flow would not adversely affect conditions in downstream water bodies that support habitat, even during the summer months and drought years when all or a large majority of the proposed diversions would occur.

Specifically, no detectable changes in the amount or areas of inundation (and corresponding soil saturation/moisture and plant uptake) would occur in these water bodies; therefore no adverse impacts on aquatic habitats (including wetland and riparian), and no reduction in fish passage or habitat, are anticipated due to the combined diversions from the GWR Project. The proposed diversions would reduce the volume of freshwater entering the system, particularly in the dry summer months, and could result in increased salinity within these already brackish channels. The GWR Project includes minimum in-channel by-pass flows for habitat protection. These minimum flows are consistent with the actual flows measured during the late summer and fall seasons of typical drought conditions. The slight increase in salinity that would occur in some months of each year is within the normal fluctuation of the existing, background conditions.

10.3 Conservation Measures

The Ground Fish FMP identifies various conservation measures associated with non-fishing effects to EFH. Measures applicable to the described GWR Project-related actions include maintaining suitable water quality for the various life stages using an estuarine environment, suitable morphology and vegetation and access to the variety of habitats temporally necessary to starry flounder within an estuary.

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APPENDICES

Appendix A Clean Water State Revolving Fund Application

Appendix B Clean Water Act Section 404 Permit Application

Appendix C Resolution No. 2015-24 – A Resolution of the Board of Directors of the Monterey Regional Water Pollution Control Agency to (1) Certify the Final EIR for the Pure Water Monterey Groundwater Replenishment Project, (2) Adopt California Environmental Quality Act Findings, (3) Approve Mitigation Measures and the Mitigation Monitoring and Reporting Program, (4) Adopt a Statement of Overriding Considerations, and (5) Approve the Project as Modified

Appendix D Documents related to Previous Consultation with National Marine Fisheries Staff

Appendix E Evaluation of Inflow to Salinas River Downstream of Blanco Drain

Appendix F Fish Passage Analysis, Reclamation Ditch at San Jon Road and Gabilan Creek at Laurel Road

Appendix G Salinity Impacts to Elkhorn Slough Resulting from Surface Water Diversion for the Pure Water Monterey Groundwater Replenishment Project

Appendix H Clean Water Act Section 401 Water Quality Certification Application for the Pure Water Monterey Groundwater Replenishment Project (excluding Biological Assessment for USFWS that was submitted separately)

Appendix I Consolidated Final EIR for the Pure Water Monterey Groundwater Replenishment Project, certified October 8, 2015 (prepared by Denise Duffy and Associates, Inc. for MRWPCA)

Appendix J NMFS Biological Opinion for the Salinas Valley Water Project, June 21, 2007

Appendix K National Marine Fisheries Service. 2013. South-Central California Coast Recovery Plan. West Coast Region, California Coastal Area Office, Long Beach, California

Appendix L Pure Water Monterey Groundwater Replenishment (GWR) Project – Likelihood of Steelhead presence in the Salinas River Lagoon and Old Salinas River Channel (prepared by HES Environmental, July 19, 2016)

Appendix M National Marine Fisheries Service's Dismissal of Protest to Water Rights Applications 32263A, Blanco Drain, and 32263B, Reclamation Ditch, Monterey County, with Final Protest Dismissal Terms, August 23, 2016

Appendix N NMFS' confirmation of acceptance of Conceptual Design Plan for the Reclamation Ditch Diversion Design (September 30, 2016)