HB

United States Department of the Interior

BUREAU OF RECLAMATION
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cc: Howard

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Sacramento, CA

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Maria Rea
Supervisor, Central Valley Office
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
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Subject: Request for Consultation under Section 7 of the Endangered Species Act

Dear Ms. Rea: Maria,

The Bureau of Reclamation proposes to implement The Lower American River Anadromous Fish Habitat Restoration Program (proposed action), which includes several related anadromous fish habitat restoration activities in the Lower American River between Nimbus Dam (river mile [RM] 23) and State Route 160 Bridge (RM 2). The purpose of the proposed action is to restore, enhance, and protect aquatic and riparian habitat suitability to facilitate increases in the overall anadromous fish production of the Lower American River. The proposed action will implement a suite of river corridor restoration activities through December 31, 2039, including gravel augmentation, floodplain and side channel habitat enhancements, and placement of woody material.

Enclosed is a Biological Assessment (BA) addressing the proposed action's potential effects on National Marine Fisheries Service-Jurisdictional Species and Essential Fish Habitat for Pacific Salmon in support of initiating formal consultation under Section 7(a)(2) of the Endangered Species Act. As described in the enclosed BA, Reclamation has determined that the proposed action: (1) *may affect and is likely to adversely affect* Central Valley (CV) steelhead, and *may affect, but is not likely to adversely modify* their critical habitat, (2) will have *no effect* on CV spring-run Chinook salmon, yet *may affect, but is not likely to adversely modify* their critical habitat, and (3) will have *no effect* on Sacramento River winter-run Chinook salmon. While take of listed CV steelhead and some habitat modification may occur during construction activities associated with habitat restoration, these impacts will be short-term and the long-term benefits of the resulting habitat improvements will far outweigh the short-term effects on the listed species. Additionally, it is determined that the proposed action is *not likely to eliminate or significantly diminish or disrupt* Essential Fish Habitat for Pacific salmon inhabiting the Lower American River.

We request concurrence with these determinations by the National Marine Fisheries Service.

If you have any questions or need additional information regarding this request, please contact Michele Palmer at 916-414-2414 or mpalmer@usbr.gov.

Sincerely,

Susan M. Fry
Area Manager

Enclosure

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RECLAMATION

Managing Water in the West

Lower American River Anadromous Fish Habitat Restoration Program

Biological Assessment for NMFS-Jurisdictional Species and Essential Fish Habitat for Pacific Salmon

U.S. Department of the Interior
Bureau of Reclamation

March 2015

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

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

Lower American River Anadromous Fish Habitat Restoration Program

Biological Assessment for NMFS-Jurisdictional Species and Essential Fish Habitat for Pacific Salmon

Prepared by:

United States Department of the Interior Bureau of Reclamation
Mid-Pacific Region
Bay-Delta Office

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Summary of Findings, Conclusions, and Determinations

The Bureau of Reclamation (Reclamation) proposes to implement a Lower American River Anadromous Fish Habitat Restoration Program (proposed action), which includes several related salmonid habitat restoration activities in the Lower American River between Nimbus Dam (river mile [RM] 23) and the State Route 160 Bridge (RM 2). The purpose of the proposed action is to restore, enhance, and protect aquatic and riparian habitat suitability to facilitate increases in the overall anadromous fish production of the Upper Sacramento River. The proposed action will implement a suite of river corridor restoration activities through December 31, 2039, including gravel augmentation, floodplain and side channel habitat enhancements, and placement of woody material. The proposed activities include a continuation of ongoing anadromous fish restoration activities authorized under the Central Valley Project Improvement Act of 1992 (CVPIA) Section 3604(b)(13). Since the late 1990s, implemented restoration projects have contributed to increases in anadromous fish spawning and rearing habitat within the Lower American River.

Section 9 of the Endangered Species Act (ESA) prohibits acts that result in the "take" of threatened or endangered plant and animal species. "Take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" is further defined as an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering.

Although the purpose of the proposed action is to enhance anadromous fish habitat and increase anadromous fish populations, work proposed to be conducted within the active channel of the Lower American River has the potential to result in "take" of listed anadromous fish. This Biological Assessment (BA) has been prepared for submission to the National Marine Fisheries Service (NMFS) to evaluate possible impacts on federally listed anadromous species and their designated critical habitat that have the potential to be present in the action area. Additionally, this BA serves to evaluate potential impacts on essential fish habitat for Pacific salmon stocks that may be found in the Lower American River.

The proposed action was designed to avoid and minimize adverse effects on federally listed fish species and their habitat to the maximum practicable extent. Conservation and avoidance measures that have been incorporated into the proposed action include:

1) restricting instream work to in-river work windows that minimize impacts and the potential for take of vulnerable life stages of the listed species;

2) implementing best management practices to control erosion, sedimentation, and potential spills of hazardous materials (e.g., fuel, oil, hydraulic fluids) to minimize effects on water quality;

3) using heavy equipment operation practices that minimize the potential for injury or death of vulnerable life stages of listed fishes; and

4) replacement of any riparian vegetation removed during construction to restore shaded riparian aquatic habitat values in the action area.

It is determined that the proposed action: (1) *may affect and is likely to adversely affect* Central Valley (CV) steelhead, and *may affect, but is not likely to adversely modify* their critical habitat, (2) will have *no effect* on CV spring-run Chinook salmon, yet *may affect, but is not likely to adversely modify* their critical habitat, and (3) will have *no effect* on Sacramento River winter-run Chinook salmon. While take of listed CV steelhead and some habitat modification may occur during construction activities associated with habitat restoration, these impacts will be short-term and the long-term benefits of the resulting habitat improvements will far outweigh the short-term effects on the listed species.

Additionally, it is determined that the proposed action is *not likely to eliminate or significantly diminish or disrupt* Essential Fish Habitat for Pacific salmon inhabiting the Lower American River.

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Chapter 1 Introduction

The Bureau of Reclamation (Reclamation) proposes to implement a Lower American River Anadromous Fish Habitat Restoration Program (proposed action), which includes several related salmonid habitat restoration activities in the Lower American River watershed. The action area encompasses the Lower American River between Nimbus Dam (river mile [RM] 23) and the State Route 160 Bridge (RM 2), Sacramento County, California. Activities include spawning gravel augmentation, floodplain and side channel habitat enhancements, and placement of woody material. The proposed activities are a continuation of ongoing anadromous fish habitat restoration efforts in the Lower American River authorized under the Central Valley Project Improvement Act of 1992 (CVPIA) Section 3604(b)(13). Since the late 1990s, habitat restoration projects have contributed to increases in anadromous fish spawning and rearing habitat within the Lower American River.

Section 9 of the ESA of 1973 prohibits acts of disturbance that result in the "take" of threatened or endangered plant and/or animal species. "Take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" is further defined as an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering. This Biological Assessment (BA) has been prepared by Reclamation, in accordance with legal requirements set forth under Section 7 of the ESA (16 United States Code [USC] 1536[c]). The purpose of this BA is to describe and evaluate the potential effects of the proposed action on federally listed anadromous fish species and applicable critical habitats that may be found in the action area including:

- threatened California Central Valley (CV) steelhead (*O. mykiss*) distinct population segment (DPS), and its associated designated critical habitat;
- endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) evolutionarily significant unit (ESU);
- threatened Central Valley (CV) spring-run Chinook salmon (*O. tshawytscha*) ESU, and its associated designated critical habitat; and

This document has also been prepared in conformance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act (CFR 62[244] December 19, 1997) to address potential impacts on Essential Fish Habitat (EFH)[1] for commercially managed anadromous Pacific salmon that inhabit the Lower American River during freshwater life stages, pursuant to Amendment 14 of the Pacific Coast Salmon Plan (Pacific Fisheries Management Council 2003). For this project, the waters and substrate associated with the Lower American River in the project area are designated as EFH for species of concern CV fall/late-fall Chinook salmon ESU.

[1] EFH refers to those waters and substrate necessary to salmon for spawning, breeding, feeding, or growth to maturity.

1.1 Biological Assessment

This BA is intended to define environmental conditions and habitat restoration procedures under which implementation of specific salmonid restoration and management activities within the Lower American River can proceed without separate consultations with NMFS for each individual project. The principal provision of this project action is that the habitat restoration procedures and associated environmental effects on listed species are consistent with the effects analysis of this BA. Reclamation has implemented similar restoration actions for over 30 years, and the analyses presented in this assessment consider this experience. The future actions and associated environmental consequences are expected to be similar to these past actions. Uncertainties for several features and locations of the proposed restoration action are identified and addressed to the extent possible; in these cases, the worst case effects were determined and are within the range of effects described for all other features and restoration locations.

If changed circumstances occur that result in different effects than those analyzed in this document (e.g., environmental conditions change substantially, new construction technologies will be used, increased knowledge of the biology of listed species, or the listing of new species under the ESA during the lifetime of the proposed action), Reclamation will prepare a supplemental BA and reinitiate consultation with NMFS with a request to append the new effects analysis to the existing consultation.

Chapter 2 Project Description

2.1 Project Need and Objectives

The restoration and rehabilitation of spawning and rearing habitat for anadromous fish in the action area is a high priority for federal and state resource agencies. The CVPIA 3406(b)(13), the CALFED Bay-Delta Authority's Ecosystem Restoration Program, and other sources have authorized and directed funding for much of the stream channel, floodplain, and riparian restoration work completed to date in the Lower American River. Since the late 1990s, salmonids have benefited from past and ongoing restoration activities within the Lower American River watershed.

The Lower American River Anadromous Fish Habitat Restoration Program is the culmination of many years of coordination and deliberation among agency, environmental and other stakeholders. During the late 1990s, two separate but related coordination activities were underway. The Lower American River Task Force (LARTF) was primarily focused on issues related to flood control, while the Sacramento Area Water Forum (Water Forum) was primarily focused on securing a reliable water supply and protecting the environmental and aesthetic values of the LAR. Both these groups were comprised of multi-agency and multi-disciplinary people. These groups coalesced in preparing a River Corridor Management Plan (RCMP) in January 2002. The fisheries and instream habitat management portions of the RCMP are presented in the "Initial Fisheries and In-Stream Habitat Management and Restoration Plan for the Lower American River," which was completed

by the Lower American River Fisheries and In-Stream Habitat Working Group (FISH Group) in October 2001 (SWRI 2001). Known as the FISH Plan, this document contains recommendations for restoring gravel and side-channel habitats in the Lower American River.

The FISH Group (consisting of 24 different agencies including NMFS, U.S. Fish and Wildlife Service, and California Department of Fish and Wildlife) continues to evaluate opportunities for enhancing fishery resources in the Lower American River. Reclamation, in collaboration with the FISH Group, has identified a need to combine several restoration and management activities into one long-term proposed action that will allow managers some flexibility to tailor habitat restoration projects (within pre-established limitations), and to reprioritize and schedule activities based on the most current monitoring results. This flexibility will allow Reclamation to use fishery and physical habitat monitoring information and available funding levels to meet established restoration goals and objectives, respond to any environmental changes, and optimize overall performance of the CVPIA (b)(13) Habitat Restoration Program. The objectives of the proposed action are to: improve adult spawning and juvenile rearing habitat conditions for anadromous fish species including steelhead and Chinook salmon.

2.2 Action Area

The action area, the area subject to the proposed federal action, encompasses an approximately 21-mile reach of the Lower American River and adjacent land between Nimbus Dam (RM 23) and the State Route 160 Bridge (RM 2). This area of evaluation is large enough to encompass both the potential direct impacts on listed species, such as mortality of rearing juveniles, and the potential indirect impacts, such as elevated turbidity that may extend beyond the individual project sites, as well as temporary impacts to existing habitat.

The Lower American River between Nimbus Dam (RM 23) and State Route 160 Bridge (RM 2) presents several opportunities for improving and restoring salmonid spawning and rearing habitats. As of 2014, the FISH Group has identified 11 restoration sites (eight locations where future restoration activities are specifically described in Appendix A and three previously restored locations where maintenance may be needed in the future; Table 1; Figure 1) that are intended to maintain flexibility for providing salmonid spawning and rearing habitat enhancement through gravel placements and side channel and floodplain enhancements to help meet the goals of the CVPIA (b)(13) Habitat Restoration Program. The criteria used to select sites and develop conceptual designs include: biological need, site suitability and access, engineering feasibility, environmental compliance and permitting, gravel availability and transportation, and cost-benefit. The proposed action includes activities applicable to these 11 sites as well as possible unknown sites as described in the following sections.

Table 1. Lower American River Anadromous Fish Habitat Restoration sites.

Site	RM	Restoration Type	Method[a]	Approximate Maximum Dimensions[b]	Approximate Maximum Quantity	Frequency	Approximate Duration of Activity
Site 1- Upper Sunrise[d]	21.5	Gravel Augmentation; Woody Material	RS, WM	3.5 acres	12,000 yd^3	Once, replenish as needed	4 weeks
		Side Channel/Floodplain Habitat	EX, WM	3 acres	25,000 yd^3	Once, revisit as needed	4 weeks [c]
Site 2- Sunrise	20.4	Gravel Augmentation; Woody Material	RS, WM	1.5 acres	7,000 yd^3	Once, revisit as needed	4 weeks
		Side Channel/Floodplain Habitat	EX, WM	1.5 acres	10,000 yd^3	Once, revisit as needed	4 weeks [c]
Site 3- Sacramento Bar	18.6	Side Channel Creation/Floodplain Modification	EX, WM	10 acres	50,000 yd^3	Once, revisit as needed	8 weeks [c]
		Gravel Augmentation; Woody Material	RS, WM	1.5 acres	10,000 yd^3	Once, revisit as needed	4 weeks
Site 4- El Manto	17.9	Side Channel Creation; Floodplain Modification	EX, WM	7 acres	35,000 yd^3	Once, revisit as needed	8 weeks [c]
		Gravel Augmentation; Woody Material	WM, RS	1.8 acres	10,000 yd^3	Once, revisit as needed	4 weeks
Site 5- Ancil Hoffman	15.8	Side Channel Creation; Floodplain Modification	EX, WM	5 acres	30,000 yd^3	Once, revisit as needed	6 weeks [c]
		Gravel Augmentation; Woody Material	WM, RS	1.7 acres	9,000 yd^3	Once, revisit as needed	4 weeks
Site 6- Upper River Bend	14.5	Side Channel Creation; Floodplain Modification	EX, WM	7 acres	35,000 yd^3	Once, revisit as needed	8 weeks [c]
		Gravel Augmentation; Woody Material	WM, RS	2 acres	10,000 yd^3	Once, revisit as needed	4 weeks
Site 7- Howe to Watt	8.5-9.2	Side Channel Reconnection; Woody Material	EX, WM	2.6 acres	10,000 yd^3	Once	4 weeks [c]
Site 8- Paradise Beach	5	Side Channel Creation; Floodplain Modification; Woody Material	EX, WM	7 acres	35,000 yd^3	Once	7 weeks [c]

Site	RM	Restoration Type	Method[a]	Approximate Maximum Dimensions[b]	Approximate Maximum Quantity	Frequency	Approximate Duration of Activity
Unspecified Locations[e]	2-23	Gravel Augmentation	RS, WM	Per site: 12 acres*	12,000 yd^3 per site; 10 sites	Up to once a year, as needed	5 weeks
		Side Channel Creation/Modification; Floodplain Modification	EX, WM	Per site: 7 acres*	4 new/ modified side channels per site; 10	Once per site	2-6 weeks[c]
		Woody Material	WM	Per site: 4 acres*	Per Year: 100 log structures; 3 sites	Once	1-3 weeks[c]

[a] Method codes are: RS = Riffle Supplementation; EX = Excavation; WM =Woody Material Placement

[b] Number represents potential action area; the actual project footprint location within the area is unknown but will be smaller.

[c] Values represent overall construction timeframe; actual duration of instream work will be less than half of this timeframe (i.e., less than 2-4 weeks dependent on project type and site).

[d] This restoration site encompasses three locations where some previous restoration work has occurred.

[e] Three previously restored sites (Nimbus, Upper Sailor Bar, and River Bend; Reclamation 2008) may also need future maintenance consistent with the characteristics identified under unspecified locations .

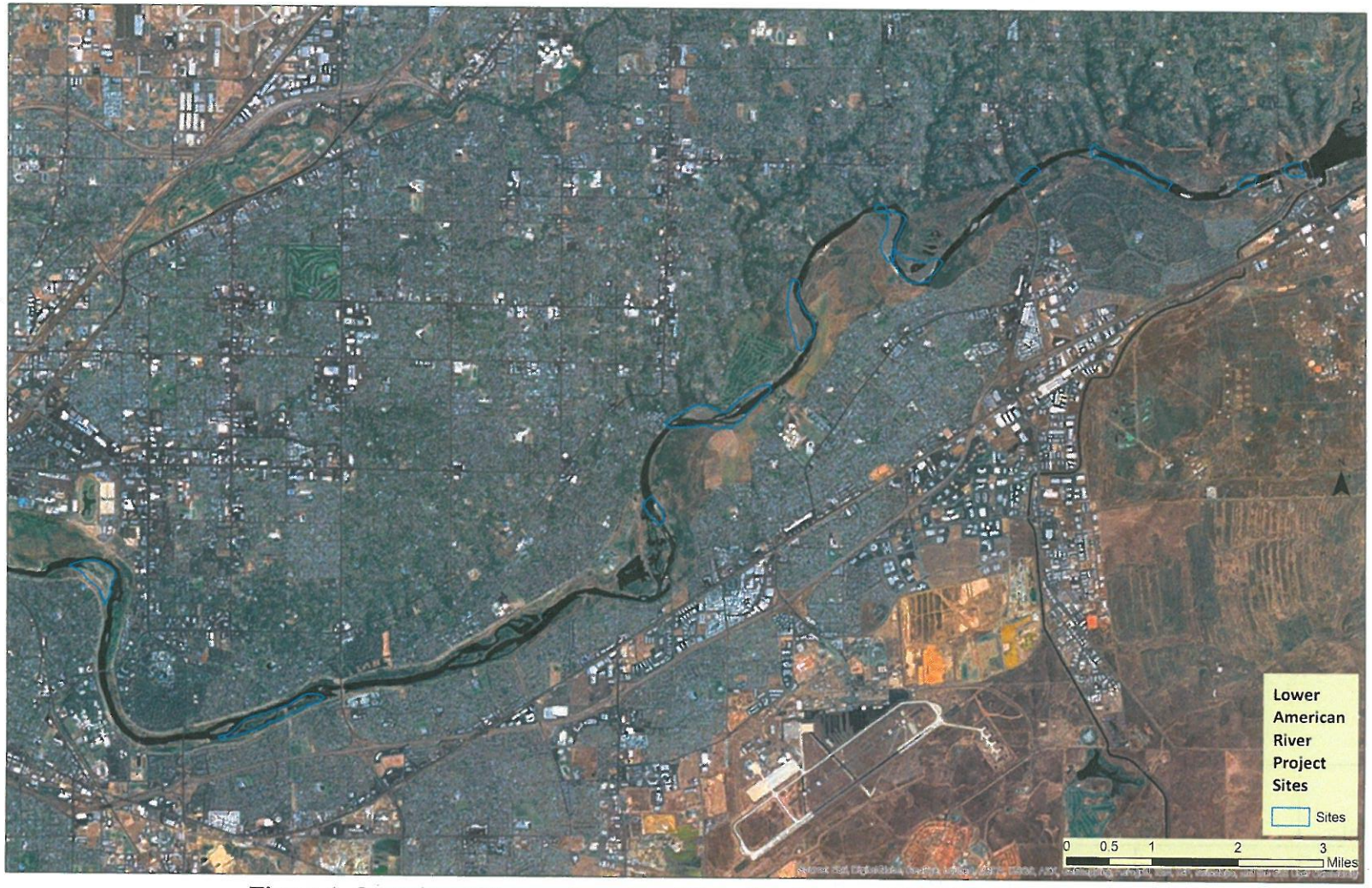

Figure 1. Overview of Lower American River Anadromous Fish Habitat Restoration sites.

2.3 Proposed Action

Reclamation proposes to accomplish the project objectives with the following activities:

- gravel augmentation,
- floodplain and side channel enhancements, and
- placement of woody material.

Work will be conducted within portions of a 21-mile reach of the river downstream of Nimbus Dam. A total of 11 sites have been identified where one or more restoration activities may be performed. In the future, the FISH Group may identify additional sites where similar restoration activities (i.e., similar types, size, and construction methods) would be beneficial. Instream work will be conducted during times of the year that are least likely to result in take of Chinook salmon and steelhead.

The proposed activities are designed to minimize potential direct and indirect effects on listed fish species during construction and installation, while meeting long-term restoration goals established by the FISH Group. Because the anadromous fish species inhabiting the Lower American River range throughout the Central Valley, Sacramento-San Joaquin River Delta, San Francisco Bay Estuary, and portions of the Pacific Ocean during their various life stages, meeting these goals will have ecosystem and fisheries benefits that extend well beyond the action area.

2.3.1 Gravel Augmentation

Limitation of suitable spawning substrate has been identified as a limiting factor for anadromous fishes in the Lower American River (NMFS 2009). Natural spawning gravel recruitment to the project area is prevented due to upstream dams; therefore, ongoing CVPIA 3406(b)(13) gravel restoration will occur in several locations in or along the Lower American River between Nimbus Dam (RM 23) and State Route 160 Bridge (RM 2). There are five specific gravel augmentation projects included under the proposed action (Table 1, Figure 1) with a combined total area of up to approximately 12 acres. In addition to specifically identified restoration projects, the proposed action includes potential implementation of similar gravel augmentation activities (i.e., similar types, size, and construction methods) at currently unspecified locations between Nimbus Dam (RM 23) and State Route 160 Bridge (RM 2). Gravel augmentation will generally be implemented once at each site but, depending on evaluation of monitoring data and judgment of the FISH Group, some sites may not be implemented at all and some may need to be periodically replenished. In a given year, up to three project sites will be implemented with up to 12,000 cubic yards of gravel placed at any one location and up to a total of 36,000 cubic yards for all three sites. Following an adaptive management approach, the FISH Group will select sites for a given year based on the results of ongoing monitoring within the lower American River.

The gravel placed would be uncrushed, rounded "natural river rock" with no sharp edges. It would be a reasonably well-graded mix, designed for spawning use by salmonids, made using an approximately ¼" screen on the bottom. The D_{50} (median diameter of sample) of the mix would be around 1 inch to 1-1/2 inch. The gravel would be processed onsite or prior to delivery to the sites to remove excessive fine materials and minimize introduction of excessive fine sediments into the river. The gravel would be free of oils, clay, debris, and organic material. Materials

excavated from side-channel work could be used for onsite gravel placement and sorted as needed to meet design criteria. The larger gravel and cobble resulting from sorting operations would be used as needed to enhance stability of habitat features.

Stockpile areas would be located near project sites or within the site boundaries. Existing improved and unimproved roads would be used by transport trucks to deliver gravel to stockpile areas. Stockpile areas adjacent to the river generally would be about one half acre or less and would be placed in existing clearings where ground disturbance would be minimized by using existing dredger tailings or similar type of material.

For purposes of this analysis, tandem transfer trucks (trucks pulling a trailer that can be telescoped into the truck bed) capable of carrying 24 tons per load would be used for transporting gravel to project sites. Single bed off road trucks capable of carrying 12 to 50 tons would be used for transporting gravel within project work sites off of public roads.

Gravel will be placed in the river using dump trucks and front end loaders. At some sites, the substrate will be graded with a bulldozer prior to gravel additions to remove armoring (surface layer of larger rock) or to meet topographic design specifications. A bulldozer would be used to distribute the materials in areas unworkable for loaders. For the gravel placement, front end loaders would pick up a bucket of gravel from the stockpile and drive from the stockpile into the river and carefully dump the gravel in a manner as to distribute it across the river bottom according to design parameters. Placement would proceed starting from the river access site and working out into the river. This would allow the loaders to drive on the newly placed gravel, thereby avoiding driving in overly deep water and distributing fines from the existing substrate. Off-road dump trucks would haul the material into the river in areas where the travel distance to an onshore stockpile is excessively long for multiple loader trips. The loaders would distribute the gravel along the river bottom to create the hydraulic conditions necessary for salmonid spawning. This work would use two or three front end loaders for 4-6 weeks at a location, dependent on project site. A tracked bulldozer or excavator would be used for grading the existing substrate prior to spawning gravel placement and larger placed rock as needed.

2.3.2 Floodplain and Side Channel Habitat Enhancements

Floodplain and side channel habitats serve as important refuge and rearing areas for salmonids and these habitats likely contribute substantially to the productive capacity and life history diversity of Chinook salmon (Lindley et al. 2009, Yoshiyama et al. 1998; Martens and Connolly 2014). However, the number and quality of these habitats have been reduced in the Lower American River as a result of activities such as channel modifications and levee construction (Lindley et al. 2009). There are eight specific floodplain and side channel enhancement sites included under the proposed action (Table 1, Figure 1, Appendix A) resulting in up to approximately 43.1 acres of new or re-established floodplain and side channel habitat. In addition to specifically identified restoration projects, the proposed action includes potential implementation of similar habitat restoration activities (i.e., similar types, sizes, and construction methods) at currently unspecified locations between Nimbus Dam (RM 23) and State Route 160 Bridge (RM 2).

Floodplain and side channel habitat enhancements may consist of new or reconnected side channels and floodplain modifications that are designed to function optimally under flows within the main channel ranging between 3,250 cfs to 7,000 cfs. Physical characteristics will be variable with average water velocities ranging between 1.0 fps to 5.0 fps, water depths averaging between one to three feet deep, and channel widths ranging between 12 to 50 feet wide for new channels and potentially larger for existing channels. Water velocities would be designed to be variable and range up to about five feet per second at design flows. Floodplain and side channel habitats will be created, reconnected, or modified by excavation using heavy equipment (i.e., bulldozer, front end loader, excavator). Where the excavated material is of the appropriate size distribution it would be sorted and placed into side channel or main channel areas to enhance habitat features. The fines would be distributed over the floodplain to assist in vegetating the area. Gravel placed into the main channel may facilitate flow into side channels. Low elevation gently sloping benches would be created along channels in opportune areas to provide juvenile rearing habitat through a range of flows.

Woody material (e.g., trees, trunks, rootwads, and willows) would be incorporated into the side channels to enhance habitat quality. The woody material would be held in place by partially burying it in the existing substrate or banks or keying into existing material to provide some stability under higher flows.

2.3.3 Placement of Woody Material

Large woody debris (LWD) contributes to habitat diversity and creates and maintains foraging, cover, and resting habitat for both adult and juvenile anadromous fish. LWD recruitment into the Lower American River has been affected by various factors including urban conversion of riparian habitat, dam and levee construction, bank protection and streamflow regulation (CALFED Science Program, n.d.). In order to improve conditions within this reach, woody material will be placed below or above the low flow water line up to the ordinary high water line. Woody material (up to 40 feet long and 2 feet diameter) will consist of trees or bush type material, including willow, cottonwood, alder, oak, ash, walnut, conifer, or other suitable tree species, an intact root ball or crown, and at least one trunk. Placement of woody material in the active main channel and/or side channels is expected to create instantly available juvenile salmonid rearing habitat. Structures that create quiet water or debris accumulation at the stream margins are beneficial for salmonid fry survival following emergence.

Woody material will be placed, as needed, within gravel augmentation and side channel enhancement sites within the Lower American River. Using an adaptive management approach, the FISH Group will identify potential placement sites based on the results of ongoing anadromous fisheries monitoring within the area. Access to placement sites will use existing roads, when feasible, to minimize impacts on vegetation or other sensitive biological or cultural resources. Up to 100 log structures will be placed within the Lower American River in a given year. The designs for woody material structures will be consistent with guidance provided in the California Salmonid Stream Habitat Restoration Manual, 4th Edition (CDFG 2010).

2.3.4 Features Common to All Sites

Instream work will be done at lower river flows 5,000 cfs and during time periods to minimize effects on steelhead as specified in permits. Work mobilizing gravel and equipment to the sites

and work out of the wetted channel or within wetted areas disconnected from the river channel could occur outside of fish timing windows, but work in areas with flowing water that are accessible to fish would be confined to timing windows and suitable flows.

Any equipment used in or near the river would be properly cleaned to prevent any hazardous materials from entering the river, and spill containment materials would be on site in case of an accidental discharge. Reclamation and other personnel will regularly monitor equipment operators to insure environmental compliance.

Although the action area is between Nimbus Dam (RM 23) and the State Route 160 Bridge (RM 2), the actual gravel placement and channel work would occur in a smaller total length of river. Gravel placement would cover approximately 12 acres, and floodplain and side channel enhancement would result in approximately 43.1 acres of new or reconnected floodplain and side channel habitats.

Detailed designs will be prepared for site specific work as funding becomes available to conduct the work and will be coordinated annually with the FISH Group. An example of a restoration site project overview is presented in Figure 2.

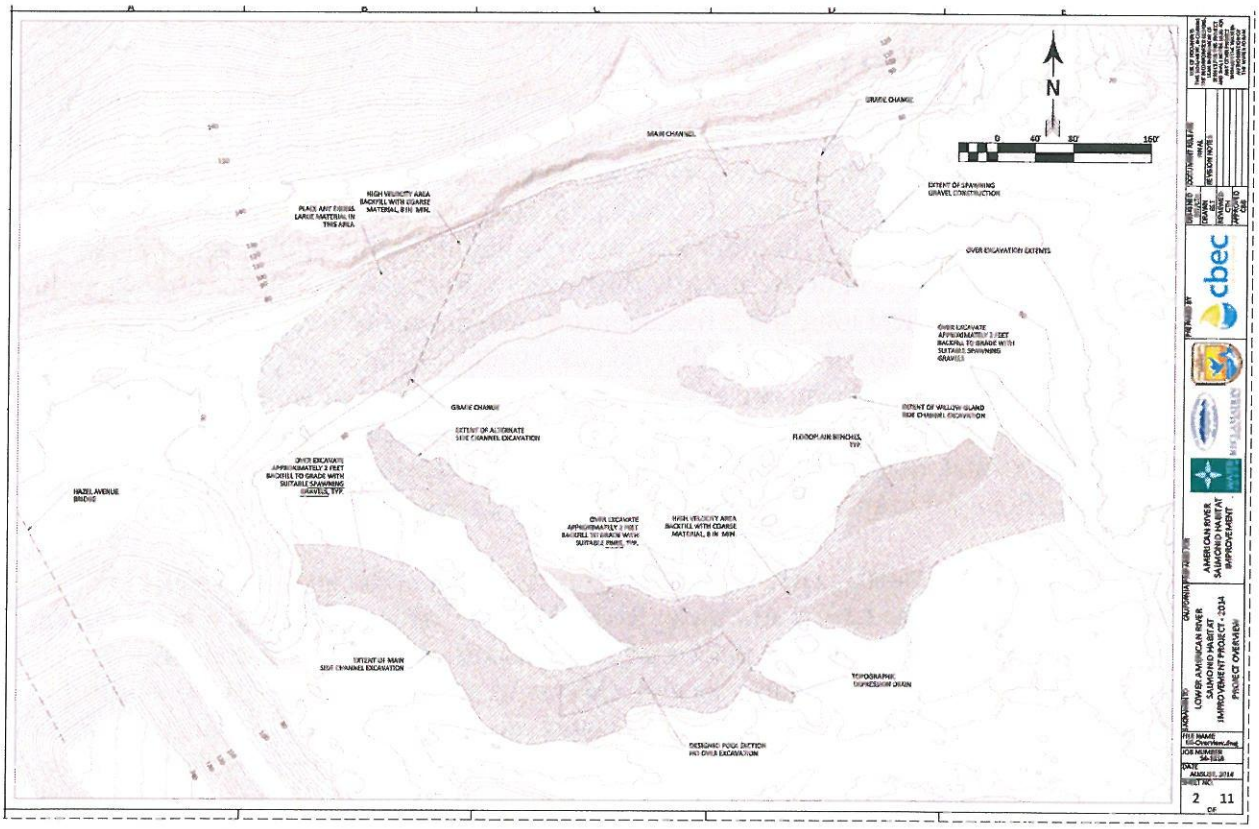

Figure 2. Example Nimbus restoration site project overview.

2.4 Construction Methods and Criteria

2.4.1 Gravel Augmentation Activities

Our proposed gravel augmentation method is by riffle supplementation (Figure 3), which includes direct placement of gravel within the channel and subsequent contouring (partial or entire channel width) and grading to appropriate depths to provide immediate spawning habitat.

Figure 3. Example of spawning usage (light areas) after riffle supplementation gravel augmentation method.

Up to 12,000 cubic yards of cleaned and sorted river-run gravel will be placed at individual sites each year with up to a combined total of 36,000 cubic yards within the action area annually. The gravel will generally be sized between 1/4 inches and 5 inches following USFWS guidance (Table 2). Some site specific project features will require deviations from these size criteria to meet project goals such as smaller gravel to provide spawning habitat for smaller fish or larger material to maintain site stability. The gravel will be transported to augmentation sites or staging areas using dump trucks, and then placed directly from the truck and with front end loaders.

Some augmentation sites may also require floodplain modification and recontouring of the channel, and up to approximately 30,000 cubic yards of material at each site may be excavated, sorted, and redeposited in the nearby channel. Where additional instream grading of gravel is required, an excavator or bulldozer will be used. Existing access routes will be used whenever possible. Some additional clearing or grading may be necessary to provide equipment access to the gravel augmentation sites. Instream work will be conducted during seasons of the year that are least likely to result in the take of steelhead.

Table 2. Approximate gravel augmentation size gradation.

Particle Size (inches)	Percent Passing	Percent Retained
4" or 5"	95%-100%	0%-5%
2"	75%-85%	15%-30%
1"	40%-50%	50%-60%
3/4"	25%-35%	60%-75%
1/2"	10%-20%	85%-90%
1/4"	0%-5%	95%-100%

Source: USFWS 2006

2.4.2 Floodplain and Side Channel Habitat Enhancements

Up to 10 acres of floodplain and side channel enhancements may occur at individual sites each year with up to a combined total of 24 acres within the action area annually. Enhancement activities will require heavy construction equipment (e.g., front end loaders, bulldozers, and excavators), as well as hand tools. During the majority of construction, a gravel berm would be left at both the upstream and downstream ends of each site if needed to isolate the project area from the main channel.

Up to approximately 30,000 cubic yards of material may need to be excavated, sorted, and redeposited in the channel at these sites. Gravel in excess of what would be needed for creating or modifying the floodplain and side channel to their design specifications may be placed in the main river channel within the vicinity of the excavation. Any instream work will be conducted during seasons of the year that are least likely to result in the take of steelhead.

2.4.3 Placement of Woody Material

Woody material placement will consist of rootwads or logs partially placed in the channel with one end partially buried in the substrate. Woody material functions to provide rearing habitat by creating diverse cover for rearing juveniles spawning adults. They are also used to scour the channel, creating or expanding pool habitat. Logs with rootwads intact would be positioned with the rootwad end extending down into the pool to create complexity for increasing rearing habitat and maximizing scour.

Due to a desire to create features more similar to naturally occurring woody material, woody material will not be secured to the banks using artificial materials such as steel cable. The

woody material will be keyed into the bank or into placed gravels by partially burying the material in existing soil and rock. Woody material that County Parks personnel identify as being a safety hazard will be removed, or moved to a safe location, by existing contractors utilized by county parks for removing in-river hazards. Reclamation will pay for this removal.

2.5 Regulatory Context

2.5.1 Central Valley Project Improvement Act of 1992

Reclamation's authority to implement the Lower American River Anadromous Fish Habitat Restoration Program ultimately derives from Public Law 102- 575, the Central Valley Project Improvement Act of 1992. Congress passed this act to address impacts of the Central Valley Project on fish and wildlife and their associated habitats. Specifically, CVPIA § 3406(b)(13) directs the Secretary of the Interior to:

> Develop and implement a continuing program for the purpose of restoring and replenishing, as needed, spawning gravel lost due to the construction and operation of Central Valley Project dams, bank protection projects, and other actions that have reduced the availability of spawning gravel and rearing habitat in the Upper Sacramento River from Keswick Dam to Red Bluff Diversion Dam, and in the American and Stanislaus Rivers downstream from the Nimbus and Goodwin Dams, respectively. The program will include preventive measures, such as re-establishment of meander belts and limitations on future bank protection activities, in order to avoid further losses of instream and riparian habitat.

2.5.3 Biological Opinion on the Long-term Operations of the Central Valley Project and State Water Project – June 2009

In June 2009, NMFS issued a Biological Opinion (BO) and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project that indicated that dams block the downstream transport of spawning gravel that would replenish gravel below the dams and dam operations have mobilized gravel remaining below the dams, which has led to a degradation of the quality and quantity of available salmonid spawning gravel and rearing habitat. Spawning gravel augmentation addresses these issues within the constraints imposed by dam operations.

2.5.4 Federal Endangered Species Act

The ESA protects federally listed threatened and endangered species. Section 9 of the ESA prohibits "take" of threatened or endangered species. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Sections 7 and 10(a) of the ESA provide a method for exempting an activity that may result in an "incidental take" of a federally listed species. Incidental take refers to take of a listed species that is incidental to, but not the primary purpose of, an otherwise lawful activity.

2.5.5 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a

federal fisheries management plan (FMP). EFH refers to those waters and substrates necessary for the spawning, breeding, feeding, or growth to maturity. 'Waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species' full life cycle. 'Adverse effect' means any impact that reduces the quality and/or quantity of EFH, and may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. The MSA requires federal agencies to consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (MSA §305[b][2]). A component of this consultation process is the preparation and submittal of an EFH assessment. All EFH assessments must include the following information: 1) a description of the proposed action; 2) an analysis of the effects, including cumulative effects, of the proposed action on EFH, the managed species, and associated species, such as major prey species, including affected life history stages; 3) the federal agency's views regarding the effects of the proposed action on EFH; and 4) proposed mitigation, if applicable. In instances where MSA and ESA issues overlap, NMFS encourages an integrated approach for consultation.

The EFH mandate applies to all species managed under a FMP. For the Pacific Coast (excluding Alaska), there are three FMPs covering groundfish, coastal pelagic species, and Pacific salmon. For this project, Reclamation's proposed action has the potential to affect EFH for Chinook salmon in the Lower American River.

2.5.6 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act, as amended in 1964, was enacted to protect fish and wildlife when Federal actions result in the control or modification of a natural stream or body of water. The statute requires Federal agencies to take into consideration the effect that water-related projects would have on fish and wildlife resources. Consultation and coordination with USFWS and State fish and game agencies are required to address ways to prevent loss of and damage to fish and wildlife resources and to further develop and improve these resources.

2.6 Proposed Conservation and Avoidance Measures

2.6.1 Measures to Minimize Injury and Mortality of ESA Species

Due to the year-round presence of at least one freshwater life stage of listed steelhead in the action area, the use of zones and in-river work windows to entirely avoid and prevent injury or mortality to listed anadromous fish is not possible. However, the least mobile salmonid life stages (i.e., incubating eggs and pre-emergent fry) are the life stages most likely to experience direct injury and mortality from construction activities. Therefore, instream work will be restricted to July 1 through September 30[2], with consideration of the spatial and temporal

[2] Occasionally exceptions to this period have been granted by NMFS on a case by case basis based on fish presence and the nature of the project. Additional requests for exceptions may occur in the future, most likely in October.

distribution of spawning and incubating steelhead, as well as fall-run Chinook salmon. This in-river work window was selected to avoid potential exposure to spawning or incubating eggs. Construction may be conducted year-round in areas, such as floodplains and side channels, when flowing water is absent due to separation from the main channel by gravel berms that are either naturally present or artificially created.

Eight potential new restoration sites have been identified where floodplain and side channel enhancement and woody material placement activities may occur, and five of these new sites may also include gravel augmentation (Table 1). Additionally, there are three previously restored sites where further restoration may occur (i.e., Nimbus, Upper Sailor Bar, and River Bend), as well as some other restoration sites that may be identified in the future but the number of additional possible sites is low due to various constraints (Table 1). Floodplains and side channels will be created or modified by excavation with much of the work conducted in areas where fish will not have access (i.e., areas where flowing water is absent due to separation from the main channel by gravel berms that are either naturally present or artificially created) and instream work will be limited to inlet/outlet areas during the last stage of reconnection to the main channel. Instream habitat structures may be placed as needed where juvenile rearing habitat is identified as limited. Placement of habitat structures in floodplains and side channels would occur in areas where fish will not have access, as described above. Riffle supplementation includes using heavy equipment to perform instream work. Since juvenile steelhead may be present during the in-river work window, conservation measures will be implemented to reduce the potential for adverse effects on juvenile steelhead.

2.6.2 Measures to Prevent Loss of Potential Spawning and Rearing Habitat

The proposed action will not destroy any suitable salmonid spawning or rearing habitat; therefore, no net loss of habitat will occur. Conservation measures are not necessary.

2.6.3 Measures to Control Turbidity and Suspended Sediment during Construction

Measures to avoid and minimize the potential for adverse effects of turbidity or resuspension of sediment during instream work on the listed anadromous species will include the following:

- Appropriate best management practices (BMP) to control erosion and storm water sediment runoff will be implemented. This may include, but is not limited to, straw bales, straw wattles, silt fences, and other measures as necessary to minimize erosion and sediment-laden runoff from project areas.

- Equipment operation in the active channel will be kept to the minimum necessary to meet the project goals. When in-channel work is unavoidable, spawning gravel will be used where feasible to create a pad in the channel from which equipment will operate.

- Turbidity and settleable solids will be monitored to maintain compliance with permit requirements. If exceedances occur, work will be slowed or halted to allow turbidity to subside.

- Instream work that may cause turbidity within 200 ft upstream of active redds will be avoided if possible.

2.6.4 Measures to Avoid Adverse Effects on Riparian Vegetation

The following measures will be taken to minimize the loss and disturbance of riparian vegetation:

- Impacts to existing vegetation will be avoided to the extent practical.
- Disturbed areas adjacent to the river deemed to be unstable will be covered with river rock or revegetated with native plant species and/or mulched with certified weed-free hay following the completion of construction activities.
- Equipment used for the project will be thoroughly washed off-site to remove invasive plant seed, stems, etc. and inspected to prevent transfer of aquatic invasive species, such as quagga mussel and New Zealand mud snail, prior to arriving at the construction area.
- Project activities will avoid impacts to wetlands and sensitive plant species (e.g., elderberry) to the extent practicable. Wetlands and sensitive plant species located near construction areas, and at risk of inadvertent disturbance, will be protected with high-visibility fencing.

2.6.5 Measures to Prevent and Manage Potential Spills of Hazardous Materials

The following measures will be taken to avoid prevent and manage potential spills of hazardous materials:

- Spill prevention and cleanup kits will be in close proximity to construction areas and workers will be trained on their use.
- Heavy equipment operating in the river will use biodegradable hydraulic fluid.
- Equipment will be checked daily for leaks and any leaks fixed prior to activities in sensitive areas
- All construction equipment refueling and maintenance will be restricted to designated staging areas located away from the river and sensitive habitats.

Chapter 3 Environmental Setting and Baseline

The American River Watershed originates in the northern Sierra Nevada Mountains just west of Lake Tahoe. The Upper American River contains three forks (North, Middle, and South) that ultimately converge into the Lower American River, which confluences with the Sacramento River in Sacramento, California.

Folsom Dam—located at river mile (RM) 29.4 near Folsom, California —was completed in 1955. It serves to control floodwaters and store surplus winter runoff from the Upper American River for fish and wildlife protection, recreation, protection of the Delta from intrusion of saline ocean water, irrigation and M&I water supplies, and hydroelectric power generation. Releases from Folsom Dam are re-regulated approximately seven miles downstream by Nimbus Dam (RM 23). This facility is also operated by Reclamation as part of the CVP. Nimbus Dam creates Lake Natoma, which serves as a forebay for diversions to the Folsom South Canal. This CVP facility serves water to M&I users in Sacramento County. Releases from Nimbus Dam to the American River pass through the Nimbus Powerplant, or, at flows in excess of 5,000 cfs, the spillway gates. The 21-mile reach of the American River between Nimbus Dam and its confluence with the Sacramento River is commonly referred to as the Lower American River and is the geographical setting of this BA.

Coarse sediment from the upper watershed is prevented from being transported downstream by Folsom and Nimbus Dams, and armoring has occurred resulting in a reduction in salmonid habitat quality within the Lower American River. The dams have also blocked downstream transport of wood resulting in reduced recruitment of large woody material to the stream channel and floodplain. Additionally, artificial levees in the lower river have contributed to localized bank erosion, incision, and channelization (LARTF 2002).

Anadromous fish passage into the upper watershed has been impeded since the early 1900s by various dams constructed for mining debris containment, flood control and water supply diversions (LARTF 2002). Folsom and Nimbus Dams have presented impassable barriers to anadromous fish since 1955, reportedly blocking access to approximately 70% and 100% of historical salmon and steelhead spawning habitat, respectively (LARTF 2002).

The combination of degraded physical habitat characteristics, fish passage barriers, and changes in hydrology resulting from dams and diversions since the early 1900s has been associated with salmonid declines within the American River watershed.

3.1 Hydrology

Flows in the LAR are controlled by the releases from Nimbus Dam and vary significantly by season and by years. Water that is stored in upstream reservoirs (primarily Folsom Reservoir) during the winter and spring is released in the summer and fall for municipal and industrial supply, irrigation, water quality, power generation, recreation, and fish and wildlife purposes.

Consequently the flows are now lower in the winter and spring and higher in the summer and fall than they were prior to the building of the dams and reservoirs.

3.2 Water Quality

The main sources of water in the American River below Nimbus Dam are rain and snowmelt that collect in upstream reservoirs and are released in response to water needs or flood control. The American River system supports a number of beneficial uses along its three main forks and many tributaries and is generally considered an excellent source of high-quality water. Water from the American River watershed is suitable for all existing beneficial uses, including: municipal supply, contact and non-contact recreation, agricultural and industrial supply, warm-water and cold-water fish habitat (including anadromous fish migration and spawning habitat), and wildlife habitat. Waters from the upper watershed generally have excellent quality with regard to mineral and nutrient content and low concentrations of total dissolved solids (TDS). The quality of surface water downstream of Nimbus Dam is also influenced by other human activities along the river downstream of the dam, including historical mining, agricultural, and municipal and industrial (M&I) activities.

In May 1991, the Sacramento Regional County Sanitation District (SRCSD), the County of Sacramento (County) Department of Water Resources and the City of Sacramento (City) jointly established the Sacramento Coordinated Water Quality Monitoring Program (CMP) to conduct water quality monitoring in the Sacramento and American Rivers. The CMP has routinely monitored the Lower American River for heavy metals content and for compliance with conventional water-quality parameters. Monitoring has shown that water quality generally meets ambient water-quality criteria for aquatic life protection. Specifically, CMP data for the 1992–1995 monitoring period indicate a mean total suspended solids (TSS) content of <1 mg/L (milligrams per liter), mean electrical conductivity (EC) of 52 microSiemens per centimeter (µS/cm), and a hardness of $CaCO_3$ of 25 mg/L (Sacramento County Water Agency 1995). Nevertheless, through its Resolution No. 98-055 (1998) and its CWA Section 303(d) efforts, SWRCB named the Lower American River as impaired because of group "A" pesticides, mercury, and unknown toxicity and assigned low, medium, and low priority rankings, respectively, for the development of corresponding total maximum daily load (TMDL) programs (Corps et al. 2002).

Water temperature in the Lower American River is controlled by releases from Folsom Reservoir. On June 4, 2009, NMFS issued a biological opinion (BiOp) for listed anadromous fishes and their critical habitats governing the coordinated long-term operation of the CVP and SWP that included water temperature requirements from May 15 through October 31 for juvenile steelhead rearing.

State and federal law mandates a series of programs for the management of surface water quality. In the State of California, water resources are protected under the federal Clean Water Act (CWA) and the State Porter-Cologne Water Quality Control Act, which created the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCB). Each RWQCB is responsible for preparing and updating a water-quality control plan

(basin plan) every three years; the basin plan for a specific region identifies water quality protection policies and procedures for that region (California RWQCB, 1998). In the project area the Central Valley RWQCB is responsible for designating beneficial uses and establishing water quality objectives for the American and Sacramento River basins and the Delta to support the protection of these beneficial uses.

3.3 Covered Species and Habitats

The following federally listed species and designated critical habitats may occur in the action area and may be affected by the proposed Lower American River Anadromous Fish Habitat Restoration and Management Program:

- **California Central Valley steelhead DPS and designated critical habitat** (*O. mykiss*) threatened (January 5, 2006, 71 FR 834); (September 2, 2005, 70 FR 52488)
- **Sacramento River winter-run Chinook salmon ESU** (*Oncorhynchus tshawytscha*) endangered (June 28, 2005, 70 FR 37160)
- **Central Valley spring-run Chinook salmon ESU and designated critical habitat** (*O. tshawytscha*) threatened (September 16, 1999, 64 FR 50394); (September 2, 2005, 70 FR 52488)

In addition to the listed species addressed above, information relevant to life history timing and essential fish habitat for CV fall-run Chinook salmon is provided to facilitate the Magnuson-Stevens EFH consultation. Table 3 presents the potential temporal occurrence of special status fish species that have been documented in the action area. Despite modeling predictions indicating suitable habitat for Southern DPS of North American green sturgeon within the American River and the designation of critical habitat within the lowermost two miles of the river, no green sturgeon have been documented in the watershed (Mora et al. 2009, Beamesderfer et al. 2004, John Hannon, pers. comm., Jan 16, 2015). Considering the high level of recreational use and multi-year fishery monitoring efforts in the lower river, the absence of any reported green sturgeon observations indicates an extremely low likelihood of green sturgeon presence within the action area; therefore, there will be no effects to this species and no further analysis is warranted.

3.3.1 California Central Valley Steelhead

CV steelhead were listed as a threatened DPS under the ESA on January 5, 2006 (71 FR 834) and include all naturally spawned populations of steelhead in the Sacramento and San Joaquin rivers and their tributaries, excluding steelhead from San Francisco and San Pablo bays and their tributaries and two artificial propagation programs: the Coleman National Fish Hatchery and Feather River Fish Hatchery steelhead hatchery programs. The DPS excludes steelhead spawned and reared at Nimbus Fish Hatchery. Critical habitat was designated for CV steelhead on September 2, 2005 and includes the lower American River from the confluence to Nimbus Dam (70 FR 52488).

Populations of naturally spawned CV steelhead are at lower levels than were found historically and are composed predominantly of hatchery fish (Lindley et al. 2007, McEwan 2001). In general, the majority of CV steelhead are confined to non-historical spawning and rearing habitat

below impassable dams, but the existing spawning and rearing habitat can sustain steelhead at current population levels. In addition, monitoring data indicates that much of the anadromous form of the species is hatchery supported.

Recent steelhead monitoring data are scarce for the Lower American River system. The in-river population is small, with observations of a few hundred adult steelhead returning to spawn in the American River each year. During relatively recent observations (2003-2005, 2007), the presence of some spawning steelhead with adipose fins indicates that some in-river spawners are of wild origin (Hannon 2013). However, these wild origin fish are likely progeny of hatchery fish since the "in-river population is likely entirely made up of Nimbus Fish Hatchery steelhead or their descendents" (NMFS 2009, page 612). Based on multi-year seining surveys, juvenile rainbow/steelhead trout rearing during July through September are generally within the 100 to 175 mm size range and appear to utilize habitats with moderate water velocities almost exclusively (John Hannon, pers. comm., Jan 16, 2015). During river wide surveys in July through September, juvenile rainbow/steelhead trout have been primarily observed in riffle and fast water habitats and none in most other types of habitats of the river. As a result, there is a low likelihood low that juvenile steelhead will be present in unrestored project sites prior to, or during construction. In areas where fish have been observed during July through September, density estimates (fish counts per area) indicate an average of 0.00125 juvenile rainbow/steelhead trout per square foot (John Hannon, pers. comm., Jan 16, 2015).

Table 3. Temporal occurrence of special status fish species documented in the Lower American River.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
California Central Valley Steelhead												
Adult Immigration												
Adult Holding												
Spawning												
Egg Incubation												
Juvenile Rearing												
Juvenile Emigration												
Sacramento River Winter-run Chinook Salmon												
Juvenile Nonnatal Rearing												
Juvenile Emigration												
Central Valley Spring-run Chinook salmon												
Juvenile Nonnatal Rearing												
Juvenile Emigration												
Central Valley Fall-run Chinook salmon												
Adult Immigration												
Adult Holding												
Spawning												
Egg Incubation												
Juvenile Rearing												
Juvenile Emigration												

Source: SAFCA 2001; PSMFC 2014a, b; Snider et al. 1998; Snider and Titus 2000, 2001, 2002.

3.3.2 Sacramento River Winter-run Chinook Salmon

NMFS redesignated winter-run Chinook salmon federally endangered on June 28, 2005 (70 FR 37160). Although critical habitat for winter-run Chinook salmon was designated on June 16, 1993 (June 16, 1993, 58 FR 33212), none has been designated within the Lower American River. The Sacramento River winter-run Chinook salmon ESU consists of one population, which is confined to the Upper Sacramento River. Historically, there was never a spawning population within the American River. However, small numbers (6-39 per year) of putative winter-run Chinook salmon[3] juveniles have been captured in a rotary screw trap deployed just downstream of the Watt Avenue Bridge at about RM 9 (1995-1999, 2013, and 2014)(PSMFC 2014a,b; Snider et al. 1998; Snider and Titus 2000, 2001, 2002) which indicates that some nonnatal rearing may occur within the Lower American River. Most putative winter-run Chinook salmon juveniles have been captured from January through March with some captured as early as December and as late as April. Based on observed capture periods and warm temperatures during the summer months, nonnatal rearing is not anticipated to occur prior to November.

3.3.3 Central Valley Spring-run Chinook Salmon

Central Valley spring-run Chinook salmon were listed as threatened on September 16, 1999 (64 FR 50394). This ESU consists of all spring-run Chinook salmon occurring in the Sacramento River basin. Critical habitat was designated for Central Valley spring-run Chinook salmon on September 2, 2005 and includes the lower American River from the confluence to Watt Avenue Bridge (70 FR 52488).

The Central Valley spring-run Chinook salmon ESU is comprised mainly of three self-sustaining wild populations (Mill, Deer and Butte Creeks) (Lindley et al. 2007), which are outside of the action area. These three populations have been experiencing positive growth rates since the low abundance levels of the late 1980s. Recent estimates indicate roughly 2,000 miles of salmon spawning and rearing habitat were available before dam construction and mining, but 82 percent of that habitat is unavailable or inaccessible today (Yoshiyama et al. 1996). Currently, the bulk of the remaining spring-run Chinook are produced in Deer, Mill, and Butte creeks, the Feather River, and perhaps the mainstem Sacramento River.

Historically, a spring-run Chinook salmon spawning population occurred in the American River but this population no longer exists due to their inability to access suitable spawning grounds upstream of Nimbus and Folsom dams. However, small numbers (5-28 per year) of putative spring-run Chinook salmon[2] juveniles have been captured in a rotary screw trap deployed just downstream of the Watt Avenue Bridge at about RM 9 (1995-1999, 2013, and 2014)(PSMFC 2014a,b; Snider et al. 1998; Snider and Titus 2000, 2001, 2002), which indicates that some nonnatal rearing may occur within the lower American River. Most putative spring-run Chinook salmon juveniles have been captured from February through April with some captured as early as December and as late as May. Based on observed capture periods and warm temperatures during the summer months, nonnatal rearing is not anticipated to occur prior to November.

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[3] Assignments of individuals to winter-run or spring-run categories in most years were inconclusive due to the use of length-at-date criteria. SNP genetic markers used in 2013 and 2014 provide a high degree of certainty for winter-run designations, but uncertainty remains regarding spring-run designations.

Critical Habitat

The Lower American River is designated by NMFS to contain critical habitat for the CV steelhead DPS from the confluence to Nimbus Dam, for the spring-run Chinook salmon ESU from the confluence to Watt Avenue Bridge, and for the Southern DPS of North American green sturgeon from the confluence to State Route 160 Bridge. The latter is located outside the action area and will not be affected; therefore, no further analysis is warranted. The ESA defines critical habitat as those specific areas within the geographic area occupied by the species, at the time of listing, containing physical and biological features essential to the conservation of the species that may require special management considerations; and occupied areas that are essential to the conservation of the species. ESA regulations state that the physical and biological features essential to the conservation of the species include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographical and ecological distribution of a species. These principal biological and physical features are known as primary constituent elements (PCEs). NMFS developed a list of four PCEs specific to freshwater riverine systems for CV steelhead and CV spring-run Chinook salmon (70 FR 52536, Sept. 2, 2005) with PCEs #1-3 applicable to CV steelhead and PCEs #2 and #3 applicable to CV spring-run Chinook salmon within their respective designated critical habitats in the Lower American River, including:

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

(2) Freshwater rearing sites with:

(i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;

(ii) Water quality and forage supporting juvenile development; and

(iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

(4) Estuarine areas free of obstruction and excessive predation with:

(i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater;

(ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and

(iii) Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Essential Fish Habitat

The Lower American River is designated by NMFS to contain EFH for Chinook salmon, as defined by the Magnuson-Stevens Fisheries Conservation and Management Act of 1994, as amended. EFH refers to those waters and substrates necessary for spawning, breeding, feeding, or growth to maturity. Freshwater EFH for salmon consists of four major components: spawning

and incubation habitat; juvenile rearing habitat; juvenile migration corridors; and adult migration corridors and adult holding habitat (Pacific Fishery Management Council 2003). Important components of EFH for spawning, rearing, and migration include suitable substrate composition; water quality (e.g., dissolved oxygen, nutrients, temperature); water quantity, depth and velocity; channel gradient and stability; food; cover and habitat complexity (e.g., large woody debris, pools, channel complexity, aquatic vegetation); space; access and passage; and floodplain and habitat connectivity (PFMC 2003).

As defined, the term "waters" includes aquatic areas (and their associated physical, chemical, and biological properties) that are used by fish or, where appropriate, have historically been used by fish. The term "substrate" includes sediment, hard-bottom, structures underlying the waters, and associated biological communities. "Necessary" means the habitat required for a sustainable fishery and the managed species' contribution to a healthy ecosystem. Finally, "spawning, breeding, feeding, or growth to maturity" refers to a species' full life cycle.

The Lower American River provides all four major components of freshwater EFH for salmon. The purpose, and anticipated effect, of the project is to increase the amount of available habitat and enhance stream and riparian habitat suitability for Chinook salmon.

Chapter 4 Effects of the Proposed Action

This assessment considers the nature, duration, and extent of the effects of the proposed action relative to the migration timing, behavior, and habitat requirements of federally listed species and the magnitude, timing, frequency, and duration of project impacts to listed species. Specifically, the assessment considers the potential impacts related to adverse effects to listed species and their designated critical habitats resulting from the Lower American River Anadromous Fish Habitat Restoration Program. The program includes avoidance and minimization measures for potential impacts.

4.1 Presence of Listed Species

Although nonnatal rearing winter-run and spring-run Chinook salmon juveniles may be found seasonally in portions of the action area, they are not present during the construction work window; therefore, there will be no effect to these listed species and no further analysis of effects to these species is warranted. Due to the life history timing of steelhead, it is possible for one or more life stages (i.e., migrating, holding, or spawning adults; incubating eggs; pre-emergent fry; or rearing and emigrating juveniles) to be present at some point within the action area throughout the year. In order to avoid harm to the most sensitive life stages for steelhead (i.e., incubating eggs and pre-emergent fry), as well for fall-run Chinook salmon, the in-river work window is limited to July 1-September 30. The only steelhead life stages that may be present within the action area during this period are rearing juveniles.

4.2 Construction impacts of spawning gravel augmentation, floodplain and side channel enhancements, and placement of instream habitat structures

4.2.1 Hazardous Materials

The potential spill of hazardous materials (e.g., fuel, lubricants, hydraulic fluid) during construction and staging activities into the Lower American River could have deleterious effects on any juvenile steelhead rearing within close proximity to construction activities. Operation of construction equipment in or adjacent to the river presents the risk of a spill of hazardous materials into the river (e.g., construction equipment leaking fluids). Additionally, construction activities that include refueling of construction equipment on location can result in minor fuel and oil spills. Without rapid containment and clean up, these materials could have deleterious effects on any juvenile steelhead within the exposure area. However, juvenile fish exhibit a greater level of mobility and thus possess a greater ability to avoid potentially hazardous materials. The use of conservation measures for the handling and containment of hazardous materials and use of biodegradable hydraulic fluids will minimize the risk of injury or mortality to juvenile steelhead.

Reclamation, or a designated contractor, will develop and implement a Spill Prevention Containment and Countermeasures Plan (SPCCP) prior to the onset of construction. The SPCCP will include measures to be implemented onsite that will keep construction and hazardous materials out of waterways and drainages. The SPCCP will include provisions for daily checks for leaks; hand-removal of external oil and grease. In addition, all construction equipment refueling and maintenance will be restricted to designated staging areas located away from streams and sensitive habitats.

Reclamation expects that adherence to BMPs that dictate the use, containment, and cleanup of contaminants will minimize the risk of introducing such products to the waterway because the prevention and contingency measures will require frequent equipment checks to prevent leaks, will keep stockpiled materials away from the water, and will require that absorbent booms are kept on-site to prevent petroleum products from entering the river in the event of a spill or leak. Heavy equipment operated in the river will use biodegradable hydraulic fluid. Reclamation expects that implementation of BMPs will prevent fuel spills or toxic compounds from causing injury or death to individual fish. Therefore, the likelihood of this potential impact is considered extremely unlikely to occur and considered discountable.

4.2.2 Loss of Riparian Vegetation

Impacts to existing vegetation will be avoided to the extent practicable. Disturbed riparian areas, not intended for future road access or gravel placement, will be revegetated with native plant species and mulched with certified weed-free hay following the completion of construction activities. The loss of riparian vegetation is an indirect effect of creating and maintaining access points to the river, and covering vegetation with gravel. Riparian vegetation provides overhead cover and a substrate for food production for juvenile salmonids. The loss of riparian vegetation can, therefore, increase predation rates and reduce feeding rates for juveniles. Riffle supplementation gravel augmentation methods and the placement of woody material would

impact little of the riparian vegetation surrounding the site. Some vegetation may be temporarily or permanently removed at floodplain and side channel sites. Most effects to riparian will be temporary (approximately 1-2 growing seasons to be recolonized); only a few areas may not regrow due to long-term access. Overall, the amount of riparian vegetation that would be lost is extremely small, and juveniles will have access to adjacent suitable rearing habitat. The impacts are considered to be insignificant.

4.2.3 Increased Turbidity

The re-suspension and deposition of instream sediments is an indirect effect of construction equipment and gravel entering the stream. Short-term increases in turbidity and suspended sediment levels associated with construction may negatively impact fish populations temporarily through reduced availability of food, reduced feeding efficiency, and exposure to toxic sediment released into the water column. Fish responses to increased turbidity and suspended sediment can range from behavioral changes (alarm reactions, abandonment of cover, and avoidance) to sublethal effects (e.g., reduced feeding rate), and, at high suspended sediment concentrations for prolonged periods, lethal effects (Newcombe and Jensen 1996). If this occurs while embryos are incubating, injury or mortality to incubating eggs or alevins may occur through the infiltration of fine sediment into salmonid redds with a reduction of intra-gravel water circulation and in severe cases entombment of salmonid eggs. The deposition of fine sediments in food producing riffles could also reduce the abundance and availability of aquatic insects on which juveniles feed, and result in the loss of rearing cover for juveniles; in the action area, silt and sand on the stream bottom will be disturbed during placement of new materials, however, the amount of sediment that may be re-suspended during project installations is not likely to be significant; any re-suspension and re-deposition of instream sediments is expected to be localized and temporary and would not reach a level that would acutely affect aquatic organisms. The use of in-river work windows will prevent the siltation of steelhead redds and eggs.

Suspended solids and turbidity generally do not acutely affect aquatic organisms unless they reach extremely high levels. At high levels, suspended solids can adversely affect the physiology and behavior of aquatic organisms and may suppress photosynthetic activity at the base of food webs, affecting aquatic organisms either directly or indirectly (Alabaster and Lloyd 1980). Riffle supplementation sites and floodplain and side channel enhancement sites, however, require applying the gravel directly to the streambed and/or grading it, thereby increasing the likely exposure and chance for adverse effects to listed juveniles. Nonetheless, gravel augmentation activities occurring within the active channel will primarily occur within the middle of the channel (>90%) where fewer juveniles are expected to be rearing. Previous studies indicate that juvenile salmonids tend to be found within 10-20 feet of river banks (Allen 2000, FISHBIO and Normandeau Associates 2012, Palmer and Hellmair 2012). Although some rearing and migrating juveniles may be found further from the banks, the area disturbed by gravel placement or excavation and associated turbidity at any given time is expected to be less than 40 percent of the river width, and to be most concentrated within about 200 feet downstream of the project site; therefore, juveniles will have opportunities to move to other portions of the channel where they can avoid potential injury or death from turbidity increases. Additionally, the Clean Water Act § 401Water Quality Certification that will be issued for the Lower American River Anadromous Fish Habitat Restoration Program will limit the potential effects of fine sediment on fish by limiting the maximum increase of turbidity over background levels.

BMPs to control erosion and storm water sediment runoff will be implemented including, but not limited to, straw bales, straw wattles, silt fences, and other measures as necessary to minimize erosion and sediment-laden runoff from project areas. Instream construction will proceed in a manner that minimizes sediment discharge. Impacts of potential increased turbidity are expected to be minimal due to timing of gravel augmentation to avoid sensitive life stages, implementation of BMPs, and ability of juveniles to move to adjacent habitat.

4.2.4 Physical Disturbance

Physical disturbance is a direct result of construction activities and the placement of materials, which has the potential to affect rearing juveniles through displacement and disruption of normal behaviors. Displacement may temporarily expose juvenile fish to a greater risk of predation, but limiting the in-river work window to the summer months (July through September[4]) will minimize effects to juveniles to the maximum extent practicable. Rearing habitat for juvenile fish is generally well-distributed allowing for juvenile movement to other areas to avoid the physical disturbance of construction activities. During construction activities, juvenile fish will not be able to utilize portions of the project footprint where equipment is actively working or within the associated turbidity plume, which is expected to be less than 40 percent of the river width, and to be limited within about 200 feet downstream of the project site However, rearing habitat for juvenile fish is generally well-distributed allowing for juvenile movement to other areas to avoid the physical disturbance of construction activities. Disturbance to listed fishes resulting from riffle supplementation, floodplain and side channel enhancement, and habitat structure placement is expected to be short-term due to the nature and duration of proposed instream and shoreline work. The duration of potential exposure from instream work is temporary and varies by restoration site (Table 1), and is expected to be less than 4 weeks for riffle supplementation and less than 1.5 weeks for both instream habitat structure placement and for excavation/contouring in the active main channel associated with reconnection of floodplain and side channel habitats.

Direct injury or death may occur during instream construction activities during the installation of spawning gravel and instream habitat structures, and while grading the streambed. Materials added to the streambed and equipment working in the stream could injure or kill steelhead juveniles, which rear in shallow water.

The in-river construction work window will avoid the risk to migrating, holding or spawning steelhead adults, incubating eggs and pre-emergent fry, and migrating juveniles; and will minimize the risk to rearing juveniles. Additionally, conservation measures are designed to alert fish to equipment operation in the channel before gravel is placed in the water (e.g., slow, deliberate equipment operation and tapping water surface prior to entering stream channel). Riffle supplementation sites and floodplain and side channel enhancement sites require applying the gravel directly to the streambed and/or grading it. Materials placed at riffle supplementation sites are intended to be used immediately and will only be mobilized under higher flows. Since

[4] Occasionally exceptions to this period have been granted by NMFS on a case by case basis based on fish presence and the nature of the project. Additional requests for exceptions may occur in the future, most likely in October.

juvenile steelhead are known to inhabit the Lower American River throughout the construction season, they are at risk of exposure to instream activities. Due to the possibility that juveniles may be present in shallow water work areas, some impacts may occur to juveniles during instream gravel placement and grading activities for riffle supplementation, instream excavation activities for floodplain and side channel enhancement, and instream placement of habitat structures. Steelhead juveniles are at risk of harm from direct injury, turbidity, physical disturbance, and hazardous material spills from these activities. Despite the potential for exposure based on timing of activities relative to potential presence, a majority of gravel augmentation activities will occur within the middle of the channel (>90%) where fewer juveniles are expected to be rearing. Previous studies indicate that juveniles tend to be found within 10-20 feet of river banks (Allen 2000, FISHBIO and Normandeau Associates 2012, Palmer and Hellmair 2012). Although some rearing and migrating juveniles may be found further from the banks, the area disturbed by gravel placement or excavation and associated turbidity at any given time is expected to be less than 25 percent of the river width, and to be limited within about 200 feet downstream of the project site; therefore, juveniles will have opportunities to move to other portions of the channel where they can avoid potential injury or death. Although salmonids are expected to avoid areas where equipment is actively placing or excavating gravel, an undetermined number of juvenile salmonids may attempt to find shelter in the substrate and be injured or killed by equipment. Materials placed at riffle supplementation sites are intended to be used immediately and will only be mobilized under higher flows that occur infrequently. Placement of habitat structures in areas that are accessible by fish using heavy equipment and/or requiring temporary stream crossings for placement may impact juveniles. However, placement in the active channel will generally occur along non-vegetated channel margins where juvenile fish presence is expected to be minimal due to the lack of vegetation cover, which reduces the potential for exposure and associated injury or death from equipment. Due to BMPs designed to encourage fish movement out of the area prior to construction, minimal effects to juveniles are expected to occur as a result of the riffle supplementation method, floodplain and side channel enhancement, as well as placement of habitat structures within the channel; nonetheless, a small amount of take of juveniles may occur.

4.5 Effects to Critical Habitat

Overall, the Project will not diminish but will improve and increase the conservation value of the spawning habitat PCE for CV steelhead and the rearing habitat and freshwater migration corridor PCEs for CV steelhead and spring-run Chinook salmon. Some short-term effects to the action area's water quality have the potential to occur. The potential for hazardous materials to enter the Lower American River is low as a result of BMP implementation. There may be temporary or permanent loss of some riparian habitat as a result of access to restoration sites. Impacts to existing vegetation will be avoided to the extent practicable, and most disturbed areas will be revegetated. A few areas that will continue to be used for access to long-term gravel augmentation sites will not be revegetated; however, these areas are minimal and because the majority of the Lower American River contains adjacent riparian habitat, the potential effect to riparian habitat is considered to be insignificant.

Gravel augmentation, floodplain and side channel enhancement, and placement of instream habitat structures may cause a temporary increase in turbidity and may redistribute and deposit silt or sand into the Lower American River, which could temporarily degrade current spawning gravel and reduce food availability. In addition, physical disturbance to spawning or rearing

habitat could occur during gravel augmentation, floodplain and side channel enhancement, or instream habitat structure placement. BMPs will be employed during implementation of the Project so that spawning gravel will not be negatively affected. Implementation of these BMPs will ensure these potential effects are insignificant.

4.6 Beneficial Effects

All coarse sediment from the upper watershed is trapped by Folsom and Nimbus dams, which has resulted in gravel curtailment and reduction in fish habitat quality downstream of these facilities. In addition to the reduction of sediment supply, recruitment of LWM to the stream channel and floodplain has also declined in the Lower American River. As a result of the proposed action activities to augment spawning gravel, enhance floodplain and side channel habitats, and place instream habitat structures, spawning and rearing habitat are expected to improve and increase. Monitoring has indicated that gravel from past gravel injections has created new spawning habitat for salmonids.

Instream habitat structures such as woody material contribute to habitat diversity and create and maintain foraging, cover, and resting habitat for both adult and juvenile anadromous fish. LWM recruitment into the Lower American River decreased after Folsom and Nimbus dams were built. Placement of instream woody material on the banks of the active channel will create instantly available habitat by enhancing creating diverse cover for juveniles and possibly adults.

4.7 Cumulative Effects

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 biological opinion.

Non-Federal actions that may affect the action area include angling and State angling regulation changes, voluntary State or private sponsored habitat restoration activities, agricultural practices, water withdrawals and diversions, adjacent mining activities, and increased population growth resulting in urbanization and development of floodplain habitats. While state angling regulations have moved towards restrictions on selected sport fishing to protect listed fish species, incidental hooking of Chinook salmon, hook and release mortality of steelhead, and trampling of redds by wading anglers may continue to cause a threat. Habitat restoration projects may have short-term negative effects associated with instream construction activities, but these effects are temporary, localized, and the outcome is expected to benefit listed species and habitats. Increased water turbidity levels for prolonged periods of time may result from agricultural practices, adjacent mining activities, and increased urbanization and/or development of riparian habitat, and could adversely affect the ability of young salmonids to feed effectively, resulting in reduced growth and survival. Turbidity may cause harm, injury, or mortality to juvenile Chinook or steelhead in the vicinity and downstream of the project area. High turbidity concentration can cause fish mortality, reduce fish feeding efficiency and decrease food availability (Berg and Northcote 1985, McLeay et al. 1984). Urban activities within or adjacent to the action area may have negative effects on water quality due to runoff laden with pesticides and industrial chemicals. Water withdrawals and diversions may result in entrainment of individuals into unscreened or

improperly screened diversions, and may result in depleted river flows that are necessary for migration, spawning, rearing, flushing of sediment from spawning gravels, gravel recruitment, and transport of LWM. Future urban development may adversely affect water quality, riparian function, and stream productivity.

4.8 Synthesis of Effects of the Proposed Action on Covered Species

Although juvenile steelhead have the potential to be exposed to hazardous materials as a result of the project, the BMPs and conservation measures in place make this a discountable effect. Loss of riparian vegetation due to road maintenance or gravel placement may occur as a result of the project, but Reclamation will be replanting where possible, and any additional loss is considered to be at an insignificant level to affecting listed species. Increased turbidity as a result of the project may occur, although temporary in nature and limited to a small area. Juvenile steelhead would have adjacent suitable habitat to temporarily move to if needed to avoid turbidity and physical disturbance, but a small amount of take of juveniles may occur.

The impact of instream work during gravel augmentation, floodplain and side channel enhancement, or habitat structure placement has the highest likelihood to affect listed species. The effects vary depending on the activity. The riffle supplementation gravel augmentation method, instream excavation activities for floodplain and side channel enhancement, and instream habitat structure placement have the highest likelihood of harassing, injuring, or killing juvenile salmonids when they are rearing in areas during augmentation or placement and some level of take may occur. However, adverse impacts will only be temporary; while long-term impacts will be beneficial.

Overall, implementation of spawning gravel augmentation, floodplain and side channel enhancement, and placement of instream habitat structures is expected to increase and improve spawning and rearing habitats for CV steelhead, as well as for CV fall-run Chinook salmon. Subsequently, population abundances are expected to increase and be maintained as a long-term benefit of the continued project.

4.9 Impacts of the Proposed Action on ESU/DPS Survival and Potential for Recovery

Long-term gravel augmentation and restoration of riparian and floodplain ecosystems along the Lower American River (including gravel bars, side channels, and shady vegetated banks) were identified as high priority recovery actions in the Central Valley Salmon and Steelhead Recovery Plan (NMFS 2014). The "Effects of the Action" section acknowledges and analyzes the potential effects of the Lower American River Anadromous Fish Habitat Restoration Program. Some potential effects of the implementation of the project may result in take of listed salmondids in the action area, although negative effects are expected to be minimal. Most significant immediate and long-term effects of the habitat restoration program will be to improve overall conditions for listed salmonids by increasing and improving habitat. This improvement of habitat will be achieved through increasing spawning and rearing habitat.

The temporary adverse effects that are anticipated to result from the implementation are not the type or magnitude that would be expected to appreciably reduce the likelihood of survival and recovery of the affected species in the action area, or at the ESU/DPS level. VSP parameters of spatial structure, diversity, abundance, and productivity are not expected to be reduced; in contrast, implementing this Project is expected to improve these parameters, which will be necessary for the Lower American River populations to reach and/or maintain a viable status. The Central Valley Salmon and Steelhead Recovery Plan (NMFS 2014) indicates that the steelhead population in the American River is classified as Core 2, having the second highest priority for overall recovery efforts. Reclamation expects that any temporary adverse effects of this project will be outweighed by the immediate and long-term benefits to species survival and increased abundance produced by the improvement in habitat for steelhead and Chinook salmon.

4.10 Impacts of the Proposed Action on Critical Habitat

Overall, the Lower American River Anadromous Fish Habitat Restoration Program will not diminish, but will improve and increase the conservation value of the PCEs spawning habitat and rearing habitat for CV steelhead. The long-term effects of the program are anticipated to be beneficial to designated critical habitat for these species.

Gravel augmentation, excavation, and placement of instream habitat structures may cause a temporary increase in turbidity and may deposit silt or sand into the Lower American River, which could degrade spawning habitat conditions and reduce food availability. In addition, physical disturbance to spawning or rearing habitat could occur during gravel placement, floodplain and side channel habitat enhancement, or instream habitat structure placement. BMPs will be employed during implementation of these activities, including an in-river construction window that avoids spawn timing, so that spawning habitat will not be negatively affected. In addition, BMPs to sort fine material from gravel prior to placing will minimize and localize turbidity plumes. Implementation of these BMPs will ensure these potential effects remain insignificant.

Chapter 5 Amount or Extent of Take

Reclamation anticipates some incidental take of CV steelhead during the implementation of the Lower American River Anadromous Fish Habitat Restoration Program. Specifically, Reclamation anticipates that juvenile steelhead may be killed, injured, or harassed during the implementation of restoration activities.

Ecological surrogates are those elements of the project that are expected to result in take, and that are also somewhat predictable and/or measurable, and can be monitored to determine the level of take that is occurring. The most appropriate threshold for minimal take is an ecological surrogate of temporary habitat disturbance during gravel placement, instream excavation activities for floodplain and side channel enhancements, and instream placement of instream habitat structures. Estimated amounts of maximum areas used for floodplain and side channel enhancements and placement of instream habitat structures differs from overall Project footprints because the impact areas are

limited to those portions of these activities that will occur instream versus construction occurring in areas non-accessible to fish. The amount and extent of take was identified using the description of ecological surrogates associated with the action and the estimated number of fish based on fish density data. Actual take is anticipated to be very low because instream activities will occur during periods that will minimize fish exposure to the maximum extent practicable, will be implemented according to BMPs, and only small numbers of fish are expected to rear within or near Project sites.

Anticipated annual take will be limited to the following:

(1) Take in the form of harm to rearing juvenile CV steelhead and temporary loss of up to 500 ft X 300 ft sections of main channel riffle rearing habitat per project site resulting from the physical placement of up to 12,000 cubic yards of spawning gravel per project site and occurring at up to three project sites per year in the Lower American River via the riffle supplementation gravel augmentation method.

Harassment of juveniles may occur associated with displacement. Injury or death may result if gravel lands on juvenile fish, or if fine sediment from turbidity plumes enters their gills and causes respiratory distress or failure. The area disturbed by gravel placement or excavation and associated turbidity at any given time is expected to be less than 40 percent of the river width, and to be most concentrated within about 200 feet downstream of the project site. Based on previous snorkel surveys and seining surveys, average rainbow/steelhead trout densities for the Lower American River during July through September is approximately 0.00125 per square foot in the riffle habitats used by these fish (John Hannon, pers. comm., January 16, 2015). Therefore, we estimate that the maximum number of juvenile rainbow/steelhead trout affected by gravel placement and turbidity (amount of take) will be no more than 198 individuals (66 per site and up to 3 sites) per year. Of this potential level of take, mortality is likely no more than 10 rainbow/steelhead trout (i.e., no more than 5.1% of total take). There is not a stronger ecological surrogate based on the information available at this time because it is not possible to quantify the exact numbers of individuals that may be affected.

(2) Take in the form of harm to rearing juvenile CV steelhead and temporary loss of up to 100 ft X 50 ft sections of main channel riffle rearing habitat per project site resulting from floodplain and side channel excavation activities occurring at up to three project sites per year in the Lower American River.

Harassment of juveniles may occur associated with displacement. Injury or death may result if gravel lands on juvenile fish, or if fine sediment from turbidity plumes enters their gills and causes respiratory distress or failure. The area disturbed by gravel placement or excavation and associated turbidity at any given time is expected to be less than 25 percent of the river width, and to be limited within about 200 feet downstream of the project site. Based on previous seining surveys, average rainbow/steelhead trout densities for the Lower American River during July through September is approximately 0.00125 per square foot (John Hannon, pers. comm., January 16, 2015). Therefore, we estimate that the maximum number of juvenile rainbow/steelhead trout affected by excavation, gravel placement, and turbidity (amount of take) will be no more than 57 individuals (19 per site and up to 3 sites) per year.

Of this potential level of take, mortality is likely no more than 3 rainbow/steelhead trout (i.e., no more than 5.3% of total take). There is not a stronger ecological surrogate based on the information available at this time because it is not possible to quantify the exact numbers of individuals that may be affected.

(3) Take in the form of harm to rearing juvenile CV steelhead and temporary loss of up to 500 ft X 300 ft sections of margin rearing habitat per project site resulting from woody material placement of up 50 log structures per project site occurring underwater or near the water's edge at up to three project sites per year in the main channel of the Lower American River.

Harassment of juveniles may occur associated with displacement. Injury or death may result if heavy equipment crushes juvenile fish, or if fine sediment from turbidity plumes enters their gills and causes respiratory distress or failure. The area disturbed by instream habitat structure placement and associated turbidity at any given time is expected to be less than 25 percent of the river width, and to be limited within about 200 feet downstream of the project site. Based on observations of previous gravel disturbance actions, turbidity plumes are most concentrated within approximately 200 feet downstream of a Project site. Based on previous snorkel and seining surveys, average rainbow/steelhead trout densities for the Lower American River during July through September is approximately 0.00125 per square foot in the habitats used by these fish (John Hannon, pers. comm., January 16, 2015). Therefore, we estimate that the maximum number of juvenile rainbow/steelhead trout affected by woody material placement and turbidity (amount of take) will be no more than 198 individuals (66 per site and up to 3 sites) per year. Of this potential level of take, mortality is likely no more than 10 rainbow/steelhead trout (i.e., no more than 5.1% of total take). There is not a stronger ecological surrogate based on the information available at this time because it is not possible to quantify the exact numbers of individuals that may be affected.

Chapter 6 Findings and Determination

The potential project effects on listed anadromous fishes and their habitat were analyzed. Construction activities may result in temporary and localized increases in turbidity and suspended sediment, and direct mortality and disturbance of juvenile steelhead may result from instream work. With the incorporation of conservation measures, any negative impacts on populations or habitat will be inconsequential in the long-term. The proposed action has been designed to the greatest extent possible to alleviate the potential for take to occur. Additionally, the proposed action will result in the addition or enhancement of salmonid spawning and rearing habitat, which is expected to support an increased number of salmonids over the long-term.

Based on this analysis, it is determined that the proposed Lower American River Anadromous Fish Habitat Restoration Program: (1) *may affect and is likely to adversely affect* CV steelhead, and *may affect, but is not likely to adversely modify* their critical habitat, (2) will have *no effect* on CV spring-run Chinook salmon, yet *may affect, but is not likely to adversely modify* their critical habitat, and (3) will have *no effect* on Sacramento River winter-run Chinook salmon. While take of threatened CV steelhead and some habitat modifications may occur during construction activities associated with habitat restoration, these impacts will be short-term and

the long-term benefits of the resulting habitat improvements will far outweigh the short-term effects on the listed species.

In addition, it is determined that the proposed action *is not likely to eliminate or significantly diminish or disrupt*, essential fish habitat (EFH) for species of concern CV fall/late-fall Chinook salmon ESU.

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APPENDIX A

Lower American River Anadromous Fish Habitat Restoration

Site Descriptions

Lower American River Anadromous Fish Habitat Restoration Site Descriptions

The Lower American River between Nimbus Dam and the State Route 160 Bridge (RM 2) presents several opportunities for improving and restoring salmonid spawning and rearing habitats. Sites were selected throughout the study reach by an interagency group of experts. Sites are intended to maintain flexibility for providing salmonid spawning and rearing habitat enhancement through long-term gravel replenishment, in-channel gravel placements, and side channel and floodplain enhancements to meet the goals of the CVPIA program. The criteria used to select sites and develop conceptual designs include: biological need, site suitability and access, engineering feasibility, environmental compliance and permitting, gravel availability and transportation, and cost-benefit. The proposed action includes 11 restoration sites (eight locations where future restoration activities are specifically described below and three previously restored locations where maintenance may be needed in the future; Table A-1; Figure A-1).

Site Specific Descriptions

Site 1 – Upper Sunrise (RM 21.5). This site includes a ¾ mile reach of the river between the upper Sunrise side channel and the 2012 gravel placement and side channel creation project and includes the adjacent floodplain along the south side of the river. Previous projects occurred in this reach in 2010 – 2012. The past work included riffle and island creation midway through the reach, side channel reconnection at the downstream end of the reach and gravel placement and side channel creation at the upstream end of the reach. Woody material was placed in the main channel adjacent to the created islands and within the created side channel at the upstream end of the reach. The reach includes a low elevation area along the south side of the river where additional side channel and floodplain habitat could be created. Additional gravel placement could occur at the 2010 – 2011 placement site to enlarge the site to create a channel spanning riffle. If high flows disconnect the upper Sunrise side channel again, then additional work at the downstream end of the reach would occur to maintain the side channel connection. This side channel was the highest density steelhead spawning area in the river for many years.

Site 2– Upper Sunrise (RM 20.4). The site includes the reach of the river between the Sunrise Boulevard bridge and the old Fair Oaks bridge. The area consists of a riffle where heavy salmonid spawning occurs, pool habitat upstream of the riffle, and some low elevation floodplain on the south side of the river. A juvenile isolation area is within the floodplain. Work at this site would include side channel creation, floodplain modification, and woody material placement along the south side of the river. This would eliminate the isolation area. Gravel could be placed in the main channel upstream of the existing riffle to increase the amount of spawning and summer steelhead rearing habitat.

Site 3 – Sacramento Bar (RM 18.6). The site includes Sacramento Bar and the reach of river adjacent to Sacramento Bar. Sacramento Bar is a slightly perched floodplain where both gravel mining and dredging occurred in the past. The mining left a pond disconnected from the river at

Table A-1. Lower American River Salmonid Habitat Restoration Program sites.

Site	RM	Restoration Type	Method[a]	Approximate Maximum Dimensions[b]	Approximate Maximum Quantity	Frequency	Approximate Duration of Activity
Site 1- Upper Sunrise[d]	21.5	Gravel Augmentation; Woody Material	RS, WM	3.5 acres	12,000 yd^3	Once, replenish as needed	4 weeks
		Side Channel/Floodplain Habitat	EX, WM	3 acres	25,000 yd^3	Once, revisit as needed	4 weeks[c]
Site 2- Sunrise	20.4	Gravel Augmentation; Woody Material	RS, WM	1.5 acres	7,000 yd^3	Once, revisit as needed	4 weeks
		Side Channel/Floodplain Habitat	EX, WM	1.5 acres	10,000 yd^3	Once, revisit as needed	4 weeks[c]
Site 3- Sacramento Bar	18.6	Side Channel Creation/Floodplain Modification	EX, WM	10 acres	50,000 yd^3	Once, revisit as needed	8 weeks[c]
		Gravel Augmentation; Woody Material	RS, WM	1.5 acres	10,000 yd^3	Once, revisit as needed	4 weeks
Site 4- El Manto	17.9	Side Channel Creation; Floodplain Modification	EX, WM	7 acres	35,000 yd^3	Once, revisit as needed	8 weeks[c]
		Gravel Augmentation; Woody Material	WM, RS	1.8 acres	10,000 yd^3	Once, revisit as needed	4 weeks
Site 5- Ancil Hoffman	15.8	Side Channel Creation; Floodplain Modification	EX, WM	5 acres	30,000 yd^3	Once, revisit as needed	6 weeks[c]
		Gravel Augmentation; Woody Material	WM, RS	1.7 acres	9,000 yd^3	Once, revisit as needed	4 weeks
Site 6- Upper River Bend	14.5	Side Channel Creation; Floodplain Modification	EX, WM	7 acres	35,000 yd^3	Once, revisit as needed	8 weeks[c]
		Gravel Augmentation; Woody Material	WM, RS	2 acres	10,000 yd^3	Once, revisit as needed	4 weeks
Site 7- Howe to Watt	8.5-9.2	Side Channel Reconnection; Woody Material	EX, WM	2.6 acres	10,000 yd^3	Once	4 weeks[c]
Site 8- Paradise Beach	5	Side Channel Creation; Floodplain Modification; Woody Material	EX, WM	7 acres	35,000 yd^3	Once	7 weeks[c]

Site	RM	Restoration Type	Method[a]	Approximate Maximum Dimensions[b]	Approximate Maximum Quantity	Frequency	Approximate Duration of Activity
Unspecified Locations[e]	2-23	Gravel Augmentation	RS, WM	Per site: 12 acres*	12,000 yd^3 per site; 10 sites	Up to once a year, as needed	5 weeks
		Side Channel Creation/Modification; Floodplain Modification	EX, WM	Per site: 7 acres*	4 new/ modified side channels per site; 10	Once per site	2-6 weeks[c]
		Woody Material	WM	Per site: 4 acres*	Per Year: 100 log structures; 3 sites	Once	1-3 weeks[c]

[a] Method codes are: RS = Riffle Supplementation; EX = Excavation; WM =Woody Material Placement

[b] Number represents potential action area; the actual project footprint location within the area is unknown but will be smaller.

[c] Values represent overall construction timeframe; actual duration of instream work will be less than half of this timeframe (i.e., less than 2-4 weeks dependent on project type and site).

[d] This restoration site encompasses three locations where some previous restoration work has occurred.

[e] Three previously restored sites (Nimbus, Upper Sailor Bar, and River Bend; Reclamation 2008) may also need future maintenance consistent with the characteristics identified under unspecified locations .

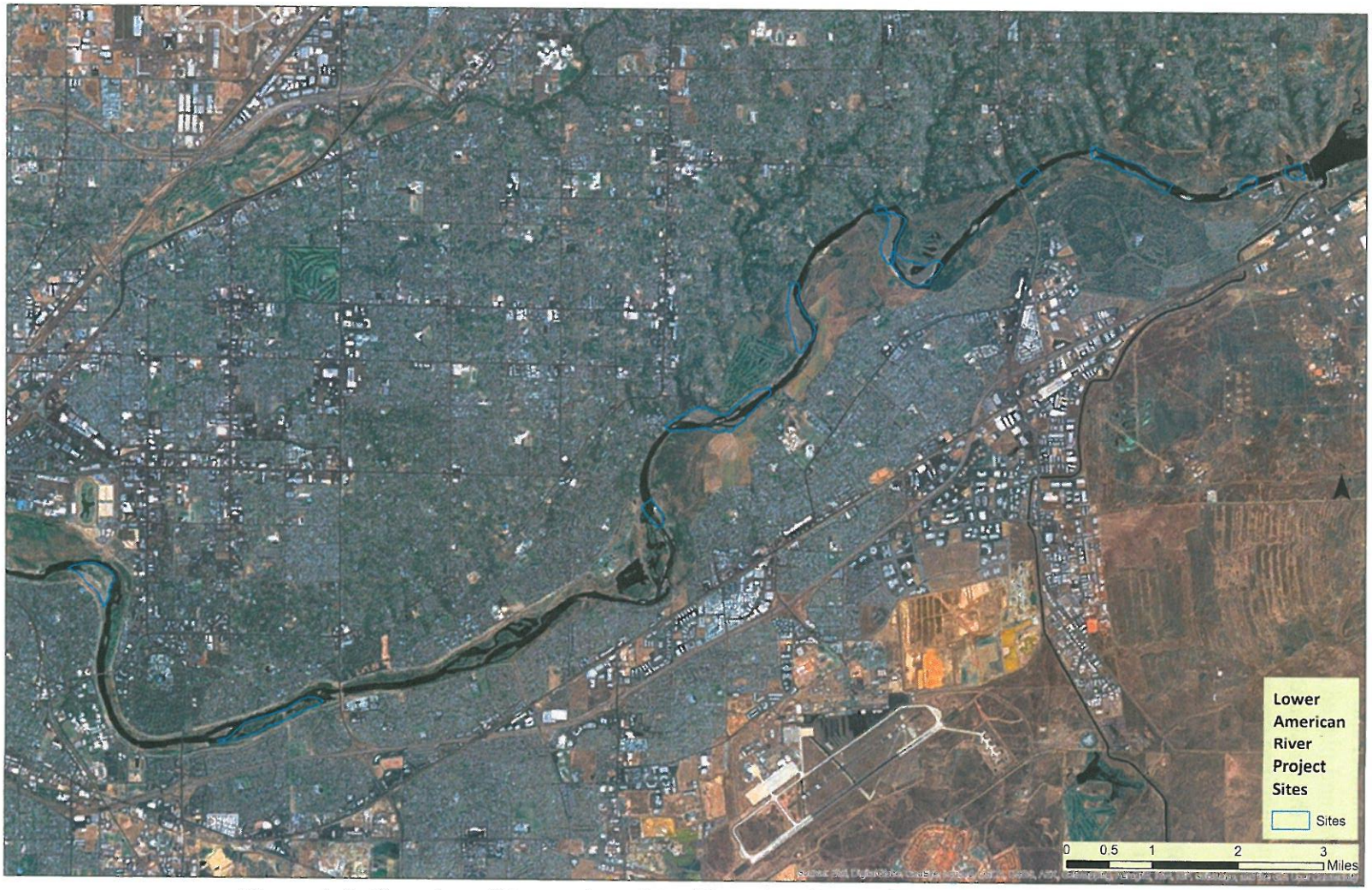

Figure A-4. Overview of Lower American River Anadromous Fish Habitat Restoration sites

all times except for high flows. The river channel at the upstream end of the site receives spawning use, predominantly along the edges of the channel. The spawning habitat consists of predominantly oversized material with most usable sized material along the banks. The project would create side channel and modify floodplain habitat on Sacramento Bar. Gravel from the bar would be sorted and placed in the river channel along the east side of the bar to improve the size distribution of the spawning habitat. Prior to gravel placement the surface layer of larger rock would be pushed into deeper water to provide a consistent material composition more compatible with spawning and egg incubation than the existing armored surface composition.

Site 4 – El Manto (RM 17.9). The site includes low elevation floodplain habitat along the left bank of the river and the main channel of the river upstream and downstream of San Juan Rapids. Spawning occurs on the riffles through this reach. The habitat in the center of the channel is armored with material too large for spawning. The project would include side channel creation and floodplain modification along the left bank of the river. An isolation area is near the downstream end of the site. The site connects to the river at around 2,000 – 3,000 cfs so is frequently connected and disconnected from the main channel. This isolation area could be permanently connected to the river channel to provide backwater rearing habitat during the cooler parts of the year. Gravel from the floodplain could be sorted and placed in the river channel to improve the spawning habitat. The riffle downstream of San Juan Rapids includes good depths and velocities for spawning but is all armored so that no spawning can occur. The armor layer would be pushed into deeper water and replaced with a layer of spawning sized material. Woody material would be included in the side channel habitat areas.

Site 5 – Ancil Hoffman (RM 15.8). The site includes floodplain area along the right bank of the river. The main channel includes riffle habitat where spawning occurs, mostly along the left bank and adjacent to the island at the upstream end of the site. The project would include side channel creation and floodplain modification along the right bank and gravel placement in the main river channel. The short side channel at the upstream end of the site includes good depths and velocities for spawning but the substrate is mostly too large. The oversized material would be pushed to deeper water or onto the island and replaced with spawning sized material from the floodplain area. The finished side channel would be slightly deeper than the existing channel which is dry at low flows. Woody material would be added to the side channel areas.

Site 6 – Upper River Bend (RM 14.5). The site includes a one mile reach of the river between the upstream part of River Bend Park and the downstream end of Ancil Hoffman golf course. The reach includes floodplain area along both sides of the channel. The riffles in this area include low density spawning. Much of the existing habitat is armored with material too large for spawning. Side channel habitat would be created and floodplain habitat modified in the low elevation areas on both sides of the river. Cordova Creek, a tributary entering along the south side of the reach, is the site of another restoration project. Work near the Cordova Creek confluence would be integrated in with the Cordova Creek work. Gravel could be added to the river channel to improve the size distribution of the spawning habitat. Woody material would be included in the side channel habitat.

Site 7 – Howe to Watt (RM 8.5 to 9.2). The site includes the low elevation area along the south side of the river between the Watt and Howe boat ramps. It includes existing side channel and

backwater habitat that becomes disconnected from the river at lower flow levels. Work at this site would increase the connectivity between the backwater habitat and the river channel so that juvenile rearing can occur at most flows. Isolation areas would be modified to remain connected to the channel or drain to reduce the chance of isolation or stranding of fish. No work would occur in the main channel of the river. Woody material would be included in the side channel habitat.

Site 8 – Paradise Beach (RM 5). The site includes a large floodplain area along the left bank of the river upstream of Paradise Beach. Side channel habitat would be created and the floodplain habitat modified so that it becomes inundated over a range of flows. Woody material would be included in the side channel habitat. Isolation ponds are present on the floodplain. These ponds frequently isolate juvenile salmonids. The isolation risk would be reduced by connecting the isolation area to the river so it remains connected at most flows. No work would occur in the main channel. This area of the American River becomes inundated by the backwater from the Sacramento River when the Sacramento River flow is greater than about 30,000 cfs at Freeport.