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## United States Department of the Interior

### BUREAU OF RECLAMATION

Interior Region 10  
Bay-Delta Office  
801 I Street, Suite 140  
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NAT'L MARINE FISHERIES SVS  
SACRAMENTO, CA

2/4/20

FEB 11 2020

Ms. Maria Rea  
Assistant Regional Administrator  
National Marine Fisheries Service  
650 Capitol Mall, Suite 5-100  
Sacramento, CA 95814

Subject: Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat  
Consultation for the Long Term Operations of the Central Valley Project and State Water  
Project (Your Letter Dated January 24, 2020)

Dear Ms. Rea:

The Bureau of Reclamation is in receipt of your subject letter and Essential Fish Habitat (EFH) Consultation, which was developed in close coordination among our offices. We appreciate the opportunity to have provided input and coordinate closely with NOAA's National Marine Fisheries Service (NMFS) on the EFH Conservation Recommendations. Consistent with Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), attached is Reclamation's response to the EFH Conservation Recommendations which provides additional information and clarifications on certain recommendations.

Reclamation understands that 50 CFR § 600.920 requires such response to be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations, unless NMFS and Reclamation have agreed to use alternative time frames for our response. Accordingly, based upon our close coordination on NMFS' EFH Conservation Recommendations and frequent discussions on this matter, NMFS and Reclamation have agreed to an alternative time frame allowing for approval of the action upon submission of this letter.

We value the opportunity to work together with NMFS, and our close coordination on development of the EFH. We look forward to working with you and your staff on implementing the EFH and, should you have any questions in the meantime, please feel free to contact me or Dr. Cynthia Meyer at (916)414-2425 or [cmeyer@usbr.gov](mailto:cmeyer@usbr.gov).

Sincerely,

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Office Manager

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## Response to Essential Fish Habitat Conservation Recommendations

On January 24, 2020, the Bureau of Reclamation received the National Marine Fisheries Service's (NMFS) completed Essential Fish Habitat (EFH) consultation on the Reinitiation of Consultation on the Coordinated Long-term Operation of the Central Valley Project (CVP) and the State Water Project (SWP) (ROC on LTO), in accordance with section 305(b)(2) of the MSA (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600. As required by section 305(b)(4)(B) and section 305(b)(3) of the MSA, Reclamation provides the following additional information and clarifications:

### ***General Clarification:***

The environmental baseline for the ROC on LTO includes the effects of multiple physical, hydrological, and biological alterations that have negatively affected the species and habitat considered in this consultation. These baseline conditions include the past, present, and ongoing effects of the existence of the CVP structures. It is well established that the existence of dams and other structures, which may already be endangering species survival and recovery, is an existing human activity that is included in the environmental baseline and is not an effect of the action. The decisions of Congress and the state legislature to authorize the construction of those structures fundamentally altered the habitat and survival prospects of the species considered in this document. While those negative effects may continue to occur, they are not effects of the ongoing operation of the CVP and SWP. Reclamation has discretion in aspects of its operations, such as the exercise of discretion in operational decision making, including deciding how to comply with the existing terms of respective existing water supply and settlement contracts, and legal obligations. However, Reclamation does not have discretion to remove any of the CVP or SWP structures. In contrast to other obligations, Reclamation has a fundamental, nondiscretionary obligation to ensure that its facilities do not present an unreasonable risk to people, property, and the environment. Reclamation Safety of Dams Act, P.L. 95-589, directs Reclamation to "preserve the structural safety of Bureau of Reclamation dams and related facilities..." (P.L. 95-578, as amended).

### ***A. Sacramento River***

#### ***1) Seasonal Operations – Effect SR-1:***

*Reclamation should operate facilities to maintain flow conditions adequate enough to provide for passage, water quality, minimize juvenile stranding and redd dewatering, and maintain and restore properly functioning channel, floodplain, riparian, and estuarine conditions.*

Reclamation will work with NMFS and other agencies and stakeholders to implement this recommendation downstream of dam facilities. The Sacramento River Temperature Task Group (SRTTG) will continue regular meetings to provide input to Reclamation on how best to meet these goals along with all the CVP purposes. Reclamation is focusing on establishing a sustainable run of winter-run Chinook salmon in Battle Creek.

#### ***2) Spring pulses – Effect SR-2:***

*Reclamation should develop a monitoring plan in coordination with the relevant resource agencies [e.g. NMFS, USFWS, California Department of Fish and Wildlife (CDFW), etc.] to assess the effectiveness of a spring pulse in increasing juvenile migration success, when one is implemented. In addition, on an annual basis, Reclamation should disclose the steps taken in consideration of whether or not to implement a spring pulses action component. Related to effect SR-2, NMFS also recommends the inclusion, by reference, of Term and Condition (T&C) 1.b from the Biological Opinion as a conservation recommendation that Reclamation shall not implement the spring pulse releases if they would cause Reclamation to drop into a lower tier of the Shasta summer temperature management.*

Reclamation will continue to coordinate with the NMFS Southwest Fisheries Science Center and other agencies on their development of the monitoring activities to undertake in a spring pulse flow.

Reclamation will coordinate with the SRTTG in development of a spring pulse flow and the criteria needed to be met, including Shasta Dam storage, weather and climate forecasts, and upcoming water operations requirements, for a pulse to occur.

### 3) Cold Water Pool Management – Effect SR-3:

*Reclamation in coordination with the Sacramento River Temperature Task Group (SRTTG), should consider moving the temperature target downstream in September and October to protect fall- and late fall-run Chinook salmon spawning and incubation, if this would not interfere with Reclamation's ability to meet winter-run Chinook salmon performance measures associated with temperature related mortality and egg-to-fry survival. Reclamation should work with the SRTTG to develop temperature management strategies that protect spawning and egg development of spring-run, fall-run, and late fall-run Chinook salmon.*

Reclamation will work with the SRTTG in the development of temperature management strategies to aid in protection of fall and late fall-run Chinook salmon spawning and incubation if this would not interfere with Reclamation's ability to meet winter-run Chinook salmon performance measures associated with temperature related mortality and egg-to-fry survival.

### 4) Fall and Winter Refill and Redd Maintenance – Effect SR-4:

*Reclamation should establish a process through the SRTTG to consider real-time operations to manage flow and reservoir releases in the Upper Sacramento River that dissuade fall-run Chinook salmon spawning in high flow channel margins as a way to reduce the potential for redd dewatering.*

Reclamation will work with the SRTTG to manage flows in the Sacramento River to reduce the potential for redd dewatering. During fall of 2019 Reclamation released variable flows in October, as recommended by fishery agencies, to meet water supply needs and discourage spawning in shallow areas. These types of operations have been used previously in the Stanislaus and American rivers. Monitoring showed that there was likely some spawning discouraged, although there were some spawning that occurred during the higher flow pulses that were at risk of dewatering as the flows receded. The variable operations produced pulses of

juvenile Chinook salmon emigrating past Red Bluff Diversion Dam, but there was not consensus on whether this earlier emigration is desirable. Collaboration will continue to refine these types of operations when practicable to provide suitable conditions for salmonids while meeting water supply needs.

5) Battle Creek Salmon and Steelhead Restoration Project and Battle Creek Reintroduction Plan – Effect SR-10:

*Although NMFS considers the effect of the Battle Creek Salmon and Steelhead Restoration Project and Battle Creek Reintroduction Plan action component to have a beneficial effect on Chinook salmon EFH, NMFS recommends the inclusion, by reference, of T&C 1.f from the Biological Opinion as a conservation recommendation.*

*Term and Condition 1.f: Reclamation shall work with NMFS, FWS, and CDFW to complete a Battle Creek Acceleration Plan by December 31, 2020. The plan shall address the Battle Creek Salmon and Steelhead Restoration Program and the Battle Creek Winter-run Chinook Salmon Reintroduction Plan, and work with FWS to identify Livingston Stone National Fish facility improvements necessary to support the Battle Creek Winter-run Chinook Salmon Reintroduction Plan.*

Reclamation will work with NMFS, FWS, and CDFW and expects to complete the Battle Creek Acceleration Plan by December 31, 2020.

6) Rearing Habitat Restoration – Effect SR-13:

*NMFS recommends that Reclamation consider prioritizing and designing side-channel restoration actions that reduce the amount and extent of juvenile stranding.*

*NMFS recommends the inclusion, by reference, of T&C 1.g from the Biological Opinion to increase access to the Complex Channels and Floodplains HAPC of Chinook salmon EFH.*

*Term and Condition 1.g: In order to minimize project related impacts to fish growth and survival on the lower Sacramento River, Reclamation shall complete construction of the Fremont Weir component of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project by 2022.*

*For the construction effects associated with implementation of the conservation measures noted, NMFS recommends utilizing best management practices (BMPs) for Sacramento River habitat restoration. In addition to implementation of the relevant avoidance and minimization measures outlined in Appendix E of the ROC on LTO BA, Reclamation should, to the extent practicable, follow the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation should implement the BMPs that are most protective of aquatic habitats.*

Reclamation formed a Sacramento River restoration work group in 2015 to identify and implement top priority habitat improvement actions including side channels. The CVPIA

decision support model has identified juvenile rearing habitat in the Sacramento River as a high priority action. Side channels help to meet the need for additional juvenile rearing habitat. We are actively developing and implementing side channel projects, including areas where juveniles get stranded during flow reductions. Stranding will be reduced and eliminated when the side channels are constructed. In addition, the restoration group is studying the potential for incorporation of temporary juvenile isolation areas as components to increase survival and growth of juveniles disconnected from the main channel. Monitoring on the Trinity River identified areas where juveniles become isolated and the isolated salmonids survive and grow well over the summer and re-enter the main river when higher flows happen the following winter. If implemented in the Sacramento River, these types of features would be designed to function over the winter months during low flows and likely be used mostly by fall-run Chinook salmon.

The Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project is a priority for Reclamation. We expect completing construction of the Fremont Weir component of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project by 2022. Interagency and stakeholder cooperation is critical to meeting the timeline.

Reclamation will follow, to the extent practicable, the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation will implement the BMPs that are most protective of aquatic habitats.

## **B. Clear Creek**

### 1) Complex Channels and Floodplains HAPC – Effect CC-1:

*NMFS recommends that Reclamation manage releases from Whiskeytown Dam with instream flow schedules and criteria to provide suitable water flows for all life stages, reduce stranding and isolation, protect incubating eggs from being dewatered, and promote habitat quality and availability [,and] assess whether Clear Creek flows should be further adapted to reduce adverse impacts on Chinook salmon. Providing adequate flows for migration and maintenance of spawning gravels and suitable water temperatures will increase the likelihood that Chinook salmon populations persist.*

Reclamation will continue to manage releases from Whiskeytown Dam to maintain Chinook salmon populations. These populations are supported by the Trinity River diversions to Clear Creek, without which few fall-run Chinook salmon would be sustained and no spring-run Chinook salmon spawning would be supported by natural Clear Creek flows. Within operational constraints, we will work with the Clear Creek Technical Team (CCTT) to optimize the release of the available water into Clear Creek.

### 2) Thermal Refugia HAPC – Effect CC-2:

*NMFS recommends Reclamation consider the Clear Creek system in the proposed temperature modeling platform for the Sacramento River, as identified in T&C 2.b of the ROC on LTO biological opinion, including Whiskeytown Reservoir, to improve fall water temperature*

*management closer to optimum water temperatures for all life stages of Chinook salmon in Clear Creek.*

The conservation measure in the ROC on LTO for Temperature Model Platform for Shasta Reservoir will require such improved water temperature modeling for Clear Creek. It is possible that this modeling will improve Clear Creek by improving the spatial and temporal fidelity of temperature models with observed temperature mechanics going into a model with finer discretization and calibration. Reclamation will continue to work with the CCTT regarding this recommendation.

### 3) Spawning Habitat HAPC - Effect CC-3:

*NMFS recommends Reclamation develop a new spawning gravel budget and implement a long-term gravel augmentation plan in Clear Creek, including acquisition of a long-term gravel supply. Gravel augmentation would help address reductions in sediment transport caused by the PA. NMFS also recommends that Reclamation identify and implement projects to restore the creek channel closer to natural conditions. Studies have shown that CV spring-run Chinook salmon utilize gravel injection sites for spawning. This would also benefit fall-run and late fall-run Chinook salmon spawning habitat.*

*For the construction effects associated with implementation of the conservation measures noted, NMFS recommends utilizing BMPs for Clear Creek habitat restoration. In addition to implementation of the relevant avoidance and minimization measures outlined in Appendix E of the ROC on LTO BA, Reclamation should, to the extent practicable, follow the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation should implement the BMPs that are most protective of aquatic habitats.*

Clear Creek gravel augmentations have been ongoing since 1996, and, as of 2019, over 175,000 tons have been augmented, and spawning habitat availability for salmon and steelhead has increased. Reclamation, in conjunction with the CCTT, will continue actively pursuing refinements which will improve the speed and efficiency of restoration through gravel augmentations. This includes potential to pair with Reclamation's Technical Service Center and USFWS on continued geomorphic evaluations that include sediment budget.

Reclamation has recently applied more contemporary in-river implementation techniques, which aim to restore and maintain channel geometry similar to high-functioning natural systems. This is intended to improve floodplain inundation frequency, raise water surfaces and groundwater table, and create more complex habitats. Reclamation worked with NMFS to allow for both smaller- and larger-sized gravels to be included in augmentation, which closely mimic natural alluvium. Preliminary results are positive, and we will continue to keep NMFS apprised.

Reclamation and the CCTT are also looking to implement a project that would reclaim gravel from sizable gold mining tailing piles in the alluvial reaches of Lower Clear Creek and return it over several years to Clear Creek through restoration actions. The gravels that reside in these tailing piles were once distributed across a dynamically active alluvial valley that supported a vibrant riparian community, experienced frequent floodplain inundation, and contributed high

fish productivity. Sequestered in tailing piles these gravels and sterile surfaces provide none of these ecological functions, and contribute to undesirable channel confinement, low water table, floodplain disconnection, and severely limits the Creek's food productivity and habitat value for all freshwater salmonid life history stages. This project would have multiple benefits for fisheries restoration. Removing tailing piles will provide a footprint for a functional channel with frequent floodplain inundation, reduce channel confinement, and improve habitat conditions for all freshwater life stages of salmon and steelhead and riparian dependent communities. The tailings piles would be collected, size sorted, cleaned, and stockpiled to provide a long-term coarse sediment supply for future gravel augmentation efforts. All recent gravel augmentations have utilized external sources outside of Clear Creek, which increases the per-ton cost. Having a local and inexpensive gravel supply will increase the efficiency of gravel augmentation projects, allowing for more work to be completed per unit of funding.

Reclamation will, to the extent practicable, follow the Clear Creek habitat restoration BMPs and the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation will implement the BMPs that are most protective of aquatic habitats.

### **C. American River**

#### *1) Complex Channels and Floodplains HAPC – Effect AR-1:*

*NMFS recommends that Reclamation develop a gravel budget or utilize an existing and still applicable gravel budget to augment gravel in accordance with that budget.*

*For the construction effects associated with implementation of the conservation measures noted, NMFS recommends utilizing BMPs for American River habitat restoration. In addition to implementation of the relevant avoidance and minimization measures outlined in Appendix E of the ROC on LTO BA, Reclamation should, to the extent practicable, follow the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation should implement the BMPs that are most protective of aquatic habitats.*

Reclamation relies on the existing gravel budget developed by Dave Fairman at Sacramento State University (Fairman 2007) which documented a gravel deficit in the river with details of change over time. Following these findings, we worked with the Water Forum and Sacramento Area Flood Control Agency to complete iterative modeling that examines gravel transport and deposition over a range of flows. Intermittent topographic mapping is conducted to assess changes in river morphology and gravel budget. This information is used in design of each project in the American River and ongoing annual monitoring contributes to design of subsequent habitat projects.

Reclamation will, to the extent practicable, follow the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation will implement the BMPs that are most protective of aquatic habitats.



## **D. Stanislaus River**

### 1) Complex Channels and Floodplains HAPC – Effect STAN-1:

*In addition to Reclamation's commitment to construct an additional 50 acres of rearing habitat adjacent to the Stanislaus River by 2030, NMFS recommends that Reclamation seek to increase opportunities (through easements or other approaches to alleviate concerns related to seepage) to release flows over 1,500 cfs for more than 10 consecutive days, even when not in reservoir or flood management. This would allow extended inundation of higher-level areas at current and future restoration sites; and improve food production and rearing and migratory habitat in the river and provide the Stanislaus Watershed Team more flexibility to shape water volumes in a manner most beneficial to Chinook salmon EFH.*

*For the construction effects associated with implementation of the conservation measures noted, NMFS recommends utilizing BMPs for Stanislaus River habitat restoration. In addition to implementation of the relevant avoidance and minimization measures outlined in Appendix E of the ROC on LTO BA, Reclamation should, to the extent practicable, follow the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation should implement the BMPs that are most protective of aquatic habitats.*

The Stanislaus River has dense riparian vegetation down to the low flow water line which mechanical channel modifications in certain reaches of the river would be required prior to extended inundation of higher-level areas to have beneficial results. The U.S. Army Corps of Engineers (USACE) has flood/flow easements along the Stanislaus River that requires further coordination. Through the Stanislaus Watershed Team, discussion will continue regarding opportunities and possible options that would result in benefits to EFH.

Reclamation will, to the extent practicable, follow the Stanislaus River habitat restoration BMPs and the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to facilitate implementation of restoration projects in the Central Valley of California (NMFS 2018). Reclamation will implement the BMPs that are most protective of aquatic habitats.

### 2) Thermal Refugia HAPC – Effect STAN-2:

*NMFS recommends that resources (user-friendly temperature modeling tool or modeler time) be provided so that information on Stanislaus River water temperatures from Goodwin to the confluence with the San Joaquin River be modeled and provided to the Stanislaus Watershed Team on a monthly basis for consideration in the shaping and timing of flows in the Stepped Release Plan. NMFS notes that restoration efforts that increase food production can help mitigate temperature effects since higher food supply can help to offset thermal stress.*

Reclamation will work with the Stanislaus Watershed Team to identify and provide resources so that information on Stanislaus River water temperatures from Goodwin to the confluence with

the San Joaquin River be modeled and provided to the Stanislaus Watershed Team on a monthly basis for consideration in the shaping and timing of flows in the Stepped Release Plan.

3) Spawning Habitat HAPC – Effect STAN-3:

*In addition to Reclamation’s annual goal of 4,500 tons of gravel placement in the Stanislaus River, NMFS recommends that Reclamation direct necessary resources to sediment modeling and other information support necessary to gain support for gravel augmentation from the Corps. Reclamation should pursue additional gravel augmentation to address historical deficits, since the CVPIA gravel augmentation target has not been satisfied in every year. For example, since 2009, annual gravel placement has averaged less than 3,000 tons per year [See Table 2-21 in Stanislaus Operations Group (SOG) 2019]. Reclamation should provide minimum flows of at least 300 cfs in November and December for fall-run Chinook salmon spawning, even if above and beyond the minimum flows of the Stepped Release Plan.*

*For the construction effects associated with implementation of the conservation measures noted, NMFS recommends utilizing BMPs for Stanislaus River habitat restoration. In addition to implementation of the relevant avoidance and minimization measures outlined in Appendix E of the ROC on LTO BA, Reclamation should, to the extent practicable, follow the BMPs described in NMFS’s Biological Opinion for the NOAA Restoration Center’s Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation should implement the BMPs that are most protective of aquatic habitats.*

Since approximately 2005, as listed in the Central Valley Project Improvement Act Program Activity Review Report, the annual goal for gravel placement in the Stanislaus under CVPIA has been 3,000 tons. Gravel placement since 2009 has averaged 3,200 tons per year. Given the USACE’s flood/flow easements on the Stanislaus River, our Technical Service Center has been working on modeling to provide to the USACE to address concerns over potential effects of habitat projects on flooding. We anticipate completing modeling sufficient for a conditional permit for a one-year gravel placement project at Goodwin Canyon in summer of 2020. Additional modeling, which is currently underway, will be needed to address concerns over continued gravel placement and effects on the river channel hydraulics downstream of the canyon. Reclamation will continue to meet monthly with the Stanislaus River Watershed Team to discuss operations.

Reclamation will, to the extent practicable, follow the Stanislaus River habitat restoration BMPs and the BMPs described in NMFS’s Biological Opinion for the NOAA Restoration Center’s Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation will implement the BMPs that are most protective of aquatic habitats.

## ***E. San Joaquin River***

1) Complex Channels and Floodplains HAPC – Effect SJ-1:

*NMFS recommends that Reclamation also support other restoration opportunities along the lower San Joaquin River while pursuing the proposed large-scale floodplain restoration effort.*

*Specifically, NMFS recommends, by reference, the following ESA Section 7(a)(1) conservation recommendations from the NMFS ROC on LTO Biological Opinion. Reclamation and DWR should support the following Lower San Joaquin River Habitat Projects consistent with the Collaborative Planning Action in the NMFS ROC on LTO Biological Opinion.*

- i. Restoration of floodplain access and San Luis National Wildlife Refuge*
- ii. Sturgeon Bend Floodplain Restoration*
- iii. Durham Ferry State Recreation Area floodplain restoration*

*NMFS recommends utilizing BMPs for San Joaquin River habitat restoration. In addition to implementation of the relevant avoidance and minimization measures outlined in Appendix E of the ROC on LTO BA, Reclamation should, to the extent practicable, follow the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation should implement the BMPs that are most protective of aquatic habitats.*

Reclamation will consider these projects for implementation as part of annual CVPIA work planning. The activities to be implemented are prioritized through the CVPIA Science Integration Team and its decision support model.

Reclamation will, to the extent practicable, follow the San Joaquin River habitat restoration BMPs and the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation will implement the BMPs that are most protective of aquatic habitats.

## *2) Thermal Refugia HAPC – Effect SJ-2:*

*NMFS recommends that Reclamation support, specifically, restoration efforts that increase food production since higher food supply can help to offset thermal stress.*

Reclamation is currently supporting and working on studies to determine ways to increase food production to river channels that can be applied to the San Joaquin River. We supported U.C. Davis to study how different tributary types upstream of Shasta Reservoir differ in the productivity relative to food availability to salmonids. This work is being followed up by a study downstream of Keswick Reservoir to estimate how reservoir operations contribute to food production. We are conducting a study in the Sacramento River deepwater ship channel on ways to enhance food production in the delta and we are funding studies of using timed releases of water from rice fields to enhance food production when fish are present. These studies should lead to better identification of actions that could be undertaken to increase food production for salmonids on the San Joaquin River.

## **F. Delta Ecosystem**

### *1) Complex channel and floodplain, estuary, and marine and estuarine aquatic vegetation HAPCs impacted by construction related releases of contaminants – Effect DELTA-2:*

*NMFS recommends that Reclamation require additional BMPs to be used to further protect EFH present within the Delta region for Chinook salmon, and various species of Pacific coast groundfish and coastal pelagic species.*

*For the construction effects associated with implementation of the conservation measures noted, NMFS recommends utilizing BMPs for Sacramento-San Joaquin Delta habitat restoration. In addition to implementation of the relevant avoidance and minimization measures outlined in Appendix E of the ROC on LTO BA, Reclamation should, to the extent practicable, follow the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). Reclamation should implement the BMPs that are most protective of aquatic habitats.*

Reclamation will, to the extent practicable, follow the BMPs described in NMFS's Biological Opinion for the NOAA Restoration Center's Program to Facilitate Implementation of Restoration Projects in the Central Valley of California (NMFS 2018). We will implement the BMPs that are most protective of aquatic habitats.

*2) Complex channel and floodplain, estuary, and marine and estuarine aquatic vegetation HAPCs impacted by resuspension of contaminated sediments – Effect DELTA-3:*

*NMFS recommends soil testing of a statistically representative sample of soils contained within the Delta Smelt Conservation Hatchery construction footprint for contaminants. Findings of the soil testing will inform the future soil removal protocols, including preventative sediment curtains (or other measures) surrounding proposed work areas and removal or mitigation measures for uncontained sediments.*

The Delta Smelt Conservation Hatchery construction project would be required to obtain all necessary authorizations, approvals, and compliance documents prior to project implementation. All appropriate laws and regulations (including ESA) on this action would be implemented and analyzed through a separate ESA consultation.

*3) Predator Hot Spots– Effect DELTA-4:*

*NMFS recommends T&C 5.a from the ROC on LTO Biological Opinion be incorporated as a conservation recommendation to reduce predator “hot spots” in the Bay Delta region. NMFS recommends that monitoring of fall-run and late fall-run Chinook salmon be included in the decision process for operations of the DCC gates and south Delta temporary barriers to reduce potential predation associated with routes through the Delta interior or associated with the south Delta temporary barriers. Protective actions regarding the DCC gate operations include closing the gates during periods when juvenile Chinook salmon are emigrating regardless of run designation. Installation of the south Delta temporary barriers should be delayed until the spring emigration of fall-run Chinook salmon from the San Joaquin River basin is nearing completion. After installation of the barriers, the culverts are recommended to remain tied open to allow downstream passage of juvenile Chinook salmon until the monitoring at Mossdale indicates that there are few fish migrating downstream through the San Joaquin River system. NMFS recommends that T&C 5.h from the ROC on LTO Biological Opinion be incorporated as a*

*conservation recommendation to provide real-time information regarding the timing of installation and operations of the south Delta temporary barriers and their potential impacts to migrating Chinook salmon routing through the south Delta.*

*Term and Condition 5.a: Consistent with the additional Delta measures on habitat restoration in the final proposed action, Reclamation shall develop and implement a predator management experiment to reduce the mortality of emigrating juvenile salmonids at “hot spots” in the Bay-Delta.*

*Term and Condition 5.h: DWR shall incorporate the following terms and conditions related to South Delta Agricultural Barriers:*

- i. DWR shall send notice of intent to construct the barriers to NMFS at least 14 days prior to start of construction. This information shall include anticipated start dates and completion dates for each of the barriers. In the fall, DWR shall provide NMFS with the anticipated schedule for removal of the barriers, and notification when the removal has been completed.*
- ii. DWR shall provide documentation to NMFS indicating the anticipated schedule for culvert operations, including potential early closures and water elevation conditions, by the completion of barrier installation each season. Updates to barrier operations shall be provided to NMFS on a weekly basis until mid-June.*

The Delta Cross Channel gate operations, as proposed, will continue to remain closed through the bulk of the Chinook salmon juvenile emigration period for all runs. DCC gate closures in the fall to reduce fall-run Chinook salmon straying potential between tributaries will be prioritized with the need to maintain water transport capacity through the DCC and maintain through delta transport of fresh water. Reclamation will notify DWR of its reporting requirements related to Term and Condition 5.h.

*4) Complex channel and floodplain, estuary, and marine and estuarine aquatic vegetation HAPCs impacted by PA related changes in flows and local hydrodynamics– Effect DELTA-5:*

*NMFS recommends that if large pulses of Chinook salmon are detected migrating through the Delta or are observed in salvage, regardless of run type, protective actions should be employed to reduce the entrainment and loss of these fish at the CVP and SWP export facilities. These actions include export reductions to reduce hydraulic impacts within waterways leading to the south Delta export facilities, closure of the DCC gates to prevent routing of juvenile Chinook salmon into the Delta interior, and preferentially exporting from the CVP facilities to reduce loss during salvage operations. In addition, closing the DCC gates in the fall during pulse flows on the Mokelumne River designed to attract adult Chinook salmon will reduce straying of these fish into the open DCC route.*

*Reclamation and DWR should support the implementation of physical and non-physical barrier projects that are designed to re-route fish movements to increase through-Delta survival of juvenile salmonids. Reclamation and DWR should install and operate the non-physical exclusion barrier at Georgiana Slough consistent with DWR’s prior pilot study results. DWR should implement the Salmon Protection and Technology Study at Steamboat and Sutter Sloughs to determine the effectiveness of different barrier technologies at these locations in their ability to increase through Delta salmonid survival.*

*In order to reduce uncertainties regarding the mechanisms and extent of take in the form of juvenile salmonid behavioral modifications to hydrodynamic changes in the south Delta that are associated with water operations, Reclamation and DWR should implement the recommendations of the Collaborative Adaptive Management Team work plan for salmonids (Salmonid Scoping Team 2017a, b). As part of this work plan, Reclamation and DWR should fund continued development of enhanced particle tracking modeling that is sensitive to realistic changes in south Delta operations, incorporates realistic fish behavior, analyzes existing data, and conduct experiments to assist in model development.*

*Furthermore, Reclamation and DWR should develop sound experimental designs to test key alternative hypotheses regarding salmon survival (e.g., exports are important in addition to inflow in some circumstances in influencing juvenile salmon behavior, etc.). This experimental approach should build on lessons learned from recent and current studies within the Delta region to inform future study designs.*

*Finally, NMFS supports the tidal habitat restoration of 8,000 acres in the PA. In addition, NMFS recommends that Reclamation and DWR consider implementing the recommendations from the Collaborative Adaptive Management Team-sponsored evaluation of rearing habitat potential, which is expected to be released in early 2020.*

Old and Middle River management designed to protect ESA listed salmon will also protect the non-ESA listed salmon. Actions targeting non-ESA listed salmon would be contingent on the ability to maintain water supply obligations through the Delta. The Delta Cross Channel gate operations, as proposed, will continue to remain closed through the bulk of the Chinook juvenile emigration period for all runs. Reclamation will continue to coordinate with hatchery managers on potential DCC gate closures to reduce adult straying. DCC gate closures in the fall to reduce fall-run Chinook salmon straying potential between tributaries will be prioritized with the need to maintain water transport capacity through the DCC and maintain through delta transport of fresh water. In addition, the recommendation to preferentially pump from the CVP facilities to reduce loss during salvage operations is a conceptual action for reducing overall loss and requires further studies to estimate loss at CVP or SWP facilities. These data are necessary for modeling to consider the conceptual potential benefits suggested in the recommendation, prior to employing this action.

Reclamation and/or DWR will support the installation of non-physical barriers and the evaluation of the performance of non-physical barriers as prioritized by the science-based frameworks for collaborative planning, as described in the Proposed action for the ROC on LTO.

Reclamation and DWR will continue to participate in the Collaborative Science and Adaptive Management Program and the associated Collaborative Adaptive Management Team for the implementation of priority salmonid actions and sound experimental design within the Proposed Action and Incidental Take Statements for the ROC on LTO.

Reclamation and DWR will consider implementing the recommendations from the Collaborative Adaptive Management Team-sponsored evaluation of rearing habitat potential, which is expected to be released in early 2020.

## References

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