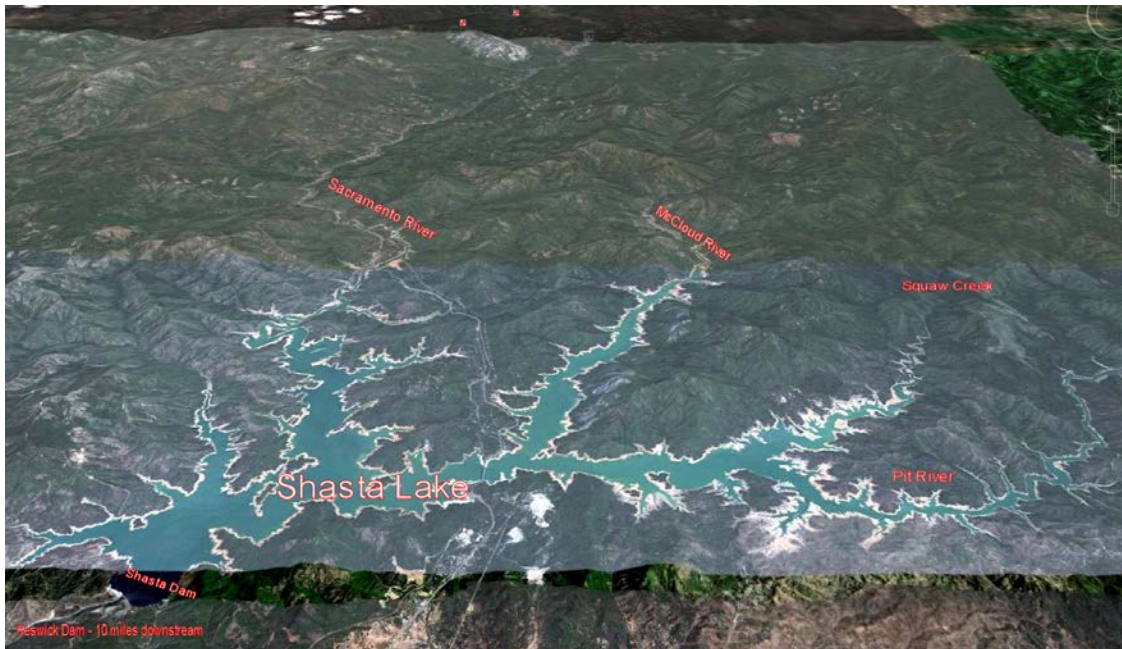


# Interagency Fish Passage Steering Committee 2015 Annual Report



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## Attachments

1. Draft Pilot Plan
2. Draft Environmental Assessment

## Background

The Shasta Dam Fish Passage Evaluation (SDFPE) is an effort to evaluate the feasibility of reintroducing Chinook salmon and steelhead to tributaries above Shasta Lake. A Fish Passage Pilot Implementation Plan is being developed with representatives from U.S. Bureau of Reclamation (Reclamation), National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), California Department of Water Resources (DWR), California Department of Fish and Wildlife (DFW), California State Water Board (Water Board), and the University of California Davis.

The SDFPE is part of Reclamation’s implementation of the June 4, 2009, Biological Opinion (BO) on the Long-Term Operation of the Central Valley Project (CVP) and State Water Project (SWP) by NMFS. The NMFS BO concluded that, as proposed, CVP and SWP operations were likely to jeopardize the continued existence of four federally-listed anadromous fish species: Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead, and the Southern distinct population segment of the North American green sturgeon. The BO set forth a Reasonable and

Prudent Alternative (RPA) that allows continued operation of the CVP and SWP in compliance with the federal Endangered Species Act (ESA).

The NMFS RPA includes a Fish Passage Program (Action V) to evaluate the reintroduction of winter-run and spring-run Chinook salmon and steelhead. Action V of the RPA applies to three dams operated by Reclamation: Shasta, Folsom, and New Melones. Action V specifies a Fish Passage Pilot Program for Shasta and Folsom and an evaluation of the potential for a pilot program in New Melones. The near-term goal for Action V, as stated in the RPA, is to increase the geographic distribution and abundance of the listed fish. The long-term goal is to increase abundance, productivity, and spatial distribution, and to improve the life history, health, and genetic diversity of the target species. Initial activities by the steering committee worked towards implementing pilot fish passage programs at at Shasta and Folsom dams. Due to the interagency resource coordination needs, complexity of the project, and similar technological aspects of the pilot evaluations between watersheds, the agencies decided to focus the initial pilot evaluations on Shasta Dam. Lessons learned from pilot evaluations at Shasta will be applied to evaluating passage at Folsom and New Melones.

## Steering Committee

The Interagency Fish Passage Steering Committee was formed in 2010 to focus on all three fish passage watersheds. The committee has evolved into the Shasta Fish Passage Steering Committee to reflect the focus on the fish passage pilot at Shasta. The agencies are devoting resources to Shasta initially before embarking on passage investigations on the multiple systems included in the RPA simultaneously. The following table lists Steering Committee membership.

### Interagency Fish Passage Steering Committee Members

Agency	Members
US Bureau of Reclamation	John Hannon, David van Rijn
National Marine Fisheries Service	Jonathan Ambrose, Alice Berg, Jeff McLain
US Fish and Wildlife Service	Jim Smith, Donnie Ratcliff
CA Department of Fish and Wildlife	Tom Schroyer, Jason Roberts, Andrew Jensen
CA Department of Water Resources	Stefan Lorenzato, Ted Frink, Marc Commandatore
US Forest Service	Bill Brock, Joe Furnish
Water Board	Amber Villalobos

## Steering Committee Activities

During 2015 the steering committee reworked the first draft of the pilot implementation plan. The top priority target species for the project is winter-run Chinook Salmon. The depressed state of the winter Chinook population resulted in the decision to switch to a captive broodstock to provide the source of fish for the pilot studies. Winter Chinook from this captive broodstock will be used for the pilot studies because of the lack of a suitable surrogate species. NMFS is working on designating an experimental population of winter-run and spring-run Chinook following up from Reclamation’s request that NMFS

promulgate a rule designating a non-essential experimental population in the watershed upstream of Shasta Dam, pursuant to Section 10(j) of the Endangered Species Act. The 10(j) designation will help address public concerns regarding listed species used for the feasibility studies. Designating an experimental population will allow for management of the population in furtherance of conservation, while providing for the continuance of otherwise lawful activities.

## Focus Areas

To guide the SDFPE effort, the participating agencies have identified six focus areas. Additional staff from the Steering Committee agencies participates in the steering committee and in subcommittees developed to address technical items related to each of these focus areas:

- **Habitat:** Conduct habitat-related work including surveys, data collection, habitat maps, Habitat Assessment report, and related habitat issues and decisions.
- **Fish Passage Technology:** Develop and assess fish passage technology and passage efficacy, design, reservoir hydrodynamics, screen criteria, operations.
- **Fish Health and Genetics:** Assess the health of existing fish populations above Shasta Lake, and identify broodstock selection, and the health and genetics of the potential broodstock.
- **Pilot Planning:** Compile information from the Habitat, Fish Passage Technology, Fish Health and Genetics, and Policy and Regulation focus areas, as well as identifying other management activities and monitoring programs to successfully implement a pilot implementation program for fish reintroduction.
- **Policy and Regulations:** Define and comply with the National Environmental Policy Act, National Historic Preservation Act, Wild and Scenic Rivers System, and ESA permits and regulations as they relate to reintroduced salmon.
- **Public Outreach:** Coordinate and foster broad awareness and transparency of the SDFPE among the public, agencies, landowners, organizations, elected officials, and other interested parties.

## Habitat

A framework was devised for assessing spawning and rearing habitat upstream of Shasta Dam, focused on the McCloud and upper Sacramento rivers. The habitat assessment describes habitat availability and condition relative to the requirements for the freshwater life stages of the salmon species being considered for reintroduction rather than quantitatively predicting the potential production of salmon above Shasta Dam. This approach provides sufficient information to estimate the potential number of salmon spawners that can be released and supported by the existing habitat conditions for purposes of the pilot reintroduction study. The analytical tools consist of a spatially-explicit stream classification procedure; a set of habitat suitability criteria derived from the literature; use of existing regionally relevant data and information, augmented with aerial videography and field verification surveys to fill data gaps; and assumptions concerning the potential distribution and use of habitat by salmon in portions of the watershed to which they have not had access for over 70 years.

The framework was developed by North State Resources under subcontract with MWH and in collaboration with the habitat subcommittee of the IFPSC. The framework was completed in the fall of 2013 and habitat assessment work began in November 2013. Because of the large area to be covered by the assessment aerial video taken in November 2013 was used to document conditions in the

mainstem rivers. Aerial video was also taken in the tributaries with sufficient visibility from the air but most tributaries had extensive canopy cover preventing adequate video to be collected for data interpretations. Following the video data collection, ground truth surveys were conducted in 14 reaches to verify the interpretations of habitat features visible on the aerial video.

The habitat assessment and framework are available on the project website. The results of the habitat assessment indicate that both the Upper Sacramento and McCloud rivers include habitats that could support winter-run Chinook spawning, egg incubation, and rearing. Considering that the primary reason for evaluating reintroduction potential for winter-run is the expected reduction in cold water below Keswick Dam with climate change, the following are key differences between the two rivers relative to a long-term reintroduction program for winter-run Chinook:

- The McCloud has approximately eleven miles and the Upper Sacramento has nine miles (Figures 1 and 2) of habitat within the 56 F egg incubation temperature used as the criteria for optimal egg incubation below Keswick Dam. Figure 1 compares water temperature 5.5 miles downstream of McCloud Dam to temperature in the Sacramento River at the 2014 temperature compliance point at South Bonneyview Bridge. The coldwater pool was depleted in Shasta with the extended drought conditions in 2014 resulting in loss of temperature control in September. Water temperature in the McCloud River in the expected winter Chinook spawning habitat held below 56 F the entire summer with no temperature management.
- The McCloud River has an estimated capacity for approximately 3,000 spawning female Chinook and the Upper Sacramento has estimated capacity for approximately 200 females within the thermally suitable zone for winter-run. This estimate used a spawning territory size of six square meters per female (Table 1).
- Rearing habitat quality was rated for both rivers. Rearing habitat capacity was not estimated due to the uncertainty in behavior of juvenile winter Chinook in this “new” habitat. Both rivers possess relatively intact riparian areas throughout most of their lengths. They are predominantly bedrock controlled channels without extensive off-channel rearing areas or floodplain habitats.

Table 1. Estimated female winter Chinook Salmon spawner capacity in the thermally suitable reach of the McCloud and Upper Sacramento rivers.

River	River Length (miles)	Thermally Optimal Length (miles)	Estimated Spawner Capacity (Number of Females)		
			6 m <sup>2</sup> Spawning Territory	10 m <sup>2</sup> Spawning Territory	20 m <sup>2</sup> Spawning Territory
Sacramento	37.0	9.0	224	134	68
McCloud	23.2	11.6	3,382	2,029	1,014

The priority for winter Chinook reintroduction upstream of Shasta laid out in the 2014 Central Valley Salmon and Steelhead Recovery Plan is the McCloud River. Therefore the project is focusing on the McCloud River for initial pilot studies.

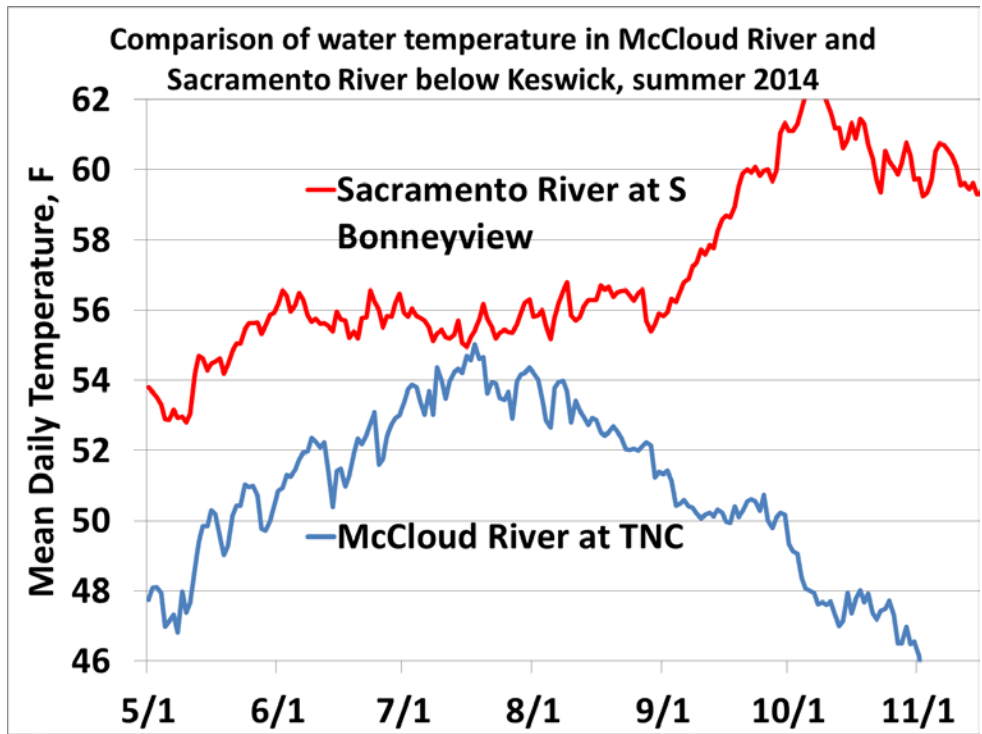


Figure 1. Water temperature in the McCloud River compared to the Sacramento River below Keswick Dam in summer of 2014. McCloud River location is 5.5 miles below McCloud Dam and Sacramento River location is 10 miles below Keswick Dam.

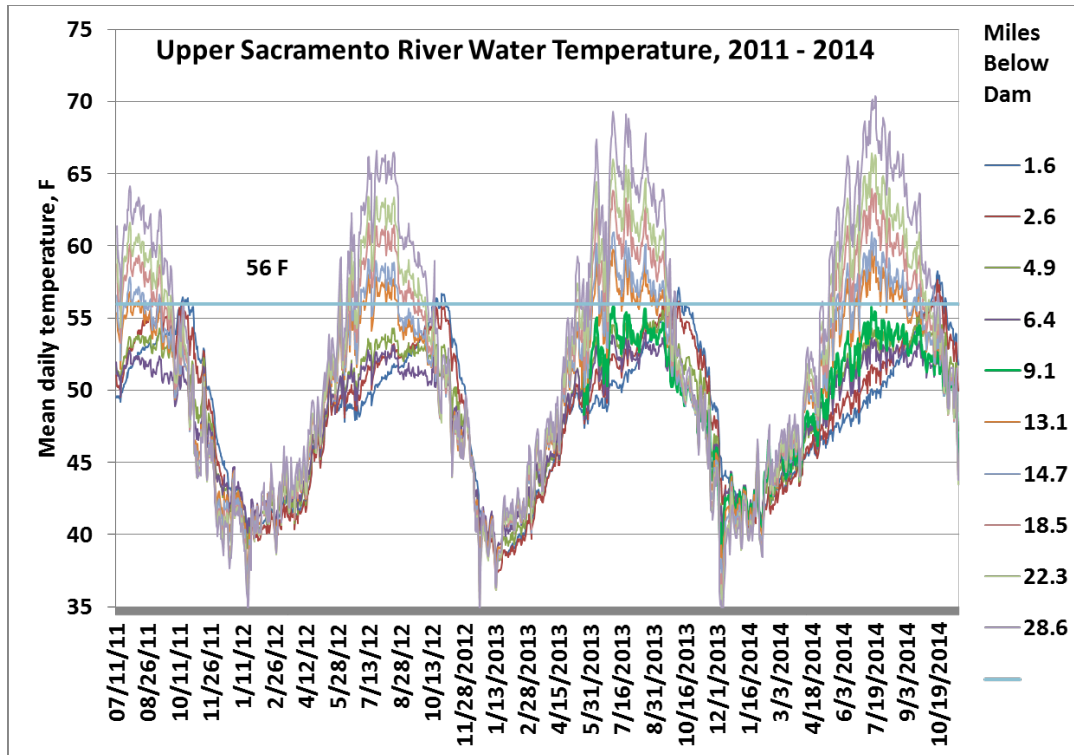


Figure 2. Upper Sacramento River mean daily water temperatures at stations established for the fish passage evaluation, 2011 - 2014. Locations are identified by miles below Box Canyon Dam. The 9.1 mile location was added in 2013.

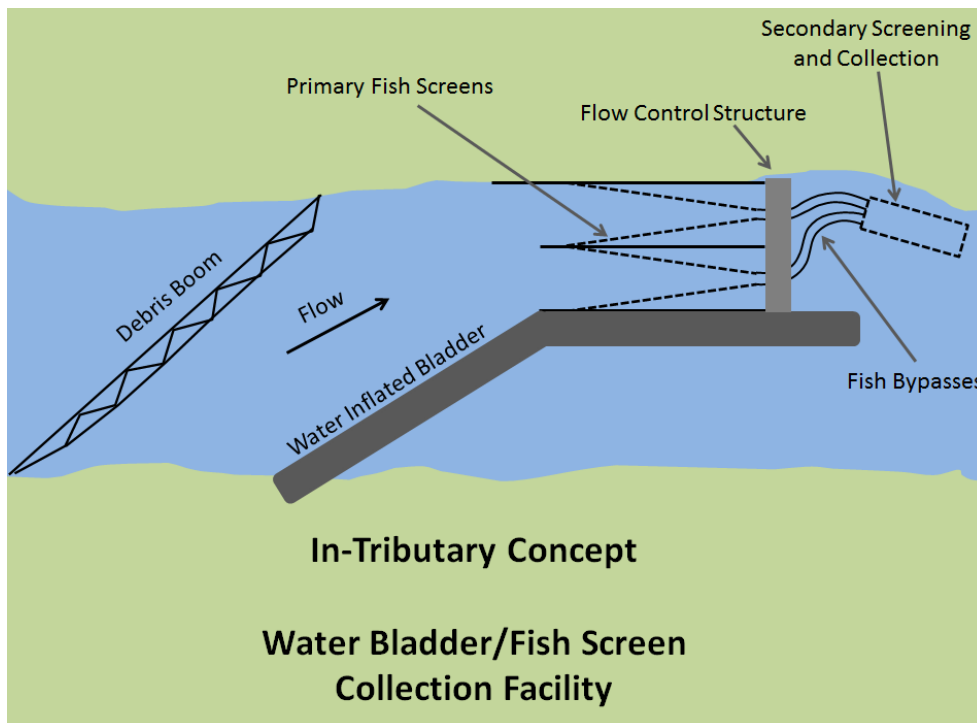
## Fish Passage Technology

The Shasta Fish Passage Technology Subcommittee is a multi-agency group supporting the Shasta Fish Passage Steering Committee with members from Reclamation, NMFS, CDFW, and CDWR. The purpose of the Subcommittee is to identify potential fish juvenile and adult passage methods at a preliminary level and determine which methods are preferred. The Subcommittee will identify precedents where passage over high dams is accomplished in the U.S. and world. The group will examine non-biological implementation issues specific to Shasta Dam (e.g. reservoir complexity/size, storage fluctuation, thermal stratification, temperature control device operations, sport fishery, recreational use, haul distance, access, Keswick Dam operations, potential dam raise), examine impacts to dam operation, and identify risk factors to implementation.

Specific activities accomplished by the Fish Passage Technology Subcommittee in 2015 include:

- A juvenile collection workshop was organized by CDWR and attended by experts in juvenile salmonid collection from Washington, Oregon, California, Colorado, and Mississippi. The workshop focused on identifying juvenile collection concepts near the mouth of a tributary river and at the head of the reservoir, close to the tributary. Top priority concepts for in-river and head of reservoir juvenile collection (Figure 3) are being carried into the design phase by CDWR engineers in collaboration with the juvenile collection workshop participants. Designs are targeted for completion in spring 2016.

- Ongoing collaboration with University of Nevada Reno on hydrodynamic and thermal CE-QUAL-W2 modeling of head-of-reservoir locations in the Sacramento and McCloud arms. This modeling, now nearly completed, is assisting in developing juvenile Chinook collection strategies.
- Coordinated with Reclamation’s Water Treatment Group (Technical Service Center, Denver, CO), with a UC Davis researcher and with a private contractor on identifying options for water treatment at Livingston Stone National Fish Hatchery. A workshop with the pathology group, hatchery personnel, and contractor will occur in October 2015 to develop water treatment options.
- Interacted with other subcommittees and MWH contractor.





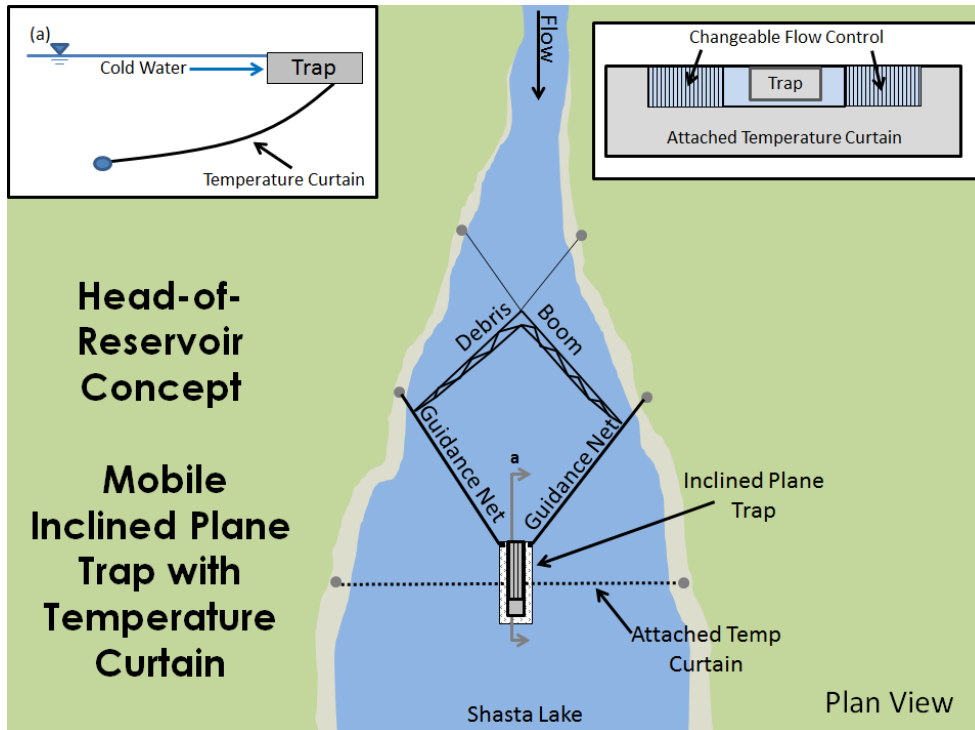


Figure 3. In-river (top) and head of reservoir (bottom) juvenile salmon collection concepts

## Fish Health and Genetics

The fish health group is working to address fish health concerns related to the capture, transport, and release of lifestages of Chinook between habitats below Keswick Dam, Livingston Stone National Fish Hatchery (NFH), and habitats upstream of Shasta Dam. The project is focusing on winter-run Chinook as the test run for the initial pilot studies with the source of fish coming from the Livingston Stone NFH. A captive broodstock was started from the 2014 brood year of winter Chinook. Offspring from these fish are planned for use in the pilot study in 2017 as long as they are not needed for supplementation in the lower Sacramento River in the case of low adult return in 2017.

The CDFW and USFWS are conducting a cooperative fish health study to determine prevalence of fish diseases in resident fish populations above Shasta Dam. The study is focusing on resident trout sampled in the lower reaches of the Upper Sacramento and McCloud rivers above Shasta Lake. The study will help to address concerns over potential disease effects related to transmission of pathogens between Chinook salmon, resident species, and other pathogen hosts. Sampling was completed in September 2015. Pathology testing is being conducted by USFWS California Nevada Fish Health Center. CDFW and USFWS will prepare a report describing the results and implications relative to salmon reintroduction upstream of Shasta Dam.

There is concern that using adult Chinook salmon from below Shasta and releasing them upstream of Shasta may transfer diseases (infectious hematopoietic necrosis primarily) into waters that feed Livingston Stone NFH and result in reduced survival in the hatchery fish. Options for a water treatment

system to treat the source water for Livingston Stone NFH are being explored in a workshop in October 2015. Indications from the pathology group are that adults cannot be moved until hatchery source water is treated so initial pilot studies are being planned to rely on introducing hatchery juveniles and/or eggs into habitats upstream of Shasta.

## **Pilot Plan**

The pilot plan is formulated based on questions that need to be answered to make an informed decision regarding whether to proceed with a long term fish passage program for reintroduction of ESA listed Chinook salmon upstream of Shasta Dam. The plan will involve obtaining adult winter-run from the Keswick trap, spawning the fish at Livingston Stone NFH, hatching eggs at the hatchery and also transporting eggs to habitats in the McCloud and/or Upper Sacramento rivers for incubation. Currently adults captured in 2014 and 2015 were spawned and the offspring are being held as a captive broodstock to produce fish for the project. The adult captive broodstock will be spawned when ready, expected to be in 2017. The fry and/or juveniles from the eggs incubated at the hatchery would be transported to upstream habitats for studies in the habitat. The upstream studies will include juvenile survival, efficiency of pilot juvenile collection, egg incubation, emigration timing and sizes, within lake survival, and fish behavior in the vicinity of potential long-term juvenile collection locations.

NMFS and CDFW requested that the USFWS reinstate the captive broodstock program for this project and as a contingency due to the potential for a depressed winter Chinook population under drought conditions. The pilot planning group has also been developing options for testing juvenile collection efficiency with trials in addition to those with the main release of winter Chinook.

The contents of the draft pilot plan are shown below.

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## Policy and Regulatory

The policy and regulatory group is addressing acquisition of any needed Federal and state permits or approvals to implement pilot study activities using ESA listed species. In addition the group has been determining how the addition of a listed fish into the waters upstream of Shasta will affect currently occurring activities and how to protect compatible uses. An issue identified by landowners during outreach activities concerns the potential change in timber harvest regulations with the listed fish presence. The Anadromous Salmonid Protection (ASP) regulations apply to watersheds where an anadromous salmonid that is listed as threatened, endangered, or a candidate under State or Federal ESAs are “currently present or can be restored.” Watersheds covered by the rules are defined in maps adopted with the ASP rules. These maps exclude watersheds above permanent dams which “attenuate the transport of fine sediments to downstream water courses with listed anadromous salmonids.” The current maps – as effective on January 1, 2010 – exclude watersheds above Shasta Dam from ASP rules. Absent changes to the maps by the Board of Forestry, there is no mechanism for ASP rules to be applied to the SDFPE.

NMFS proposed to Board of Forestry new language that would amend the Forest Practice Rules to ensure experimental populations with a 4(d) rule above a barrier would not apply under the ASP regulation. The Board of Forestry voted unanimously 9-0 in favor of the new language which will take effect in January 2017.

NMFS is working on the experimental population designation and intends to complete a National Environmental Policy Act (NEPA) document and Biological Opinion on the LSNFH HGMP to enable experimental population designation to occur in 2016.

USFWS submitted the HGMPs for LSNFH to NMFS and CDFW in October 2015. One HGMP covers the captive broodstock and the other covers the winter Chinook supplementation in the lower Sacramento River.

A legislative amendment to CESA has been determined as the best path forward to address federal experimental population designation issues for this and other future reintroduction efforts.

Reclamation is preparing an Environmental Assessment (EA) in accordance with NEPA on the implementation of the Pilot Plan. The Fish Passage Technology Subcommittee is currently developing designs for juvenile fish collection facilities. These designs, once far enough along, will be used to determine the level of impact from the potential facilities. Reclamation anticipates some level of ground disturbance from the initial designs and has begun the National Historic Preservation Act (NHPA) Section 106 process. Additional permitting may be required depending on the impacts related to the installation of any juvenile collection facilities. The EA is anticipated to be released around the same time as the Pilot Plan near the end of 2015.

## Outreach

Outreach activities occurred throughout the year to provide information to the public regarding the Project and to gather public opinion regarding the project. The Stakeholder Communication and

Engagement Plan was followed to engage local, regional and statewide landowners, stakeholders, project influencers, interested organizations, and the public in the Project. This Plan contains near-term activities primarily focused on local and regional engagements to foster participation and input to technical studies. Long-term communication and engagement actions will be incorporated over time based on feasibility study results. The Stakeholder Communication and Engagement Plan is available on the project website.

Outreach is an ongoing part of the Project and has included public meetings, meetings with interested parties, field meetings with watershed and landowner specific groups, public presentations, and posting of materials on the project website. Two public webinars were held in the last year. A webinar in December 2014 described the results of the completed habitat assessment and updated the public on the status of the project. A webinar in September 2015 updated the public on the status of the project including the current Sacramento River conditions and challenges for winter Chinook, Livingston Stone National Fish Hatchery operations and captive broodstock, juvenile fish collection facility evaluations, and the pilot plan and environmental assessment. The webinars provided an opportunity to reach a wide audience.

## Schedule

The release of Chinook salmon will mark the start of the pilot study. The timeline leading up to the start of the pilot and for the first three years of the pilot study is shown in Table 2.

**Table 2. Major milestones, deliverables, and completion dates.**

<b>Milestone</b>	<b>Deliverable</b>	<b>Completion Date</b>
Habitat Assessment	<ul style="list-style-type: none"> <li>Habitat Assessment Report</li> </ul>	August 2014
Fish Passage Pilot Plan	<ul style="list-style-type: none"> <li>Pilot Plan</li> <li>Environmental Assessment</li> <li>Finding of No Significant Impact</li> </ul>	late 2015 late 2015 late 2015 or early 2016
Experimental Population	<ul style="list-style-type: none"> <li>Experimental Population Designation</li> </ul>	Fall 2016
Juvenile Collectors	<ul style="list-style-type: none"> <li>Design</li> <li>Installation Contract</li> <li>Installation</li> </ul>	March 2016 October 2016  Spring 2017
Livingston Stone Hatchery Water Quality satisfactory	<ul style="list-style-type: none"> <li>Design and Contract for water treatment system</li> <li>Install water treatment system</li> </ul>	October 2017  March 2018
Pilot study	<ul style="list-style-type: none"> <li>Contracting</li> <li>Implement study – year 1</li> <li>Annual Report – year 1</li> <li>Implement study – year 2</li> <li>Annual Report – year 2</li> </ul>	November 2016 December 2017 March 2018 December 2018 March 2019

<b>Milestone</b>	<b>Deliverable</b>	<b>Completion Date</b>
	<ul style="list-style-type: none"> <li>• Implement study – year 3</li> <li>• Annual Report – year 3</li> </ul>	December 2019 March 2020
Feasibility Determination	<ul style="list-style-type: none"> <li>• Comprehensive Fish Passage Feasibility Report</li> </ul>	May 2020

## **American River - Precursor Study to the Fish Passage Evaluation at Folsom**

The target species for fish passage at Folsom, as specified in the RPA, is Central Valley steelhead. RPA Action II.6.1(2) prescribes a study evaluating the potential for replacement of the Nimbus Hatchery (American River) steelhead broodstock with a genetically more appropriate source. The current broodstock was derived from the Eel River and is not considered to be a part of the California Central Valley steelhead DPS. Replacing the current broodstock would enable the American River to more effectively contribute to recovery of California Central Valley steelhead. The current stock consists of large individuals which support a popular sports fishery in the American River.

The broodstock replacement study is being conducted in cooperation with the Nimbus Hatchery Coordination team. This interagency team provides technical advice on hatchery operations and is following up on the California Hatchery Review project recommendations. The broodstock replacement study collected nearly 600 resident rainbow trout genetic samples in 2014 from the American River tributaries upstream of Folsom Reservoir at 15 sites below and above historic barriers to anadromy. The samples were analyzed NMFS Southwest Science Center to help determine which fish could qualify genetically as appropriate stock for replacement of the Nimbus broodstock.

The genetic analysis showed that fish in all three forks upstream of Folsom appear to possess ancestral DNA from the American River (i.e. they are predominantly not hatchery stocks). During spring of 2015 Cramer Fish Sciences Crew in collaboration with the CDFW pathology group collected 60 rainbow trout (180 total) from each of the three upper American River forks for pathology sampling. The samples were sent to University of Washington lab for analysis. A report is being prepared describing the sample collection, pathology results, and implications of the results for bringing fish or eggs from the upper American River into the hatchery while avoiding spread of pathogens into the hatchery.

Low steelhead returns to the American River in 2015 enabled the project to supplement the steelhead production and Nimbus Hatchery with approximately 200,000 steelhead eggs from Coleman Hatchery. Coleman Hatchery is believed to provide a genetically suitable source of broodstock from within the Central Valley. The eggs were hatched at Nimbus. The juveniles were ad-clipped and tagged with blank wire tags (i.e. coded wire tags without the code) to enable them to be differentiated from the Nimbus and other Central Valley steelhead. No other Central Valley steelhead are coded wire tagged. These Coleman stock fish will be released in February with the rest of the Nimbus Hatchery production and the returns of the two stock compared. In addition 200 steelhead from these two groups (Coleman and Nimbus stock) will be implanted with acoustic tags and tracked after release to examine their migratory patterns and any differential survival or other traits.

The warm American River conditions in 2015 necessitated the steelhead being reared at Nimbus Hatchery to be removed offsite to a facility with cooler water. They were moved to the Feather River Annex next to Thermolito Afterbay to be reared until water temperature in the American River reaches a temperature more conducive to survival in the hatchery. They will likely be moved back in approximately November 2015. Release would occur in February 2016. The rearing of these fish in an



offsite location confounds the evaluation of performance of the Coleman Hatchery stock in Nimbus Hatchery.

The transfer of eggs from Coleman Hatchery to Nimbus Hatchery is planned to occur for an additional two years as a part of this study, contingent on an adequate supply of eggs at Coleman Hatchery.

A next step in this study is to collect broodstock the American River forks in spring of 2016 so that their offspring can be used in the study. Details for holding of these upper American River fish at a facility away from anadromous waters until another year of pathology sampling occurs have not been worked out.

The results of this study are intended to feed into the fish passage studies in the American River using an appropriate steelhead stock that could meet the goals of the RPA.