Battle Creek Salmon and Steelhead Restoration Project
May 2017

Battle Creek has the unique geology, hydrology, and habitat suitability to support threatened and endangered Chinook salmon and Central Valley steelhead. The Battle Creek Salmon and Steelhead Restoration Project (Restoration Project), located in Shasta and Tehama Counties near Manton, California, is among the largest cold-water anadromous fish restoration efforts in North America. The project is restoring approximately 42 miles of habitat on Battle Creek and an additional 6 miles of habitat on tributaries to Battle Creek, while continuing hydroelectric power production at Pacific Gas and Electric Company's (PG&E's) Battle Creek Hydroelectric Project - Federal Energy Regulatory Commission (FERC) Project No. 1121.

In 1999, a Memorandum of Understanding (MOU) between PG&E, Bureau of Reclamation (Reclamation), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and California Department of Fish and Wildlife (CDFW, formerly Department of Fish and Game) was signed, committing each partner to the Restoration Project. In addition, numerous stakeholders, including the Battle Creek Watershed Conservancy and the Greater Battle Creek Watershed Working Group, as well as landowners and funders have made important contributions to this project.

Project implementation includes modification of Battle Creek Hydroelectric Project facilities located on North Fork Battle Creek, South Fork Battle Creek, and Baldwin Creek in three phases (Phases 1A, 1B and 2). By removing five diversions dams and constructing fish screens and ladders on three other diversion dams, the project is providing safe passage for anadromous fish to reach the cold water and habitat needed for them to successfully spawn and increase their populations. The project is also preventing the mixing of North Fork Battle Creek and South Fork Battle Creek waters, through the construction of powerhouse bypass and tailrace connectors; protecting a trout hatchery from diseases carried by anadromous fish, through the construction of a fish barrier weir; increasing instream flows; dedicating water rights for instream purposes at dam removal sites; and implementing adaptive management to ensure fisheries objectives are met.

RESTORATION PROJECT STATUS:

Phase 1A – This phase involves the removal of Wildcat diversion dam and pipeline conveyance system; the installation of fish screens and fish ladders at the North Battle Creek Feeder and Eagle Canyon diversion dams on North Fork Battle Creek; and construction of a fish barrier weir on Baldwin Creek.

- Wildcat diversion dam and pipeline conveyance system were removed in 2010.
- A fish barrier weir which maintains 5 cubic feet per second minimum flow in Baldwin Creek near Asbury diversion, downstream of the Darrah Springs State Trout Hatchery was completed in December 2013. The 5 cfs allows for suitable salmon and steelhead habitat, while the barrier prevents these fish, which could carry viruses, from infecting the trout hatchery.
- Fish screens and fish ladders have been constructed at the Eagle Canyon Diversion Dam and North Battle Creek Feeder (NBCF) Diversion Dam sites from 2010 -2012; however, as the result of hydraulic evaluations of these new facilities (in 2012) and physical modeling of the NBCF fish ladder and fish screen (in early 2013), it was determined that modifications were necessary. The North Fork Screens and Ladders construction contract was awarded in July 2016 to implement these modifications through June 2018. The contract involves modifying the NBCF Diversion Dam fish ladder and fish screen to ensure hydraulic design criteria are met, to address operational and access needs and safety issues, and to improve the function and durability of existing maintenance, sensor, and monitoring systems; and addressing Eagle Canyon Diversion Dam operational and access needs, safety issues, and undesirable false fish-attraction spills.

Phase 1B – This phase is comprised of the reconstruction of the Inskip Powerhouse tailrace (discharge outlet) and construction of a 5,600 foot bypass pipeline and chute system to Coleman Canal on South Fork Battle Creek (to prevent mixing of North Fork Battle Creek waters with South Fork Battle Creek waters).

- Construction of the Inskip Powerhouse bypass and tailrace was completed at the end of 2012, however, in early December 2012 a significant storm event occurred, which damaged the newly constructed access roads and drainage system, and created erosion at the penstock bypass and tailrace connector outlets. Access road repairs and sediment erosion cleanup occurred in 2013, and safety and facility access improvements occurred in 2014 and 2015. Low flow facility testing occurred in 2016 and high flow testing is occurring in January 2017. Facility acceptance and transfer (to PG&E) is anticipated to be completed in June 2017.

Phase 2 - This phase consists of the installation of a fish screen and ladder on Inskip Diversion Dam; construction of a South Powerhouse tailrace connector; removal South Diversion Dam and conveyance system; and removal of Lower Ripley Creek Feeder, Soap Creek Feeder, and Coleman Diversion Dams.

- Hydropower Facilities Modifications - Stage 2:
    - Installation of a fish screen and ladder at Inskip Diversion Dam; construction of a tailrace tunnel connector from South Powerhouse to Inskip Canal; and removal of Lower Ripley Creek Feeder and Coleman Diversion Dams
    - Final plans and specifications planned to be completed in June 2017; contact award anticipated in December 2018; and construction completion anticipated in December 2021.
- South Dam and Canal Removal:
    - Removal of South Diversion Dam, South Canal and Soap Creek Feeder Diversion Dam
    - Final plans and specifications planned to be completed in September 2017; contract award anticipated in December 2018; and construction completion anticipated in December 2020.

ADAPTIVE MANAGEMENT:

Adaptive management will be implemented beyond Restoration Project construction completion.

- **Restoration Project Adaptive Management:** The Restoration Project Adaptive Management Plan (AMP) was completed in 2004. It's goal is to implement specific actions to protect, restore, enhance and monitor salmonid habitat associated with the Battle Creek Hydroelectric Project within the Restoration Project area to guard against false attraction of adult migrants, and ensure that Chinook salmon and steelhead are able to fully access and utilize available habitat in a manner that benefits all life stages and thereby maximizes natural productions, fully utilizing ecosystem carrying capacity.
- **Coleman National Fish Hatchery (CNFH) Adaptive Management:** CNFH is located downstream of the Restoration Project area on the main stem of Battle Creek. CNFH is funded by Reclamation, owned and operated by the USFWS, and guided by USFWS policy and other state and federal laws. The CNFH AMP, completed in November 2016, includes solutions and processes to support CNFH programs, operations and infrastructure so that hatchery mitigation goals and objectives are achieved and there is compatibility with the Restoration Project.
- **Integrated Adaptive Management in Battle Creek:** The Restoration Project 1999 MOU Partners; Reclamation, USFWS, NMFS, CDFW, and PG&E are committed to coordinating CNFH and Restoration Project AMP efforts. This commitment is memorialized in the *Memorandum of Understanding Regarding Integrated Adaptive Management of the Battle Creek Salmon and Steelhead Restoration Project and Coleman National Fish Hatchery,* signed by the Project Partners in November 2016 and included (as an appendix) in the CNFH AMP.

PROJECT FUNDING:

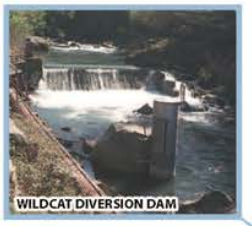
Funding for the Restoration Project has been provided by federal and state agencies and through private donations, including CALFED; the American Recovery and Reinvestment Act of 2009; CDFW; the California Wildlife Conservation Board; the California Department of Transportation; the Iron Mountain Mine Trustee Council, the California Department of Water Resources; and the Packard Foundation (via The Nature Conservancy). PG&E is contributing to the Restoration Project in the form of foregone energy generation, voluntarily pursuing amendments to the Battle Creek Hydroelectric Project's FERC license, and transferring water rights to CDFW for instream purposes.

As indicated in the following table, the project is being supported with federal, state and private funding. Reclamation has received $110.6 million (M) to date and currently estimates that an additional $24 M is needed to complete the project. Reclamation is coordinating with the 1999 MOU partners to pursue additional funding.

Federal Funding	**$54.6 M**
CALFED Early Ecosystem Restoration Funds	*$32.0 M (to Reclamation)*
American Recovery and Reinvestment Act Funds	*$12.8 M (to Reclamation)*
FY 2015 Federal Funds	*$2.3 M (to Reclamation)*
FY 2016 Federal Funds	*$6.5 M (to Reclamation)*
FY 2017 Federal Funds	*$1 M (to Reclamation)*
Federal & State Funding	**$6.5 M**
Iron Mountain Mine Trustee Council	*$6.5 M (to Reclamation)*
State Funding	**$58.2 M**
California Department of Fish & Wildlife (DFW)	*$3.4M (to USFWS)* *$26.8 M (to Reclamation)*
California Wildlife Conservation Board	*$10.0 M (to Reclamation)*
Benicia Bridge Mitigation Funds [via California Department of Transportation (CALTRANS)]	*$4.5 M (to Reclamation)*
Richmond San Rafael Bridge Mitigation (via CALTRANS)	*$1.5 M (to Reclamation)*
Delta Fish Agreement Amendment via Department of Water Resources	*$5.3M (to DFW)* *$6.7M (to Reclamation)*
Private Funding	**$23.6 M**
PG&E (in the form of Foregone Power per the 1999 MOU)	*$20.6 M*
The Packard Foundation (via The Nature Conservancy)	*$3.0 M*
TOTAL	**$141.9 M**
TOTAL FUNDS TO RECLAMATION	**$110.6 M**

Battle Creek

Salmon and Steelhead Restoration Project


WILDCAT DIVERSION DAM

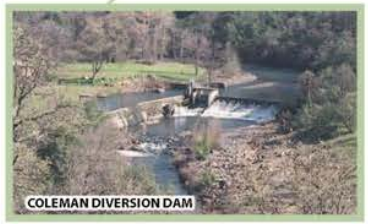

EAGLE CANYON DIVERSION DAM

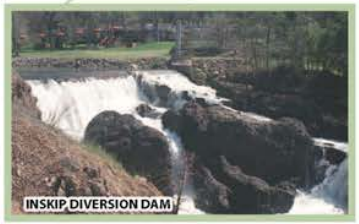

NORTH BATTLE CREEK FEEDER DIVERSION DAM

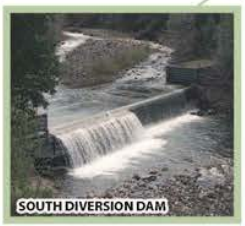

BALDWIN CREEK FISH BARRIER


LOWER RIPLEY CREEK FEEDER DIVERSION DAM


SOAP CREEK FEEDER DIVERSION DAM


COLEMAN DIVERSION DAM


INSKIP DIVERSION DAM


SOUTH DIVERSION DAM

Grace Lake
Lake Nora
Al Smith Canal
Keswick Canal
North Battle Creek Reservoir
McCumber Reservoir
Volta Powerhouse
Volta Powerhouse #2
North Battle Creek Feeder Diversion Dam
Natural Fish Barrier
Al Smith Diversion Dam
Keswick Diversion Dam
Upper Project Limit
North Battle Creek Feeder
Eagle Canyon Diversion Dam
Eagle Cross
Darrah Springs Hatchery
Baldwin Creek
Baldwin Creek Flow Augmentation and Fish Barrier
Wildcat Diversion Dam
Wildcat Canal
NORTH FORK BATTLE CREEK
Mount Lassen Trout Farm Jeffcoat Aquaculture Facilities
Canyon Canal
Upper Ripley Creek Feeder
Upper Ripley Creek Diversion
Ripley Creek
County Canal
Coleman Forebay
Coleman Canal
Mount Lassen Trout Farm Willow Springs Aquaculture Facility
Lower Ripley Creek Feeder
Lower Ripley Creek Feeder Diversion Dam
Inskip Canal
Soap Creek Feeder
Soap Creek
Soap Creek Feeder Diversion Dam
Union Canal
South Canal
Coleman National Fish Hatchery
Coleman Powerhouse
SACRAMENTO RIVER
BATTLE CREEK
SOUTH FORK BATTLE CREEK
Inskip Powerhouse
Coleman Diversion Dam
South Powerhouse
Inskip Diversion Dam
South Diversion Dam
Upper Project Limit
Natural Fish Barrier
Coleman National Fish Hatchery Weir
Lower Project Limit

Phases of Restoration Project Construction

- Phase 1A
- Phase 1B
- Phase 2

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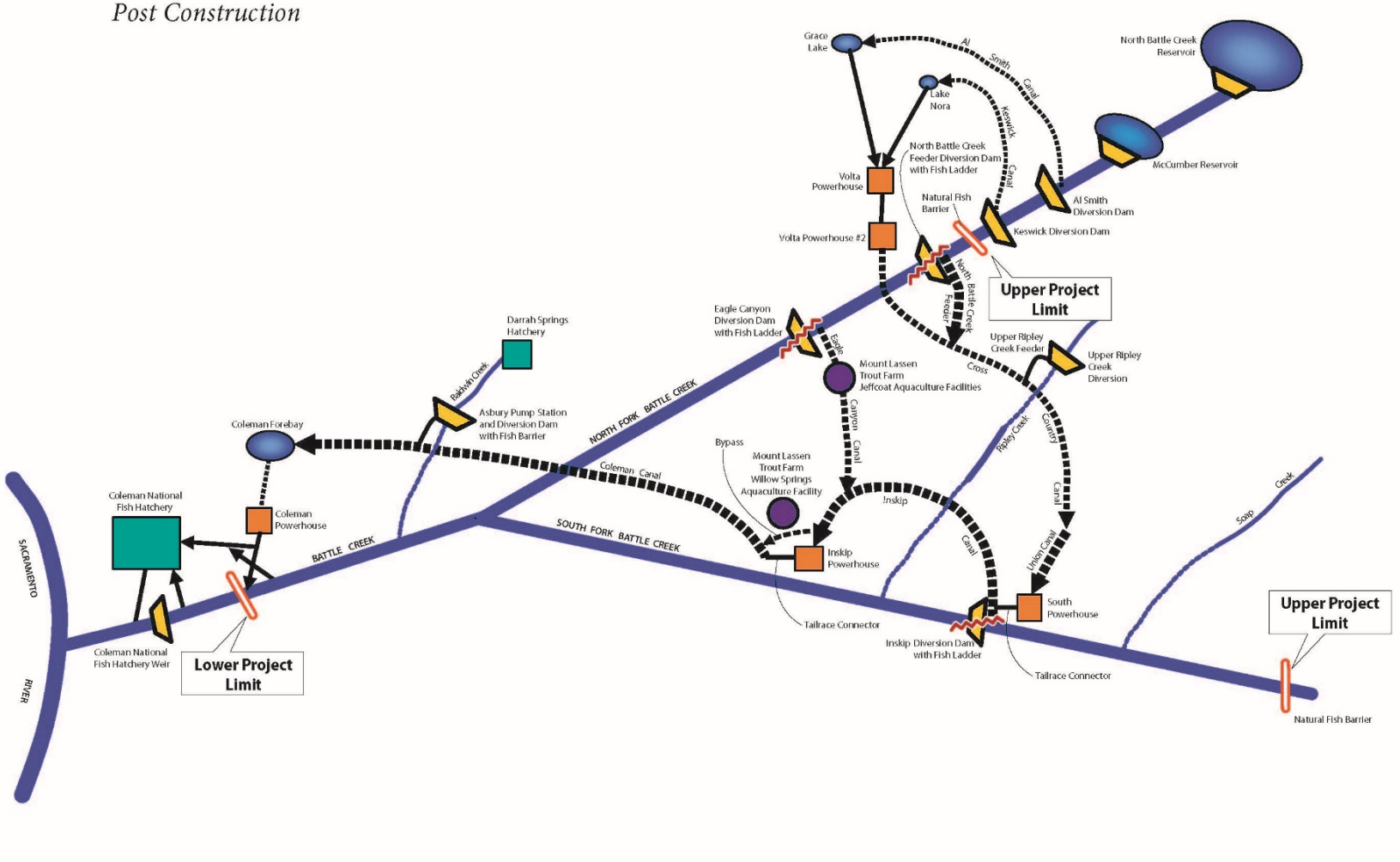
Battle Creek Salmon and Steelhead Restoration Project
Post Construction



BATTLE CREEK SALMON & STEELHEAD RESTORATION PROJECT
'Working Draft' REMAINING CONSTRUCTION CONTRACTS SUMMARY SCHEDULE
(May 2017)

PHASE	CONSTRUCTION CONTRACT (OR ACTIVITY)	KEY PROJECT ELEMENT(S)	SPECB (FINAL)	AWARD	ON-SITE CONSTRUCTION BEGINS	CONSTRUCTION COMPLETION	CONSTRUCTION CLOSE-OUT
1A	**NFSL Gate Actuator Modulation**	• Installation of automatic modulation control for head gate actuators at NBCF and Eagle Canyon Diversion Dams	Nov. 2013	Sep. 2014	Oct. 2014	May 2015	April 2017
1A	**NFSL Completion Contract (Civil, Mechanical, and Electrical Design Changes)**	• Implementation of civil, mechanical & electrical related fish screen & ladder design changes, based on hydraulic evaluations and facility operation/functionality needs	Aug. 2015	July 2016	April 2017	June 2018	Dec. 2018
1B	**HFM – Stage 1 Safety and Facility Access Improvements**	• Permanent walkway to tailrace connector inlet & outlet, concrete ramp at two outlets, delineators on "A" road & guardrails for arch culvert, wasteway inspection hatch, Inskip PH downspout drainage, control panel protections, lower jump basin drain pipes and Eagle Canyon equipment ramp.	April 2014	April 2015	July 2015	Feb. 2016	June 2017
2	**Hydropower Facility Modifications – Stage 2**	• Inskip Screen and Ladder • South PH Tailrace Connector Tunnel, including dike • Lower Ripley Creek Feeder Diversion Dam Removal • Coleman Diversion Dam Removal	June 2017	Dec. 2018	Aug. 2019	Dec. 2021	Aug. 2022
2	**South Dam and Canal Removal**	• South Diversion Dam and South Canal Removal • Soap Creek Feeder Diversion Dam Removal	Sep. 2017	Dec. 2018	Aug. 2019	Dec. 2020	May 2021

Environmental Work Windows	Timeframes
Migratory Bird Clearing (Vegetation Removal)	Sept. 1/Oct. 1 – Jan. 31/ Feb. 28 (Note: If vegetation cannot be cleared prior to this timeframe, additional mitigation measures will be implemented).
Salmon/Steelhead Instream Work	• Beginning as early as May 1 (stream conditions permitting) until November 1: South Diversion/South Canal Site, Soap Creek Feeder Diversion Dam Site, Inskip Diversion Dam/South Powerhouse Site, Lower Ripley Creek Feeder Diversion Dam Site, North Battle Creek Feeder Diversion Dam Site and Asbury/Baldwin Creek. • Beginning as early as May 1 (stream conditions permitting) until September 1: Wildcat Diversion Dam/Wildcat Canal Site and Coleman Diversion Dam/Inskip Powerhouse Site • Beginning as early as May 1 (stream conditions permitting) until September 1: Eagle Canyon Diversion Dam, Work *inclusive* of percussion impacts (e.g., blasting) • Beginning as early as May 1 (stream conditions permitting) until November 1: Eagle Canyon Diversion Dam/Eagle Canyon Canal, Work *exclusive* of percussion impacts (e.g., blasting)