Jun 27th, 11:25 AM - 12:00 PM

Concurrent Sessions B: Case Studies - Hydraulic Design of Fish Ladders and Barriers at California's Largest Salmon Hatchery

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Project Partners:

- Bureau of Reclamation
- US Fish and Wildlife Service
- California Department of Fish and Game Wildlife
- Bay Delta Conservation Project

Construction Contractors:

- Gracon
- Contractor Services Group
Presentation outline:

• CVP and the CNFH
• Overview
• Hydraulic design of fish ladders
• Hydraulic design of fish barrier
• Construction
• Hydraulic performance
• Visitor access
• Lessons learned
Central Valley Project (CVP) devised in 1933 to provide irrigation and municipal water to California’s Central Valley

Created storage reservoirs in the “rainy” northern part of the state

Transports water to drier south primarily through pumping plants and canals
The CVP and the creation of the Coleman National Fish Hatchery (2/2)

- Groundbreaking of Shasta Dam occurred in 1937, dam gates closed in 1943
- Coleman National Fish Hatchery (CNFH) constructed in 1942
- Compensates for lost spawning grounds above Shasta Dam
- Located on Battle Creek, which is relatively undeveloped, has good habitat, and cold water
- Annual hatchery production of:
  - 12,000,000 Chinook
  - 1,200,000 Late Fall Chinook
  - 250,000 Winter Chinook
  - 600,000 steelhead
CNFH Circa 2000
What needed to be fixed?

**Fish Ladder**
- Improve passage conditions
- Maximize attraction to entrance
- Provide monitoring area
- Provide for adaptive management

**Fish Barrier**
- Improve barrier performance
- Provide stable sill
Hydraulic Design of Fish Ladders

Flow Inputs
Hydraulic Design of Fish Ladders:
Final Layout

Fish Barrier Weir and Ladder Modification
3D Isometric

LEGEND
- New Concrete
- Existing Concrete
- New Concrete Fish Baffles
- Gates and Related Metal Work
- Barrier Weir Cap, Ladders and Stairs
- Grating
- Bridge Crossing Metal Work
- Trashacks, Bar Racks, and Diffuser Screens
- Vault Water Tight Doors

Note: Colors used to depict structures do not reflect the final color of structures to be constructed.
Hydraulic Design of Fish Barrier:
Construction - Cofferdam
Construction - Bypass
Completed site 2008
First Fish

09.30.2008

RECLAMATION
Ladder working well
Barrier Performance:

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99.93% blockage

Source: Monitoring and Evaluation of the Modified Fish Ladder and Barrier Weir at the Coleman National Fish Hatchery, Robert Null, U.S. Fish and Wildlife Service Red Bluff Fish and Wildlife Office
How did they get over?

(they cheated – why don’t fish think like engineers?)

4 went over the overshot gate

1 went over barrier

All were determined to be resident trout or steelhead, thankfully not Chinook
Breaching Videos - 1
Modifications in 2011

- Overshot gate modifications
- Viewing platform
Over 10,000 people have seen this already this year
Award:

Recipient of 2012 ASCE Sacramento Section “Small Project of the Year”
Lessons learned:

• Accurately measure all hydraulic inputs!

• Don’t think you are smarter than a fish
  • What they lack in intelligence they make up for in desperation and perseverance

• Advocate for public viewing opportunities
Thanks for your time!