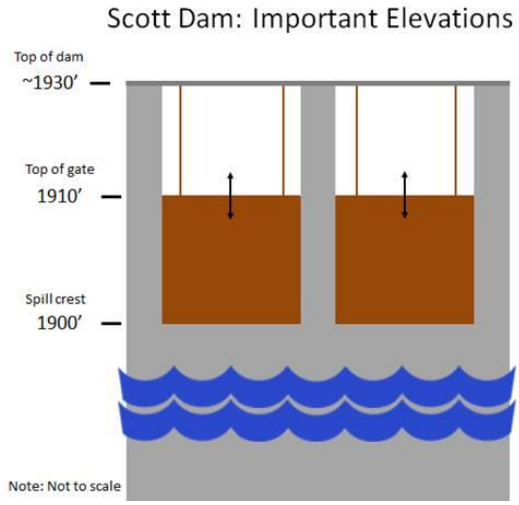
Huffman Ad Hoc PVP Fish Passage Technical Working Group – Partial Dam Removal Scenarios

Information:

Scott Dam: Concrete, gravity

- 130 feet high (PAD) (Mead & Hunt 134') and 805 feet long
- 5 radial gates 10ft high; elevation 1920.6
- 26 steel slide gates 10ft high; elevation 1920.6
- 42-inch needle valve; capacity 400-cfs at elevation 1910.0 (gates down)
- River elevation 1800'; example 1850' = a 50' dam
- Spill crest elevation 1900'



Lake Pillsbury and Reservoir Operations:

- 2,280 acres surface area
- Usable storage capacity 66,876 ac-ft, assume 10AF dead-pool. Current estimate closer to 6AF.

Cape Horn Dam: Earthfill and concrete, gravity

1. Concrete gravity section 63 feet high and 283 feet long
2. Fish ladder: 10-12cfs capacity
3. Diversion capacity 240cfs each w/ fish screens in place
4. Diversion tunnel 320 cfs capacity
5. Current storage capacity 390 ac-ft; sediment filled

Partial Dam Removal Scenarios Explored:

At Cape Horn Dam, the existing facilities would be maintained in the current condition with minimal modifications incorporated to ensure reliable operations. Reductions in diversions to the Potter Valley Powerhouse would be the main component of the partial decommissioning. At Scott Dam, the existing spillway would be lowered to provide a lower hydraulic drop to support direct passage of juvenile fish over the spillway as well as to provide for a volitional passage fishway. Reservoir operations would be changed substantially to incorporate run-of-river and modified releases from storage through the needle valve with the majority of river flows passing over the spillway or through the fishway.

At Cape Horn Dam, this alternative would require minimal construction work activities. The limited modifications to the existing facilities would be implemented within the existing facilities' footprint. As a result, the environmental impacts during and post-construction would be minimal. The major operational impact would be to reduce diversions to Potter Valley Powerhouse and the resulting reductions in power generation and amounts of water available to downstream water users. Implementation of this alternative could be expected to increase passage efficiencies for both upstream and downstream migrants.

At Scott Dam, construction of the upstream passage fishway would require significant construction activities on the left abutment of the dam. The work effort would require clearing of the work area, installation of a cofferdam, and flow diversion. The reservoir side work could be scheduled to occur during the low reservoir and flow conditions, simplifying the work activities. The environmental impacts both during and post-construction would be minimal. Implementation of this alternative would have significant impacts on project operations. Water storage in Lake Pillsbury would be substantially reduced or eliminated, with the project then being operated as a run-of-river project. The typical release and diversion of stored water would be eliminated. The addition of an upstream fishway and ability to safely pass the juvenile fish over the spillway would improve the passage conditions at the project.

Scenario 1: Reduce Scott Dam height to the extent possible while meeting minimum PVID water demand and environmental flows below E-11.

Assumptions:

1. PVID demand: 15,000AF (based on past usage)
2. Minimum dry season environmental flows: 10cfs (3,500AF) April 15 – October 15
3. No EBRR minimum flow requirement: 5 – 75 cfs per water year classification
4. Dead pool 5,000AF
5. Project sedimentation rates in 2050: 5 to 7 feet.

Results:

1. Dam height to achieve 23,500 AF = 78 feet; 23,500AF of water storage w/o sedimentation
2. Total reduction from current dam height: 52' feet
3. Dam height to compensate for sedimentation in 2050; min 83' (29,366AF); max 85' (31,984AF)
4. Total reduction from current dam height: 47' or 45' respectively

Pros:

1. Reduced dam Scott Dam height could potentially improve/enhance fish ladder/ passage efficiency for salmonid/lamprey upstream migration (TBD).
2. Possibly meets PVID water demand (15K AF) and some minimum level of environmental flows (10cfs; 3,500AF).

Cons:

1. Potentially little or no improvements to upstream or downstream passage from current setting and proposals.

2. Downstream passage potential for juvenile and adult steelhead still problematic at 80' plus feet – fish friendly fill and spill still daunting at that height.
3. Coldwater availability further limited within Lake Pillsbury for above dam rearing capacity and downstream tailrace.
4. Little or no reduction to pikeminnow/bass habitat within Lake Pillsbury. Possibly increase habitat due to lower surface water elevations and increased water temperatures. Increased opportunity for pikeminnow/bass distribution downstream.

Scenario 2: Reduce Scott Dam height to the extent possible while retaining potentially mercury laden sediment from being released downstream that has accumulated behind Scott Dam.

Assumptions:

1. Approximately 18,000AF of sediment deposited throughout the reservoir
2. Most sediment deposited at the upper elevations (>60' stage)
3. Notch design possibly using hydraulic gate
4. Outmigration – fish friendly spillway to be activated by run-of-the river
5. Upstream migration – ladder design less complex than Mead & Hunt.

Results:

1. At minimum, keep lowest point of dam above deepest sediment retaining wall (1847' + 2' mud buffer)
2. Would need to hydraulically model notched design to determine water surface elevation and model potential sediment resuspension/transport at normal and high flows
3. Most sediment deposited at upper elevations (>60' stage)
4. Ogee spillway – fish friendly
5. 49' dam = 4791 AF water storage capacity

Pros:

1. Potentially greater opportunity to design effective upstream fish passage.
2. Allows greater natural flow regime – "Run-of-the-River" concept and fish friendly fill and spill potentially for outmigrants and downstream fish passage.
3. Allows for habitat improvements above Scott Dam including channel reconfigurations to access tributaries and enhanced winter floodplain type habitats.
4. May provide a more "natural" water temperature profile without storage reservoir.
5. Potentially reduces issues with mercury within sediment.
6. Reduces pikeminnow/bass habitat conditions with Lake Pillsbury. Provide an opportunity to eradicate invasive species completely (reservoir draining, etc).
7. Allows for fish monitoring of upstream migrating fish.
8. Low to moderate O&M costs

Cons:

1. Some limitations to fish passage in the fall, spring, and dry years prior to reservoir fill and spill.
2. Could potentially increase sediment load issues at Cape Horn dam.

3. May require trapping within the upstream fish ladder to avoid re-introduction of invasive species (assuming complete eradication during construction).
4. Eliminates tailrace flows below Scott Dam.
5. Some continued risk of pikeminnow distribution downstream.
6. Eliminates ability to store water for diversion to Potter Valley powerhouse – potential loss of seasonal water supply and hydro generation.