Foster Dam Downstream Fish Passage Alternatives

**Update for WATER Fish Passage Team 08 Dec 2015 Handout**

**STAGE 1: Identifying Measures and Alternatives**

The measures for improving downstream fish passage at Foster Dam focus on operational measures or structural measures intended to attract and pass juvenile fish downstream of the project. The Measures were combined to create the following potential Alternatives (combinations of measures). This handout describes the measures at a conceptual level for the EDR.

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### Alternative 1: New Fish Weir

Construct a new fish weir with a capacity of approximately 800 to 860 cfs, a means of operating over multiple pool elevations (such as an automated floating crest), and the ability to operate year round in conjunction with or without the use of turbine flow (actual operations to be determined). The new fish weir would be used in Spill Bay 4 (or another bay TBD). Additionally, operate Spill Bays 2 and/or 3 during low pool or flood control season for fish attraction and passage. Alternative 1 also combines all or some of the following eight measures:

| O-2a | Use spill bays 2 and 3 at low and high pool |
| --- | --- |
| O-5 | Modify the temporal use of the fish weir or other passage routes |
| MT-2 | Operate spill bays and shut off turbines during peak run timing or longer |
| S-4a | Modified fish weir crest shape |
| S-4c | Water cushion on spillway for fish passing a significant distance above the spillway crest |
| EF-3 | New fish weir with capability to meet varying elevations |
| MT-3 | Flushing flow |
| BA-1 | Power generation alternatives |

***Alternative 2: Operational Improvements Only***

Use existing operational features (e.g. operate the spill bays) to provide fish passage, perform no structural improvements. The current fish weir will not be used. Instead, one or more spill bays would be open to operational capacity as a water and fish passage route. Alternative 2 also combines all or some of the following five measures:

| O-2a | Use spill bays 2 and 3 at low and high pool |
| --- | --- |
| O-2b | Use spill bay 4 at low and high pool |
| MT-2 | Operate spill bays and shut off turbines during peak run timing |
| MT-3 | Flushing Flow |
| BA-1 | Power Generation Alternatives |

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### Alternative 3: Double Bypass Canal

Build bypass canals on both sides of the river. The north side canal would use the fish hatchery water supply pipe and requires fish screening. The south side would run a pipe through the dam routing fish through a canal all the way to the tailrace. This alternative represents a significant structural and configuration change. Alternative 3 may combine 1 or 2 of the following 2 measures:

| EF-2 | Bypass Canal With Floating Orifice Gate |
| --- | --- |
| MT-3 | Flushing Flow |

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### Alternative 4: Single Bypass Canal and New Fish Weir

The concept is to build a bypass canal on the south side between the left bank and before the turbines and a new weir in spill bay 2. The south side would run a pipe through the dam routing fish through a canal all the way to the tailrace. This alternative represents a significant structural and configuration change. Alternative 4 also combines all or some of the following eight measures:

| O-2a | Use spill bays 2 and 3 at low and high pool |
| --- | --- |
| O-5 | Modify the temporal use of the fish weir |
| S-4a | Modified fish weir crest shape |
| EF-3 | New fish weir with capability to meet varying elevations |
| MT-2 | Operate spill bays and shut off turbines during peak run timing or longer |
| MT-3 | Flushing Flow |
| EF-2 | Bypass canal with a floating orifice gate |
| BA-1 | Power generation alternatives |

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### Alternative 5: Gate within a Gate

Modify or replace a spill bay gate(s) to include weirs or ports that provide adjustable openings to accommodate varying water levels and provide a route for fish passage. Alternative 5 also combines all or some of the following four measures:

| S-4e | Gate within the spillway gate |
| --- | --- |
| MT-2 | Operate spill bays and shut off turbines during peak run timing or longer |
| MT-3 | Flushing Flow |
| BA-1 | Power generation alternatives |

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### Alternative 6: Turbine Screens

Alternative 5 includes one structural measure and multiple operational measures. The operational measures are similar to Alternative 2; however, power generation would not be foregone because the penstocks would have screens installed to prevent fish from entering the penstocks and turbines. Screens would meet NMFS screening criteria. This alternative would utilize the existing fish weir with no modifications. Alternative 6 also combines all or some of the following three measures:

| O-2a | Use spill bays 2 and 3 at low and high pool |
| --- | --- |
| O-2b | Use spill bay 4 at low and high pool |
| MT-3 | Flushing Flow |

**STAGE 2: Determine Preferred Alternative**

Example Format for the Summary of Results for Foster Dam Downstream Fish Passage Alternatives

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Alternative Name** | | **Biological Benefits (**replace-ment) | | **Investment (Costs)** | | | | **Impacts** | | | | **Results** | |
|  |  | Project First Costs (Total CRFM) ($ MIL) | Additional O&M (PV) ($ MIL) | Lost Hydropower ($ MIL) | Total Life Cycle (Project First Costs + O&M) in $ MIL | Flood Risk Management Impact (Y/N) | Total Recreation Impact (Y/N) | Water Supply Impact (Y/N) | Hydropower Impacts (Y/N) | Cost Effectiveness  (Project Lifecycle Cost over Change in Biological Benefit) | Projected Stakeholder Impact |
|  |  |
| Spring Chinook | Winter steelhead |
| 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |