

Appendix 3.6: Rehabilitation and Betterment

This appendix to the Compact identifies rehabilitation and betterment projects for the Flathead Indian Irrigation Project (FIIP). Projects are listed in relative order of priority. The priority scheme may be modified by the Compact Implementation Technical Team, as identified in Appendix 3.5 to the Compact. Rehabilitation and Betterment projects that are identified are intended to be supported from Federal appropriations. As such, implementation of projects cannot be guaranteed until Federal appropriations are specifically made available. The full list of projects may not be completed if funds are insufficient to complete the work, and it is not a requirement of the Compact that all rehabilitation and betterment projects be completed. The Compact Implementation Technical Team shall plan for and prioritize rehabilitation and betterment projects as identified in Appendix 3.5.

The Tribes shall have the authority over Rehabilitation and Betterment actions that use funding from the Federal contribution to settlement.

Rehabilitation and betterment projects are intended to benefit fishery and wildlife resources, irrigation project infrastructure and ongoing operation and maintenance of the FIIP. Specific projects will lead to water savings or improved utilization of existing irrigation project water supply sources. Most of the projects share benefits across these categories.

List of Projects

- 1. Irrigation canal lateral and sub-lateral rehabilitation and betterment implemented based on the following geographic priorities: 1) Mission Valley south of Crow Creek; 2) Mission Valley north of Crow Creek; 3) Jocko Valley; and 4) Little Bitterroot Valley**

Project Scope: The majority of canal laterals and sub-laterals within FIIP service areas are gravity earthen canals, and there are well over 200 miles of this type of canal on the FIIP. Canal rehabilitation is distributed into four geographic areas due to the large scope of the project and the Parties' focus to phase in instream flows and river diversion allowances and to reduce or eliminate irrigation tailwater by geographic area.

Due to the large extent of gravity earthen canals across the FIIP, and the high cumulative cost to replace open canals with pipe, not all lateral and sub-lateral canals will be rehabilitated. The proposed rehabilitation detailed below identifies target canal lengths to be rehabilitated by geographic area.

Currently the FIIP distributes water based on a gravity canal network, generally designed for irrigation practices of the early 1900s. Lateral and sub-lateral rehabilitation provides an opportunity to modernize portions of the FIIP, and apply best irrigation management practices which conform to current standards. Prior to project implementation in any geographic area, a design planning phase will be completed to evaluate opportunities to re-align canals and reduce diversions, while maintaining service to assessed acres and valid farm turnouts on the FIIP.

Current Condition: Canals are shaped in native earth materials and have varying, but generally high rates of seepage. Condition varies, but lateral and sub-lateral canal prisms are generally deteriorated and in constant need of maintenance. Smaller water management structures are generally in a deteriorated to critically deteriorated condition. Open canals are difficult to regulate without allowing high tailwater losses.

Proposed Rehabilitation: Details for this rehabilitation and betterment project category will be developed during the pre-design phase but general criteria are listed as follows:

- Rehabilitation and betterment will, in most instances, target replacement of gravity earthen canals with pipe, although there may be individual canal sections where an open canal section is preferable.
- Focus for this project will be to rehabilitate lateral and sub-lateral canals with peak discharges less than 100 cfs, but in most instances peak canal discharge will be less than 40 cfs.
- Pipe material options will be defined during design planning, but may include reinforced concrete pipe (RCP), high density polyethylene (HDPE) pipe, and polyvinyl chloride (PVC) pipe.
- Water management structures, onfarm delivery points, and stock water access points will be integrated into specific project designs.
- Lateral and sub-lateral rehabilitation will be planned to support and optimize both canal water measurement and onfarm delivery water measurement.

Target Miles for Lateral and sub-lateral canal rehabilitation and betterment

Mission Valley south of Crow Creek	42 miles
Mission Valley north of Crow Creek	24 miles
Jocko Valley	18 miles
Little Bitterroot Valley	6 miles

Project Benefits: Lateral and sub-lateral rehabilitation will lead to water saving through reduced conveyance losses and will improve instream flow levels. Lateral and sub-lateral rehabilitation will reduce operation and maintenance costs for FIIP, eliminate numerous small water management structures, and will improve demand-based delivery to farm tracts. This activity will also reduce irrigation tailwater through improved water management and distribution.

2. Jocko K Canal Diversion and Fish Entrainment and Passage at site

Project Scope: Diversion check dam, Jocko K Canal headworks and gate structure rehabilitation, and stream and floodplain reclamation in diversion reach.

Current Condition: The diversion check dam and headworks structure have been retrofitted to include selective fish passage and screening to preclude entrainment in the K Canal. The

diversion check dam and headworks are not optimal to address fisheries concerns and irrigation operations. Deteriorated concrete at headworks. The stream channel and floodplain have been modified at the site.

Proposed Rehabilitation: Improve fish passage and screening facilities and integrate into irrigation operations. Headworks gate automation and diversion and headworks improvements. Stream and floodplain reclamation at site.

Project Benefits: Project located in occupied critical bull trout habitat and listed as needed in 2009 BIOP for FIIP transfer. Project would improve fishery conditions for threatened bull trout and would improve irrigation operations at site. Project would improve irrigation water and streamflow management. Project would improve sediment management and stream and floodplain conditions.

3. North Fork Jocko River Diversion at Tabor Feeder Canal and Fish Entrainment and Passage at site

Project Scope: Diversion dam, Tabor Feeder Canal headworks and gate structure rehabilitation, stream and floodplain reclamation at site.

Current Condition: Critically deteriorated concrete diversion dam, headworks, and headworks gates. No fish passage at dam or control of fish entrainment into Tabor Feeder Canal. Stream and floodplain at site heavily modified. Sediment management required at site.

Proposed Rehabilitation: Due to site complexity, full feasibility analysis is required to define the potential service life and rehabilitation options for the diversion dam, to define the optimal fish passage and canal fish entrainment facilities, and to execute the most effective rehabilitation and betterment approach. Irrigation and fish structure automation is needed at site.

Project Benefits: Project is located in occupied critical bull trout habitat and listed in the 2009 BIOP for FIIP transfer. Project would improve available habitat for bull trout, which are listed as threatened under the Endangered Species Act, and would preclude fish entrainment in Tabor Feeder Canal. Project would improve irrigation water and streamflow management. Project would improve sediment management and stream and floodplain conditions in diversion reach.

4. Jocko Upper S Canal Diversion and Fish Entrainment and Passage at site

Project Scope: Diversion check dam and Jocko upper S Canal headworks structure rehabilitation, and stream and floodplain reclamation at site.

Current Condition: The diversion check dam and headworks structure have been retrofitted to include selective fish passage and screening to preclude entrainment in the upper S Canal. The diversion check dam was reconstructed as an Obermeyer Gate, but cannot be operated as

intended. Headworks and diversion check dam are not optimal to address fisheries concerns and irrigation operations. The stream channel and floodplain have been modified at the site.

Proposed Rehabilitation: Improve fish passage and screening facilities and integrate into irrigation operations. Headworks gate automation and diversion check dam and headworks rehabilitation or reconstruction. Stream and floodplain reclamation at site.

Project Benefits: Project located in occupied critical bull trout habitat and listed as needed in 2009 BIOP for FIIP transfer. Project would improve fishery conditions for endangered bull trout and would improve irrigation operations at site. Project would improve irrigation water and streamflow management. Project would improve stream and floodplain conditions.

5. Flathead River Pumping Plant

Project Scope: Rehabilitation or replacement of Flathead Pumping Plant, Flathead Pumping Plant Canal, and access road to plant.

Current Condition: The three penstock pipes have geotechnical stability issues and deteriorated condition to the point where multiple leaks are occurring. Pump motor controls are obsolete and in poor condition. Impellers need replacement. Access roadway does not meet current safety standards. Flathead pump canal is concrete-lined, but a repair liner has been placed inside the original liner. Canal does not have adequate freeboard above the water surface when all three pumps are operating.

Project Rehabilitation: Full evaluation to modernize pumping plant and associated infrastructure.

Project Benefits: Rehabilitate critical project infrastructure which has the ability to increase irrigation water supply to FIIP.

6. Fish Entrainment – McDonald Reservoir, Tabor Reservoir, Flathead Pumps

Project Scope: Improvement to outlet works at two reservoirs and intake to Flathead Pumps.

Current Condition: All three sites are located in occupied bull trout habitat, and entrainment and loss of fish may occur at each site.

Proposed Rehabilitation: The 2009 BIOP for FIIP transfer identified screening as the approach to preclude entrainment. Based on Fisheries Biologist input, it is more appropriate to step back and develop optimal approach to preclude entrainment at each site and construct selected approach.

Project Benefits: Project(s) located in occupied critical bull trout habitat and listed as needed in 2009 BIOP for FIIP transfer. Project(s) would preclude fish entrainment at sites and potential take of endangered bull trout.

7. Jocko Lower J Canal Diversion

Project Scope: Diversion check dam, headworks and gate structure rehabilitation, and stream and floodplain reclamation at site.

Current Condition: Diversion check dam is a pin and plank structure that is failing. Headworks has large forebay area that requires ongoing maintenance. Stream and floodplain reach through site have been modified.

Proposed Rehabilitation: Rebuild diversion check dam, headworks and headworks forebay. Install headworks gate automation. Restore stream channel and floodplain at site.

Project Benefits: Project located in occupied critical bull trout habitat. Project would improve fishery conditions and would improve irrigation operations through gate automation and reduction in site maintenance and disturbance. Project would improve irrigation water and streamflow management.

8. Crow Creek Pumping Plant and Canal Diversion on Crow Creek

Project Scope: Increase pumping plant capacity, modernize pumping plant, and improve diversion check dam.

Current Condition: Pumping plant is outdated and often non-operational. Diversion check dam is full barrier to fish passage on Crow Creek.

Proposed Rehabilitation: Reconstruct pumping plant to increase capacity and modernize facility. Place Crow pumping plant canal in pipe. Construct suitable fish passage at diversion dam.

Project Benefits: There is opportunity to pump water from Crow Creek into Ninepipe Reservoir during off-irrigation season months while maintaining proposed instream flows and downstream irrigation water requirements. This will benefit instream flow management in Post Creek during the irrigation season. Fish passage across the diversion dam will reconnect fisheries in Crow Creek. Replacing the oil-cooled pump with a water-cooled pump will eliminate the potential for a release to Crow Creek.

9. Revais Creek Pumping Plant

Project Scope: Modernize pumping plant.

Current Condition: Pumping plant is outdated and many components are obsolete.

Proposed Rehabilitation: Reconstruct pumping plant to modern standards

Project Benefits: Improve reliability of water supply to irrigated lands and reduce dependence on Revais Creek for irrigation water supply. Replacing oil-cooled pump with water-cooled pump will eliminate the potential for a release to Jocko River.

10. Pablo Feeder Canal Diversion at Post Creek

Project Scope: Diversion check dam, headworks and gate structure rehabilitation and stream and floodplain reclamation at site.

Current Condition: The diversion check dam and headworks has deteriorated concrete and gates. The stream and floodplain at the site have been heavily modified and fish passage is not incorporated into the diversion check dam. An overpass flume was recently constructed to separate the Pablo Feeder Canal south of Post Creek from Post Creek. A short section of stream below the diversion works may be dewatered due to site operations.

Proposed Rehabilitation: Rebuild diversion check dam, headworks and headworks gates. Headworks gate automation. Fish passage across diversion dam. Stream and floodplain reclamation at site.

Project Benefits: Project located in occupied bull trout habitat. Project would improve fishery conditions for endangered bull trout and would improve irrigation operations at site. Project would improve irrigation water and streamflow management. Project would improve stream and floodplain conditions.

11. Pablo Feeder Canal Diversion at North Crow Creek

Project Scope: Diversion check dam, headworks structure improvement and stream and floodplain reclamation at site.

Current Condition: Deteriorated diversion structure, overflow structure, headworks, and headworks gates. Stream and floodplain are heavily modified at site.

Proposed Rehabilitation: Rebuild diversion structure, headworks and gates. Install headworks gate automation. Stream and floodplain reclamation at site.

Project Benefits: Greater operational control for irrigation and streamflow management. Reduced impact to stream from current channel spanning diversion structure.

12. Pablo Feeder Canal Diversion at South Crow Creek

Project Scope: Diversion check dam and headworks rehabilitation.

Current Condition: Deteriorated concrete diversion structure, headworks, and headworks gates.

Proposed Rehabilitation: Rebuild diversion structure, headworks and gates. Install headworks gate automation.

Project Benefits: Greater operational control for irrigation and streamflow management. Reduced impact to stream from current channel spanning diversion structure.

13. Camas A Canal Diversion on Little Bitterroot River

Project Scope: Diversion check dam, headworks and gates rehabilitation, and stream and floodplain reclamation at site.

Current Condition: Deteriorated high head check dam, headworks and gates. Diversion check dam is full barrier to fish passage on Little Bitterroot River. Condition of gates leads to dewatering below diversion check dam. Heavily modified stream and floodplain at site.

Proposed Rehabilitation: Due to site complexity, full site analysis to execute most effective rehabilitation and betterment approach for diversion check dam, headworks, and gate. Rebuild structures (or structure equivalents) based on analysis. Incorporate gate automation and fish passage. Preclude fish entrainment in headworks design. Stream and floodplain reclamation at site.

Project Benefits: Project would rebuild channel-spanning diversion check dam, headworks, and gate structure. Project would reconnect fisheries above and below structure. Project would eliminate river dewatering below structure. Project would improve irrigation water and streamflow management. Project would improve stream and floodplain conditions.

14. Mission Creek Structures

Project Scope: Improvements to Mission Dam outlet crossing structure at Mission A Canal to Pablo Feeder Canal, Mission B Canal diversion structure, and Mission C Canal diversion structure.

Current Condition: Deteriorated concrete at diversion structures. High maintenance due to condition and design. Modified stream and floodplain conditions at sites.

Project Rehabilitation: Rebuild structures with updated design to improve fishery conditions and reduce chronic maintenance. Stream and floodplain reclamation at sites.

Project Benefits: Greater operational control for irrigation and streamflow management. Reduced impact to stream and floodplain from current channel spanning diversion structures.

15. Structure Rehabilitation throughout FIIP Distribution System

Project Extent: Rehabilitate or replace irrigation structures with a cost over \$20,000 each throughout the FIIP.

Current Condition: Deteriorated or failed concrete structures.

Project Rehabilitation: Jocko Service Area – 11 structures; Mission South service area – 9 structures; Mission North service area – 28 structures; Camas service area – 18 structures.

Project Benefits: Rehabilitate critical project infrastructure. Greater operational control of irrigation water. Opportunity to incorporate automation and water measurement into select structures.