



# Oregon

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## Department of Fish and Wildlife

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**To:** Oregon Fish and Wildlife Commission

**Subject:** ODFW Benefit Analysis for the Ochoco Irrigation District's Fish Passage Waiver Request for Bowman Dam – Proposed Hydroelectric Project

The Oregon Department of Fish and Wildlife (“Department” or “ODFW”) Hydropower Program in coordination with the ODFW Statewide Fish Passage Program and ODFW Upper Deschutes Watershed District has reviewed a request from Ochoco Irrigation District to obtain a Fish Passage Waiver (FPW) for Arthur R. Bowman Dam (Bowman Dam), located on the Crooked River, as triggered by their proposal to retrofit the existing Bowman Dam with a hydropower project [Federal Energy Regularly Commission (FERC) No. P-1479]. The Department has actively engaged with the Applicant and its consultants over the course of the past year in discussions involving the preparation of their FPW Application. Our discussions included providing feedback on proposed potential mitigation measures, feedback on aspects of the Applicant’s assessment of the upper Crooked River Basin (NMF) habitat considerations as well as providing a timeline and schedule for working through the waiver process. The Department has reviewed the Applicants’ proposal for alternative mitigation measures in lieu of fish passage at Bowman Dam and finds that the proposed measures do not provide a net benefit to Native Migratory Fish (NMF) as required in ORS 509.585 (7a and 7b) and OAR 635-412-0025 (1) (2). The Benefit Analysis follows.

### BACKGROUND

When new hydroelectric projects are proposed the Department’s Hydropower Program coordinates agency participation in the consultation process with the project proponents to ensure that fish and wildlife concerns are addressed in the state water right and the license issued by the FERC. In addition to several issues raised in the licensing process by the Department, Bowman Dam is not equipped with an upstream fish passage facility. Licensing by FERC and issuance of a hydroelectric water right by the Oregon Water Resources Department, are “triggers” that invoke the state’s fish passage policy under ORS 509.585(4) and require fish passage to be addressed. The Oregon Fish and Wildlife Commission (Commission) is authorized by ORS 509.585 to enter into an agreement with the owner or operator of an artificial obstruction that waives the statutory requirements for fish passage. To enter into such an agreement, the Commission must determine, after opportunity for public review and comment, that mitigation proposed by the owner or operator will provide a net benefit to NMF, as the license applicant, rather than work to provide fish passage as part of its proposed hydropower project, OID has chosen to apply for a FPW, which will include proposed mitigation, as well as an evaluation of fish passage options.

After obtaining input from Department staff on a draft waiver application April 17<sup>th</sup>, 2020 the Applicant submitted its final FPW application to the Department on May 7, 2020 (Attachment A).

### **PROPOSED FISH WAIVER SITE: BOWMAN DAM**

Completed in 1961, Bowman Dam (Figure 1) is located in the Crooked River Basin at river mile (RM) 72 on the Crooked River (Figure 2), approximately 20 miles upstream of Prineville, Oregon. Bowman Dam is a federal facility under the jurisdiction of the USDI Bureau of Reclamation (Reclamation). As a transferred works, the dam is operated by OID under contract with Reclamation for the authorized purposes of irrigation storage, flood control and fish and wildlife. A reservoir sedimentation survey, completed in 1998, estimated a total reservoir capacity at 150,200 ac-ft with active volume of 148,600 ac-ft (Bureau of Reclamation [Reclamation] 1981).

Bowman Dam was constructed without fish passage facilities and is a barrier to upstream passage of all fish species. Bowman Dam is identified as one of the 2019 Statewide Fish Passage High Priority Barriers, approved by the Commission early last year. Bowman Dam is considered the highest priority artificial obstruction (AO) (manmade fish passage barrier) in the Deschutes Watershed, and is situated in the state's Group 1 high priority barriers (#15 of 589 barriers).

In 2016, OID secured a three-year preliminary permit from the FERC for the addition of a hydroelectric power plant (the Project) at Bowman Dam. OID applied to FERC to extend the preliminary permit, and FERC granted the extension in November 2019 for a period of up to 60 months. The Project would be a new facility with a hydraulic capacity of 80 to 400 cfs, a 1 MW turbine and a 2 MW turbine, and an estimated annual power output of 15,000 MWH. The Project will operate "run of release" using water that is released for irrigation, flood control and fish and wildlife purposes.



Figure 1. Downstream View looking upriver to Bowman Dam. (Source: PGE 2013)

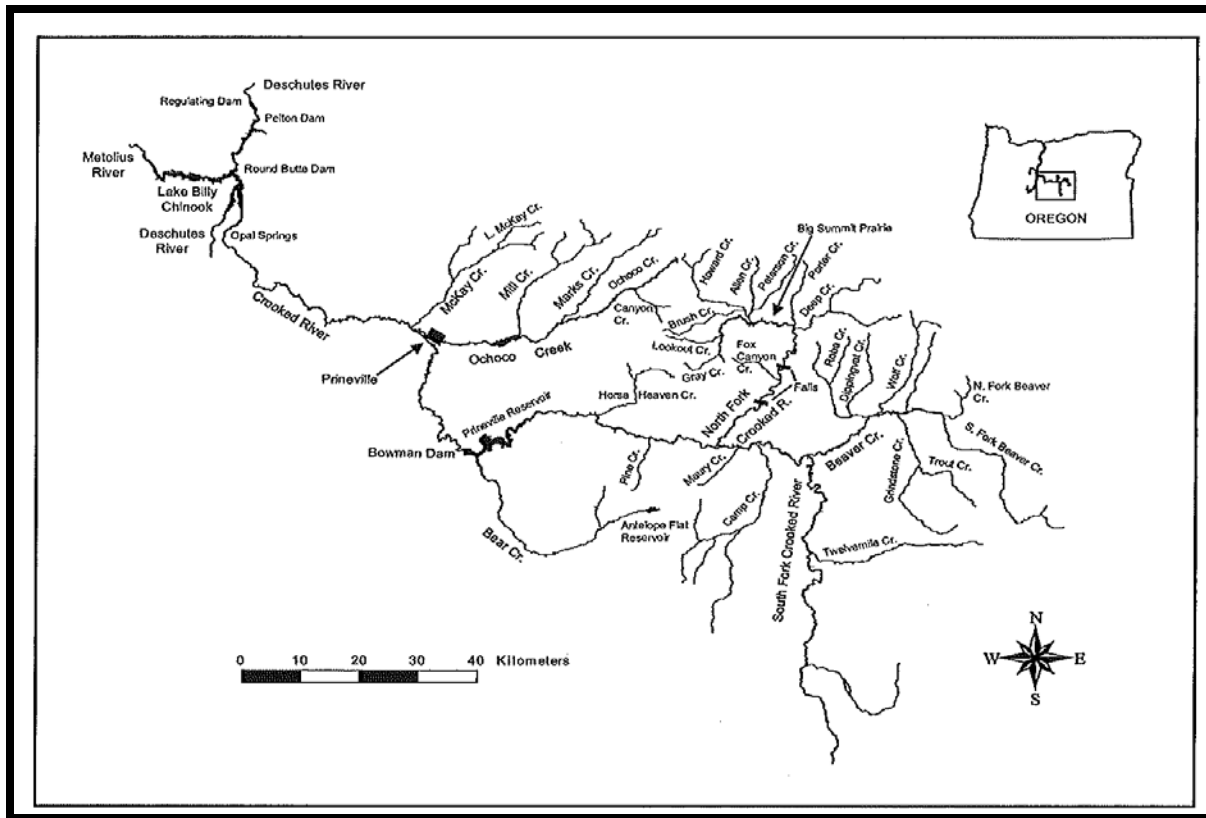


Figure 2. Crooked River Basin. (From Stuart et. al. 2007)

### 2019 STATEWIDE FISH PASSAGE PRIORITY LIST

The Department has constructed a prioritization list of 591 barriers (Appendix A) to identify priority barriers that prohibit the return of native migratory fish to critical habitats. Prioritization criteria are calculated to estimate the amount of habitat gained for purposes of prioritizing AO's at which fish passage would benefit native migratory fish in the State of Oregon.

Fish passage prioritization and inventory is a requirement of the ODFW's Fish Passage Program (FPP) through Oregon Revised Statute (ORS) 509.585 (3). Priority artificial obstructions are subject to Commission authority as provided in ORS 509.625, the Department shall primarily direct its enforcement authority toward priority projects developed through this process.

The priority list shall be based on the needs of native migratory fish currently or historically present at the artificial obstruction. More specifically, the base requirements of the priority list are identified in Oregon Administrative Rule (OAR) 635-412-0015 (2) and include the following factors: T

- the quantity of native migratory fish habitat which is inaccessible,
- the quality of native migratory fish habitat which is inaccessible,
- unique or limited native migratory fish habitat which is inaccessible, or should remain inaccessible for fish management purposes,

- the biological status of the native migratory fish,
- the level of fish passages currently provided at the artificial obstruction,
- the presence of other artificial obstructions upstream and downstream and the timeframe native migratory fish will be able to utilize restored passage, and
- existing agreements with the Department regarding fish passage.
- the prioritization may utilize existing Department information or professional judgment in the absence of information specific to a given site.

**Oregon Department of Fish and Wildlife Mitigation Oregon Administrative Rules, Chapter 635, Division 412, Section 635-412-0040, Mitigation Criteria**

For the purposes of better understanding the mitigation criteria as applied to the benefit analysis process the following criteria under OAR 635-412-0040 are included below:

(3) Mitigation shall not include any activity that is a requirement or condition of any other agreement, law, permit, or authorization except if it is also for fish passage mitigation of the same action at the artificial obstruction for a different level of government.

(6) Mitigation actions that provide fish passage shall meet the fish passage criteria contained in OAR 635-412-0035.

(8) A person owning or operating an artificial obstruction is responsible for maintaining, monitoring, evaluating the effectiveness of, and reporting on mitigation.

(9) Mitigation:

(a) Shall be conducted in-proximity to the artificial obstruction, with respect to geographic scope;

(b) Shall have habitat type and quality which is more beneficial than that affected by the AO, if mitigation is passage into, restoration of, or enhancement of habitat;

(c) Shall at least benefit the same native migratory fish species affected at the artificial obstruction;

(d) Shall have a clear benefit for those native migratory fish species affected at the AO if their status is listed as "threatened" or "endangered" under the state or federal Endangered Species Act;

(e) Shall have standards for monitoring, evaluating, and adaptive management which are approved by the Department, which assure that the goal of the mitigation is achieved and maintained, and which are detailed in the waiver agreement required in OAR 635-412-0025(9);

(f) Shall be considered if the owner or operator of the artificial obstruction believes the feasibility of fish passage at the artificial obstruction is less than that for mitigation;

(g) May require quantification of baseline conditions before a decision regarding a FPW is made in situations with no existing information, which require recent information, or which have no clear benefit;

(h) Shall attempt to restore or enhance historic conditions;

(i) To the extent possible, shall be consistent with existing native migratory fish or watershed management plans;

(k) May require data collection and evaluation before a decision regarding a FPW is made in situations with no existing information, which require recent information, or which have no clear benefit; and

## BENEFIT ANALYSIS

The purpose of this fish passage benefit analysis is to evaluate the mitigation benefit of the Applicant's proposed mitigation measures in lieu of not providing passage for NMF over/around Bowman Dam. The Department has worked extensively with the Applicant and their consultants in regard to providing feedback on draft background documents and the draft FPW application. This includes providing review and feedback in respect to the Consultant's report on the, "Assessment of Native Migratory Fish Habitats in the Upper Crooked River Basin", Technical Assessment Report prepared by Mt. Hood Environmental.

This particular benefit analysis in respect to waiving of the state's fish passage requirements for Bowman Dam Project is unique, in that the Department rarely, if ever, has been presented with a FPW application that seeks to provide mitigation in lieu of providing upstream passage/accessibility to such a large extent of potential NMF habitats (Figure 3).

The drainage area for the Crooked River above Bowman Dam is roughly 2,635 square miles (Reclamation 2010) with multiple sub-basin watersheds and many miles of mainstem and tributary streams that afford potential NMF habitat.

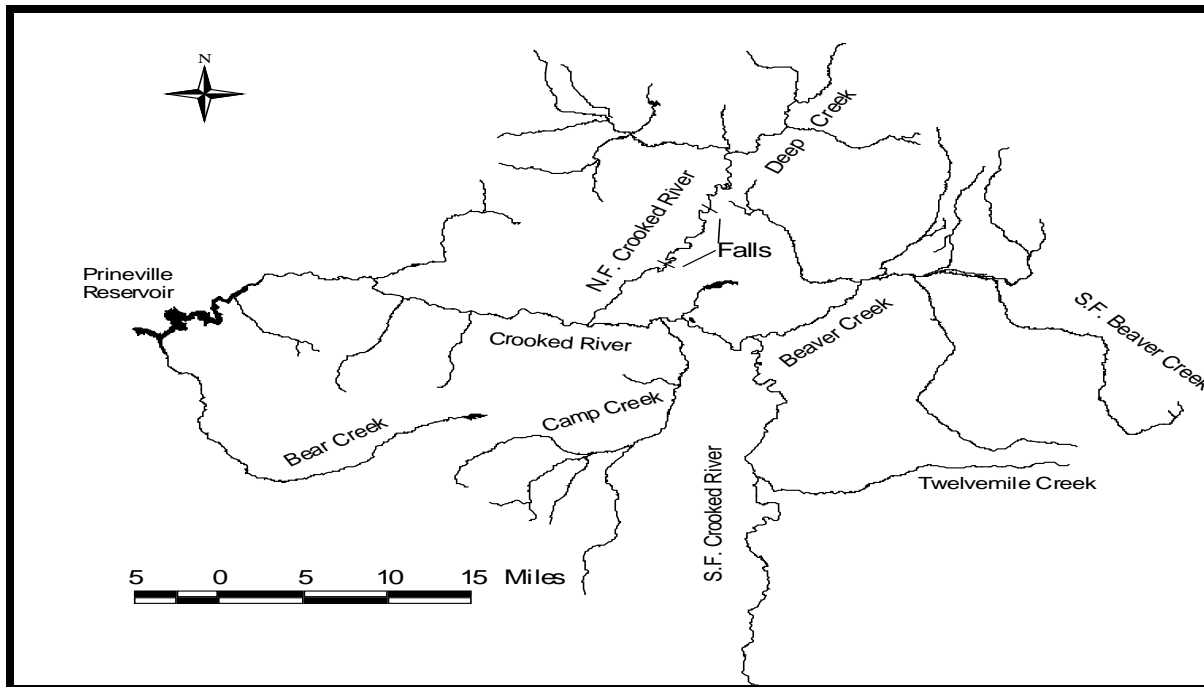


Figure 3. Upper Crooked River Basin above Bowman Dam. (Source: ODFW 1996)

Our analysis of the level of comparable benefits in respect to the Applicant's proposed mitigation versus that of providing fish passage to upstream habitats is also complicated by the lack of background material presented as part of the Application package in respect to the specific tributary drainages and NMF habitat of the upper Crooked River. ODFW staff advised the Applicant that a FPW proposal needs to provide a net benefit to NMF greater than that of providing fish passage at Bowman Dam. In addition, in order to make a benefit determination the Department needed reasonable quantification of the suitable and potentially suitable habitat for NMF (including steelhead trout and Chinook salmon) situated upstream of Bowman Dam. The Department also indicated to the Applicant as to the inadequacy of attempting to extrapolate the existing limited amount of the Department's Aquatic Inventory Program (AIP) stream inventory data to the significant number of tributary reaches lacking survey data. Those reaches with available AIP data under represented the total habitat in the upper Crooked River basin. Given that the available AIP data is so limited, ODFW recommended, as provided by rule (OAR 635-412-0040(9)(g)), additional field surveys be conducted to provide a basis for a representative depiction of the quality and quantity of suitable habitat resulting from fish passage. This information and a much more thorough discussion in respect to the overall sub-basin tributaries and habitats would assist in conducting a more comprehensive assessment of the level of adequacy of any proposed mitigation measures in respect to forgoing fish passage at the dam. The Department believes that addressing its recommendations would have strengthened the analysis and made the report more useful for conducting a benefit analysis.

Typically, towards meeting the measure of the net benefit mitigation standard, the extent of proposed mitigation projects results in a mile for mile mitigation strategy where mitigation is required to provide access to more miles of habitat as compared to providing fish passage at the waiver site. Given the hundreds of miles of existing NMF above Bowman Dam the goal for the Applicant of providing an adequate/sufficient mitigation package is a significant undertaking.

#### **NATIVE MIGRATORY FISH SPECIES AT WAIVER SITE: (BOWMAN DAM)**

NMF that currently occupy suitable stream habitats in the upper Crooked River basin above Bowman Dam (Figure 1.) include:

- Redband Trout (*Oncorhynchus mykiss gairdneri*)
- Northern Pikeminnow (*Ptychocheilus oregonensis*)
- Largescale Sucker (*Catostomus macrocheilus*)
- Bridgelip Sucker (*Catostomus columbianus*)

The NMF fish assemblage that historically were present in the upper Crooked River Basin include:

- Redband Trout (*O. mykiss gairdneri*)
- Steelhead Trout *O. mykiss ssp.*)
- Chinook Salmon (*Oncorhynchus tshawytscha*)
- Mountain Whitefish (*Prosopium williamsoni*)
- Northern Pikeminnow (*P. oregonensis*)
- Largescale Sucker (*C. macrocheilus*)
- Bridgelip Sucker (*C. columbianus*)
- \*Pacific Lamprey (*Entosphenus tridentatus*)



\*In the context of this benefit analysis the Department will not be addressing the benefits of upstream and downstream passage to historic upper basin habitats for Pacific Lamprey, as this species while present in the Deschutes River below the Pelton Round Butte dam complex, has yet to be provided passage opportunity around or over these barriers located downstream of Bowman of Dam.

The Middle Columbia Steelhead Distinct Population Segment (DPS) was listed as threatened under the U.S. Endangered Species Act (ESA) in 1999. The National Marine Fisheries Service (NMFS) designated the Upper Deschutes/Crooked River steelhead trout population area above Pelton-Round Butte Complex (PBRC) as nonessential, experimental under ESA Section 10 (j). (ODFW a 2019)

Those species of NMF present in the Crooked River downstream of Bowman dam that would see benefit from upstream and downstream passage include:

- Redband Trout
- Steelhead trout
- Chinook Salmon
- Mountain Whitefish
- Northern Pikeminnow
- Largescale Sucker
- Bridgelip Sucker

As a matter of reference and as a means of emphasizing those NMF currently present downstream of Bowman Dam, that are likely to benefit from passage at the dam, we have included an accounting of all the NMF fish that are currently utilizing the recently completed fish ladder at Opal Springs Dam (RM 7) on the Crooked River. The Opal Springs Fish Ladder first became operational on November 15, 2019 and the Vaki video system became operational on November 19, 2019. The Table summarizes the number of upstream and downstream videos of fish by species captured by the Vaki video system in the fish ladder located at Opal Springs Dam as of April 27, 2020. This preliminary data only shows the number of videos captured by species and should not be interpreted as the number of individuals that have passed through the ladder

Table 1. Summary of the number of upstream and downstream videos of fish by species captured by the Vaki video system in the fish ladder located at Opal Springs Dam as of April 27, 2020.

<b>Species</b>	<b>Upstream Video</b>	<b>Downstream Video</b>	<b>Total</b>
Bridgelip Sucker	3	0	3
Bull Trout	48	16	64
Largescale Sucker	5,109	1,837	6,946
Northern Pikeminnow	715	128	843
Rainbow Trout	288	89	377
Salmon Smolts	11	22	33
Steelhead	27	3	30
Steelhead Smolts	13	7	20
Mountain Whitefish	55	7	62
<b>Total</b>	<b>6,269</b>	<b>2,109</b>	<b>8,378</b>

## UPPER CROOKED RIVER BASIN (ABOVE BOWMAN DAM) – HISTORICAL HABITATS AND NMF OCCUPANCY

The entire upper sub-basin was historically inhabited by summer steelhead trout with the exception of the North Fork Crooked River that had a largely impassable natural barrier (Lower Falls) nine miles upstream from the mouth. (Carmichael & Taylor 2010). The Applicant's FPW application provides a good overview of the historic extent of the NMF in the upper Crooked river basin above Bowman Dam.

The Crooked River and its tributaries above the current location of Bowman Dam, in addition to supporting robust and abundant populations of native Redband Trout were once significant spawning ground for anadromous fish such as spring Chinook Salmon, steelhead trout, and Pacific lamprey.

The following is excerpted from the Department's 1996 Crooked River Basin Plan (Stuart et al. 1996),

*“Early explorers and military expeditions described the Crooked River basin as a rich area with abundant riparian vegetation, adequate supplies of grass, water and firewood, and banks of the Crooked River covered with a dense growth of trees that in some areas had to be cut away to facilitate travel (Buckley 1992). The river and streams were abundant with native fish including rainbow trout, summer steelhead and chinook salmon (Crook County Historical Society 1981). Ogdens’ journals of his expeditions up the Crooked River in 1826 described the excellent quality of beaver habitat and noted specifically that all of the tributaries and the mainstem he observed were lined with willows and aspen, and grass as tall as 7 feet (Ogden 1950). Other early explorers noted the abundant grasses and willows and one report describes the Crooked River valley: “the bottom lands of the valley will average from half a mile to mile in width...groves of alder and cottonwood, with dense thickets of willow, exist on its banks... the plains back of the hills are...clothed with a carpet of luxuriant bunch grass” (Buckley 1992). One entry from Steen’s military unit that was dispatched to survey a route in July 1860 from Harney Lake to Eugene City described the Crooked River as a “Good running stream 30 ft wide 1 ft deep in middle. Good rocky bottom. Plenty of fish. Ogden also found an Indian fish weir below the junctions of the North and South forks, that was apparently used for capturing anadromous fish.”*

The upper Crooked River and its tributaries suffered anthropogenic landscape degradations associated with the Euro-American colonization of the west. The stream habitats were severely compromised by those impacts resulting from overgrazing, irrigation withdrawals etc. originating in the late 1800's. Despite this, the upper Crooked River basin still supported runs of steelhead trout into the 1950's. The Oregon Fish Commission (OFC) was continuing to monitor these steelhead trout runs in the upper Crooked River Basin into the early 1950's. One method that biologists used at that time to monitor these runs was that of a fish weir established on Paulina Creek (Figure 4). Evidence of adult steelhead trout returning to spawn in Paulina Creek is illustrated in the photograph of a OFC biologist with a steelhead trout caught in the Paulina Creek Weir. (Figure 5.)





Figure 4. Photograph Paulina Creek fish monitoring weir. Circa 1952 (Source ODFW Files)

This is important historical context in understanding the potential for steelhead trout and other NMF might be able to successfully repopulate areas above Bowman Dam today.



Figure 5. Photograph of Oregon Fish Commission Biologist Monty Montgomery (Former Director ODFW) with steelhead trout caught in the Paulina Creek weir circa 1952 (Source ODFW Files)

Steelhead use in the upper mainstem Crooked River including the North and South forks and Beaver and Bear creeks was terminated with the completion of Bowman Dam in 1961. (Carmichael & Taylor 2010)

### **PRESENT UPPER CROOKED RIVER HABITAT**

The Crooked River basin above Bowman Dam drains approximately 2,636 square miles. The reservoir behind the dam inundates approximately 14 miles of the Crooked River channel. Two primary tributaries flow into Prineville Reservoir—Bear Creek and Sanford Creek. Bear Creek is located on the south side of the reservoir and on the western end. Bear Creek originates above Antelope Flat Reservoir on the south side of the Maury Mountains. Bear Creek and its many tributaries drain about 260 square miles, or about 10% of the basin upstream of Prineville Reservoir (BOR 2003).

The Crooked River has three major headwater tributaries, the North Fork, South Fork, and Beaver Creek which join to make the mainstem as it flows through Paulina Valley. The South Fork Crooked River flows through a combination of private ranches and Bureau of Land Management (BLM) lands. Stretches of the South Fork are included within the South Fork Wilderness Study Area, an Area of Critical Environmental Concern for Redband Trout. ODFW and nongovernment organizations (NGO's) volunteers have been working over the last 20 years with notable success at restoring many miles of the South Fork. (Figures 6 and 7.)

The Beaver Creek drainage stream reaches while still suffering from extent past degradation has seen improvement in recent years as well. Photographs of a stream reach with improving fish habitats conditions is shown in Figure 8 and Figure 9. The United States Forest Service (USFS) and BLM have also conducting restoration work on various stream reaches under their ownership in the upper basin. Wolf Creek a tributary to Beaver Creek is shown in Figure 10.

The Department recognizes that some stream habitats in the upper Crooked River basin are in a less than favorable condition. However, the Department does not agree this precludes providing NMF passage into the mainstem Crooked River and tributaries upstream of Bowman Dam. Nor would this be consistent with the state's OAR's governing fish passage waivers. Despite some sections of streams currently in poor condition they are still able to support Redband Trout populations and would provide potential suitable habitat for steelhead trout and Chinook Salmon. This is consistent with the finding in the upper basin assessment report (MHE 2020b) that for streams where habitat information was found to be available, *“analysis indicated that juvenile rearing habitat was mostly fair or good quality for Chinook Salmon and steelhead trout.”*

Further, the upper basin assessment report states, *“although passage at Bowman Dam would likely provide biological benefits to native migratory fish (NMF), the quality of habitat upstream of the dam may be limited.”* This statement supports the likely benefit to NMF. However, the latter part of this statement stating, *“the quality of the habitat may be limited needs qualification”*. This is perhaps true in regard to historical reference conditions; however, it is not fully justifiable in regard to the current habitats being able to support reconnected populations of several NMF species.





Figure 7. Photograph of South Fork Crooked River. RM 4 – (2015) (Source B. Hodgson ODFW)



Figure 6. Photograph of South Fork Crooked River. RM 6, BLM land just below Cold Springs. (2010). This reach has much improved since photo was taken. (Source B. Hodgson ODFW)





Figure 8. Photograph 1 of Beaver Creek – Upper Crooked River Basin (2016) (Source T. Porter ODFW 2020)



Figure 9. Photograph 2 of Beaver Creek – Upper Crooked River Basin (2016) (Source T. Porter ODFW)





Figure 10. Photograph of Wolf Creek – Upper Crooked River Basin (Source USDA 2013)

The habitat situated above the influence of Prineville Reservoir (Bowman Dam) has various stream habitat types suitable for Redband Trout, steelhead trout, spring-run Chinook Salmon, Mountain Whitefish, Northern Pikeminnow, Bridge-lip Sucker and Large-scale Sucker. Based upon the habitat variable partitions identified by the methods used in the ODFW 2019 barrier inventory and the resulting changes in abundance of the species associations in the Crooked River, ODFW identified multiple river valley segment types comprised of suitable cold-water habitats. These provide a diverse spatial and temporal distribution of stream habitat quality for Redband Trout and steelhead trout. Redband Trout distribution surveys conducted by the Department and USFS staff over the past 30 years provide the basis for identifying the extant of suitable habitat for this species in the upper Crooked River subbasin above Bowman Dam.

The Oregon Fish Passage Barrier Database<sup>1</sup> was used to identify both natural and artificial blocking barriers upstream of Bowman Dam. This data base is comprised of natural, artificial and partial barriers that represents the best available data at a statewide scale.

- Redband Trout habitat, calculated from the Oregon Fish Habitat Distribution Database<sup>2</sup>, has been identified 860 miles of perennial fish bearing stream habitat upstream of Bowman Dam (Figure 11). This includes habitats upstream of natural and artificial barriers.
- There is a total of 498 miles of Redband Trout habitat downstream of blocking barriers, but upstream of Bowman Dam (Figure 12).

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<sup>1</sup> Oregon Fish Passage Barriers Database, Oregon Department of Fish and Wildlife, May 2020, URL <https://nrimp.dfw.state.or.us/DataClearinghouse/default.aspx?p=202&XMLname=44.xml>

<sup>2</sup> Oregon Fish Habitat Distribution Database, Oregon Department of Fish and Wildlife, April 2020, URL <https://nrimp.dfw.state.or.us/DataClearinghouse/default.aspx?p=202&XMLname=1167.xml>

- Steelhead trout habitat distribution data, while not comprehensive, indicate there are at least 62.5 miles of historic habitat in the Crooked River upstream of Bowman Dam. This does not include those miles of potential tributary habitats.
- Similarly, there are at least 57 miles of historic spring-run Chinook habitat identified in the Crooked River upstream of Bowman Dam. This does not include those miles of potential tributary habitat.
- The Department has limited information on the historical distribution of Mountain Whitefish in the upper Crooked River Basin above Bowman Dam.

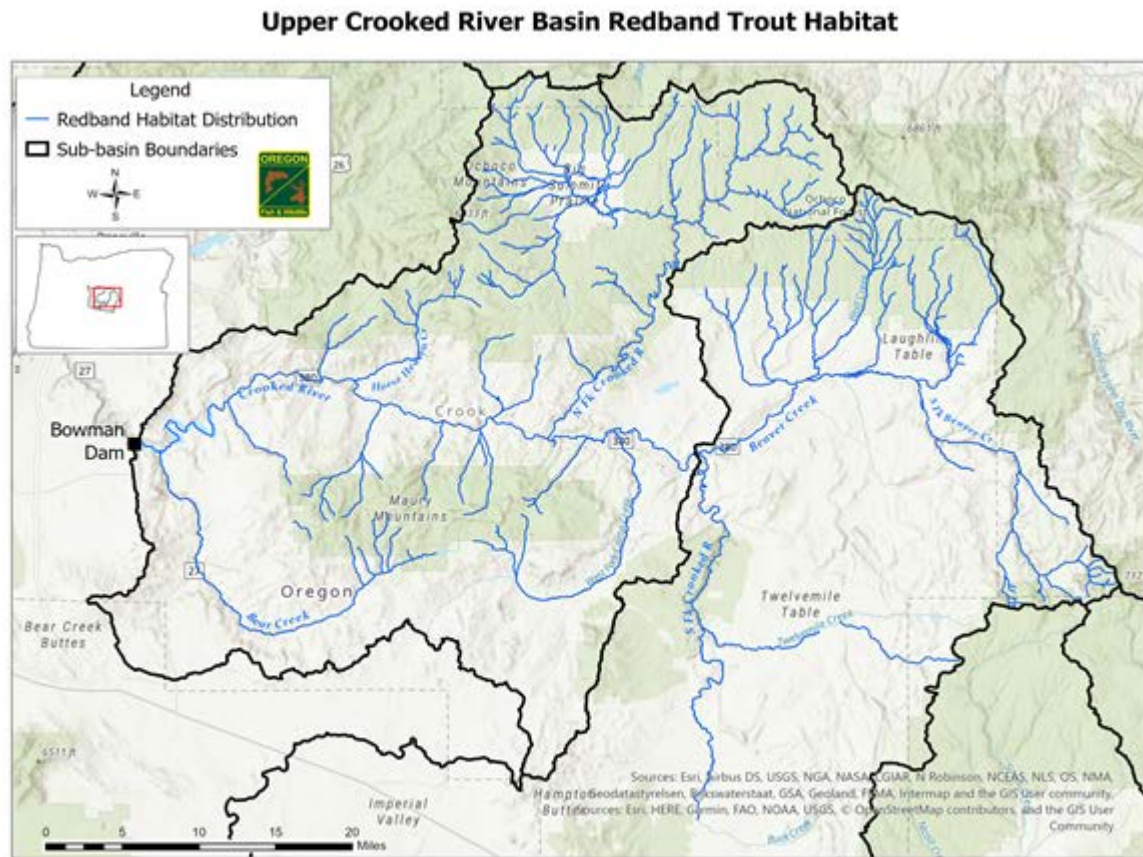


Figure 11. Upper Crooked River Basin Redband Trout Habitat (Source: Oregon Fish Habitat Distribution Data Base)



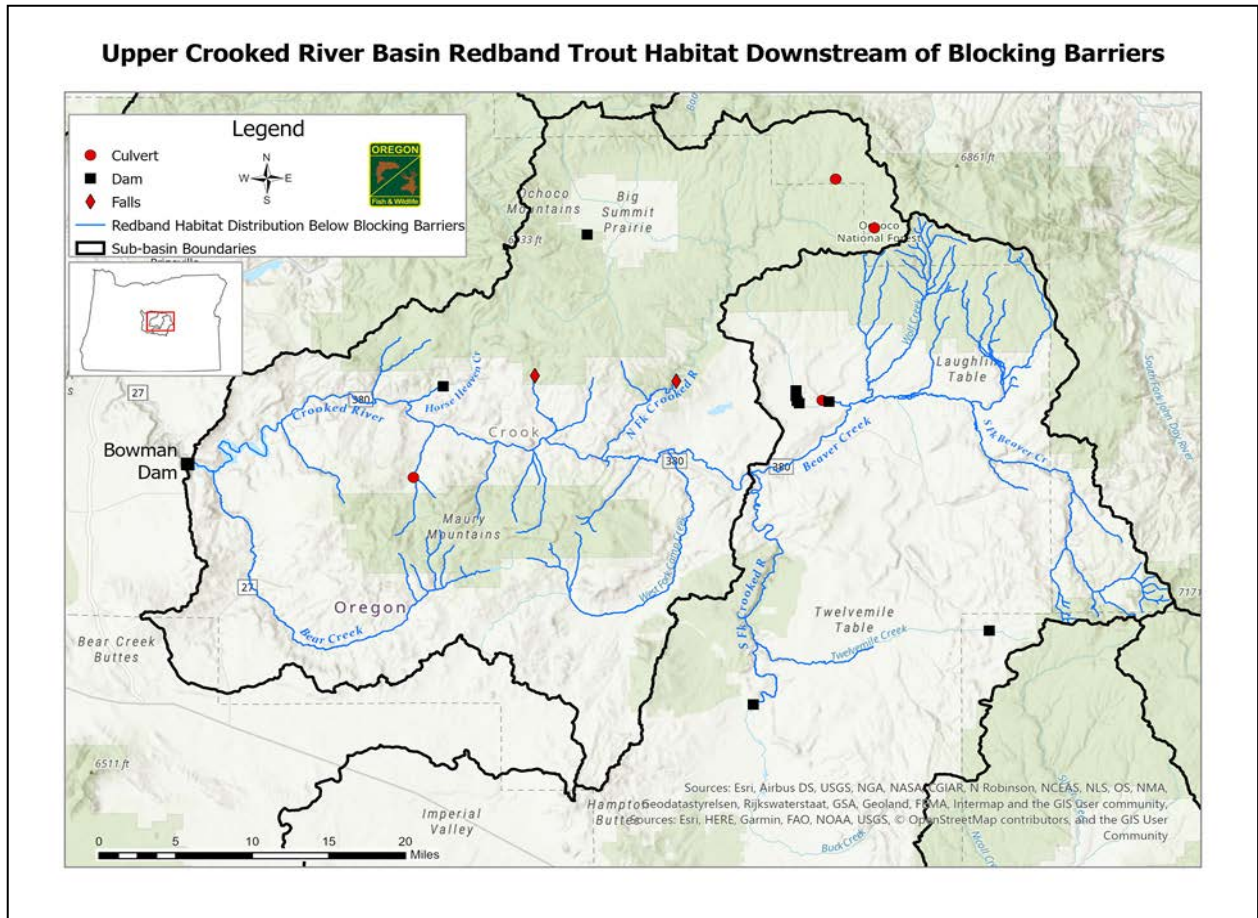


Figure 12. Map summarizing Redband Trout stream habitat where it occurs below natural and artificial blocking barriers. There is a total of 498 miles of Redband Trout habitat downstream of blocking barriers, but upstream of Bowman Dam.

### **CURRENT HABITAT AND OCCUPANCY CONDITIONS DOWNSTREAM OF BOWMAN DAM**

In the context of the overall reintroduction of anadromous fish efforts into the upper Crooked River Basin and NMF connectivity in the Crooked River below Bowman dam, it is important to highlight a few extremely notable achievements that have occurred in the last 15-years. Given downstream and upstream collection aspects at the Portland General Electric (PGE) and the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS) Pelton Round Butte Hydroelectric Facility in combination with the completion of the Deschutes Valley Water District (DVWD), Opal Springs fish passage project, there is now volitional NMF upstream and downstream passage into the upper Crooked River up to the Bowman Dam. Adult returning steelhead trout and spring -run Chinook Salmon are moving upstream of Opal Springs into those areas below the dam.

Upwards of estimated \$180,000,000 (Megan Hill, PGE, pers communication. 2020) has been invested during this 15-year period for reintroducing anadromous fish populations back into the upper Deschutes

basin, including the upper Crooked River and its tributaries below Bowman Dam. Listed below are just a few of the significant restoration actions and dates specific to the Crooked River Basin:

- **2007:** Juvenile Chinook Salmon and steelhead trout reintroduced into upper Deschutes Basin, upstream of the Pelton Round Butte Project including the upper Deschutes, Metolius and Crooked Rivers south of Lake Billy Chinook.
- **2010** Portland General Electric (PGE) and the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS) successfully completed construction of the Pelton Round Butte Hydroelectric Project fish bypass/intake structure. (located on the Deschutes River at the confluence of the Crooked River and Metolius Rivers.). To support the reintroduction of anadromous fish, PGE and the CTWS set aside \$21.5 million to restore fish habitat.
- **2012:** First reintroduced adult salmon and steelhead trout documented to have returned to the Pelton Round Butte Project. DVWD begins passing fish above the Opal Springs Hydroelectric Project (RM 7) through a trap-and-haul effort in response to a request from Federal and state agencies
- **2013:** Removal of Stearns Dam (RM 58), 12 miles below Bowman Dam on the mainstem Crooked River.
- **2019:** November 2019 passage completed at Opal Springs Dam (RM 7). Steelhead trout, Bull Trout and other native migratory fish begin volitionally moving upstream into the Crooked River basin habitats downstream of Bowman Dam (Figure 6.). Table 1. further illustrates the amount of upstream NMF fish movement occurring at this location.

The completion of Opal Springs dam fish ladder in November of 2019 provided upstream connectivity to approximately **130 miles** of NMF habitats. This includes approximately 70 miles of mainstem Crooked river habitats and the additional tributary stream habitats in Ochoco Creek and McKay Creek. Upstream passage over Bowman Dam would provide an additional **498** miles of potential NMF habitat.



Figure 13. Opal Springs Dam Fish Ladder Recently Completed (November 2019) Passage Facility (Source T. Porter ODFW)

The Applicants do suggest in their FPW application (pg. 2) that a reason justifying not providing passage at Bowman dam is that, “Prineville Reservoir currently supports self-sustaining populations of Largemouth (*Micropterus salmonids*) and Smallmouth Bass (*M. dolomieu*), Black Crappie (*Pomoxis nigromaculatus*), and Brown Bullhead (*Ameiurus nebulosus*). While some evidence for passage of non-native species exists, observation of these species below the dam is infrequent and has not occurred recently (Timothy Porter, pers. communication). Expansion of non-native populations to the lower Crooked River would likely result in intraspecific interactions with NMF, such as competition or predation. For example, it has been established that Smallmouth Bass, one of the species present in the reservoir but currently absent downstream, consume significant numbers of out-migrating juvenile salmonids wherever they co-occur with salmon and steelhead trout (Tabor et al. 1993, Zimmerman 1999, Fritts & Pearsons 2004, Erhardt et al. 2018). Additionally, passage at Bowman Dam may introduce pathogens to NMF populations in the upper Crooked River basin. *Ceratonova shasta* is a myxozoan parasite that has been reported to cause mortality of Rainbow Trout in the lower Crooked River (Stuart et al. 1996). This parasite may pose a risk to native populations of Redband Trout in the upper Crooked River basin”

Department staff acknowledge the risk of reintroducing fish populations that have been extirpated from their historical habitats. Certainly, there’s inherent risks to consider for many passage projects which provide restored connectivity to upstream and downstream habitats. The Department was closely involved in the risk analysis associated with providing upstream and downstream passage for fish reintroduction on the Pelton Round Butte project which involves many of the same similar fish health and non-native species considerations as that of providing NMF passage at Bowman Dam.



## **BENEFITS OF FISH PASSAGE AT BOWMAN DAM**

Providing fish passage at the Bowman Dam would reconnect the Redband Trout “sub” populations within the Crooked River basin, providing connectivity to upper Crooked River basins well as provide benefits to other native species such as Northern Pikeminnow and sucker species.

The benefits to providing passage at Bowman Dam include:

- Provide connectivity to an approximate 63 miles of additional steelhead trout habitat.
- Provide upstream to 53 miles of historic spawning and rearing areas for spring-run Chinook Salmon.
- Connect downstream Redband Trout populations to an estimated 498 miles of upstream habitat.
- Connect downstream Redband Trout populations within the upper and Lower Crooked River basin (allow genetic exchange and interaction between them), and improve the opportunity for expression of fluvial (migratory) life histories. This would allow downstream populations access to upstream habitats, upstream populations access to downstream habitats, and interactions among currently separate up and downstream populations.
- Provide upstream connectivity for Mountain Whitefish to historic habitats above Bowman Dam
- Potential increases in genetic fitness and population viability would make the NMF populations less susceptible to catastrophic events such as drought, and lead to an overall healthier population.
- Maintain and/or restore performance productivity, abundance and life history diversity of wild indigenous resident fish; this includes the promotion of genetic fitness and adaptiveness of fish populations: this includes population genetic fitness and adaptiveness.
- Restore habitat for a threatened and endangered species.
- Maintain and or promote species diversity within the upper Crooked River watershed.

## **APPLICANT’S PROPOSED MITIGATION IN LIEU OF PROVIDING FISH PASSAGE AT BOWMAN DAM**

The Applicant has proposed several mitigation actions which provide benefits to NMF in the Crooked River basin with emphasis on improving conditions for spring-run Chinook Salmon and steelhead trout. These measures include:

1. Gravel Augmentation
2. Ochoco Creek Passage
3. Deschutes Land Trout (DLT) Ochoco Preserve Restoration

The Applicant also included as part of their mitigation package, discussion regarding potential structural modifications to Bowman Dam which may reduce downstream total dissolved gas (TDG) saturation levels. The operation of Bowman Dam outlet discharge and spill causes TDG saturation to exceed state water quality standards. Standards are exceeded when water is spilled over Bowman Dam or volumes released through the outlet structure exceed approximately 800 cfs. (Bureau of Reclamation, February 2010). These high levels of TDG can result in gas bubble disease in fish, which can result in mortality or serious injury. ODFW has identified TDG as an issue of concern and supports efforts to reduce TDG levels in the river downstream of the dam. TDG reduction will be required by the Oregon Department of Environmental Quality (ODEQ) in order to meet requirements of the 401 - water quality certification for the proposed Hydropower Project. This is significant in that per OAR 635-412-0040, the fish passage waiver net benefit analysis is not to include any activity that is a requirement or condition of any other

agreement, law, permit, or authorization. The Applicant has previously been advised by the Department that considerations of potential TDG reductions are not an allowed mitigation action and any realized reductions cannot be considered as part of the Fish Passage Waiver. As such, the Department will not be including further discussion of the TDG issue as part of the benefit analysis.

## 1. Gravel Augmentation

As stated in the FPW application the applicants propose to implement passive gravel augmentation downstream of Bowman Dam (MHE 2020a). Although the source of the gravel has yet to be determined, the applicants propose using native gravels that have been deposited upstream of one or more dams in the Crooked River basin. Augmented gravels would include round river rock of various sizes that are suitable for Redband Trout, steelhead trout, and Chinook Salmon spawning (0.38 – 5.0 inches in diameter). Approximately 500 cubic yards of gravel would be placed downstream of Bowman Dam (approx. RM 69.5) every 3 years, or as needed to replenish the gravel recruitment pile for the duration of the hydropower license. Downstream gravel mobilization is expected under normal flow conditions.

Gravel augmentation would occur throughout the duration of the FERC license, and funding will be provided by Ochoco Irrigation District, the City of Prineville, and Crook County. The Applicant estimates the expected cost range to be approximately \$265,000 to \$471,000 over 50 years

ODFW is supportive of the proposed mitigation action contingent on the Applicant providing additional information regarding the site-specific need. What is the expected outcome for creation of spawning habitat? For example, how many spawning areas would be created, and how many potential redds could be supported based on minimum redd patch size, appropriate water velocity and depth, and appropriate substrate? The proposal states that, *“Augmenting gravel would increase the amount of quality spawning gravel and habitat area, therefore promoting natural production of these fish. ....Spawning gravel is a limited habitat feature below Bowman Dam and therefore, increasing the amount of gravel supplied to the lower Crooked River will restore this reach to conditions suitable to support spawning populations of Redband Trout, steelhead trout, and Chinook”*. The gravel augmentation description further states, *“This section of the lower Crooked River currently supports a thriving population of native Redband Trout and therefore is a high restoration priority.”*

This statement indicating that this section of the lower Crooked River currently supports a thriving fishery questions as to whether or not the location(s) where the Applicant is proposing to add gravel to the river are appropriate for this mitigation action to occur. There is a need for field investigations to further validate those particular sites where there may actually be a need for additional substrate. This would include work to determine the current amount and embeddedness/quality of any currently available spawning substrate, along with the actual rate of downstream movement of the gravel that currently exists downstream of the dam. ODFW included a study request pertaining to the need to collect this type of information in our June 3, 2019 OID Bowman Dam Hydroelectric Preliminary Application Document/Study Requests letter (ODFW 2019 b). The objective of the proposed study is, in part mapping areas of spawning gravels and assessing their embeddedness as a means of providing a baseline for monitoring actions associated with the proposed Project and potential provide avenues for mitigation.

While it may be appropriate to add spawning substrate material for Chinook Salmon, the need for additional spawning substrate for Redband Trout and steelhead trout at this location needs further confirmation. There are additional questions as to how the 300-500 yd<sup>3</sup> gravel volumes and locations were derived and how these details will relate to improved spawning of target species? As well as how and where will gravels be distributed and how will this action be monitored for efficacy? The Department

sees mitigation value and can support augmenting the spawning substrate concept, yet without a bit more specificity it is hard to support unnecessarily adding gravel/cobble/rock to the system.

Finally, given some of the unanswered questions and lack of specificity, the Department cannot assess the true extent of the proposed benefits from this mitigation action.

## 2. Ochoco Creek Passage

As outlined in the FPW application,

*“The Applicant will contribute \$90,000 in funds to a Crooked River Watershed Council fish passage project on Ochoco Creek downstream of Ochoco Dam, there is a point of diversion (POD) on Ochoco Creek that acts as partial passage barrier to approximately 2.25 miles of NMF habitat. The diversion is located at Prineville Golf Club (PGC), near river mile 9, and is identified in the 2019 Statewide Fish Passage High Priority Barriers as the tenth highest priority artificial obstruction in the Deschutes River basin (#272 of 589 barriers in Oregon). This diversion is a permanent concrete structure with wood flashboards installed seasonally to create an irrigation pond for the golf course (CRWC 2018). The Crooked River Watershed Council is leading a project to install fish passage at the POD at PGC, as well as another privately owned, POD located approximately 0.5 miles upstream. Currently, the project is in the design phase. Passage designs would incorporate input from implementation contractors and would meet Oregon passage design criteria. Contingent on the approval of a Fish Passage Waiver, Ochoco Irrigation District, the City of Prineville, and Crook County will fund the passage project at PGC.*

*The Crooked River Watershed Council estimates that it would cost \$80,000 to implement the passage project at PGC. The applicants will provide a funding contribution of \$90,500 to the project, which will cover the cost of implementation and provide additional funding to go towards passage design and project management. The Crooked River Watershed Council has secured funds for a second passage project approximately 0.5 miles upstream from the mitigation site; both projects will be implemented on the same timeline.”*

*The POD at PGC creates a seasonal barrier to many NMF in Ochoco Creek. Passage completion at PGC, as well as the POD located just upstream, would provide year-round passage and access to 2.25 miles of habitat for Redband Trout, Mountain Whitefish, Bridgelip Sucker and Largescale Sucker, steelhead trout, and spring-run Chinook Salmon. The habitat quality, flows, and water quality are very similar to the lower reaches of Ochoco Creek and can be used by NMF for overwintering, spawning, and rearing*

The Department supports this proposed fish passage measure for its contribution to increasing currently unconnected habitat. As mentioned in the FPW application, the diversion at PGC was recently listed by ODFW as a Fish Passage Priority (2019) and in ODFW’s Middle Columbia River Steelhead Recovery Plan. In conjunction with the additional Crooked River Watershed Council (CRWC) proposed fish passage project 0.5 mile upstream it will open up an additional 2.5 miles of habitat for a total of 2.5 miles of habitat for NMF, particularly Redband Trout and steelhead trout.

The 2018 CRWC), Oregon Watershed Enhancement Board application provided as a background document in the FPW, indicates that the overall \$80,000 to \$90,000 estimated cost for the design and implementation of the Prineville Golf Course passage project seems reasonably accurate.



The description for the proposed passage mitigation project states, “*In accordance with OWEB’s administrative rules, the mitigation site would be monitored for effectiveness and targeted surveys are anticipated. Additionally, the mitigation site would be monitored regularly for the life of the FERC hydropower license to ensure the structure remain free of debris and identify any repairs that may be needed.*” The Department assumes the Applicant is the responsible party implementing the necessary monitoring and any repairs or upgrades to the passage facility to ensure it will continue to effectively pass fish throughout the life of the license.

### **3. Ochoco Preserve Restoration:**

The Applicant is proposing to contribute funding to assist in habitat restoration at the Deschutes Land Trust Ochoco Preserve – a 185-acre stream restoration site at the confluence of Ochoco Creek and the Crooked River.

As described in the FPW application,

*The Crooked River and its tributaries have degraded habitat conditions, including loss of native riparian vegetation, channel diversity, floodplain connection, and bank stability as a result of land use practices. This loss of habitat has impacted NMF, particularly in the section of the Crooked River near Prineville and the lower reaches of Ochoco and McKay creeks. Contingent on the approval of a Fish Passage Waiver, the Applicant would fund \$200,000 in habitat restoration at Ochoco Preserve, a 185- acre property on the Crooked River near the confluences with Ochoco and McKay creeks. The property, which was acquired by the Deschutes Land Trust in 2017, includes river frontage on approximately 0.4 mile on Ochoco Creek, 0.4 mile on McKay Creek, and 0.9 mile on the Crooked River. Restoration at Ochoco Preserve is considered an important step in the reintroduction of anadromous salmonids in the Crooked River basin. A major emphasis of the project would be to create habitat features for spring-run Chinook Salmon and steelhead that are not found elsewhere in the basin. Currently, habitat restoration is in the planning phase, with implementation expected to occur in 2022. Though specific designs for restoration have yet to be completed, it is expected that the project would include efforts to lengthen stream reaches in Ochoco and McKay creeks, restore riparian and upland vegetation, reconnect with floodplain, and increase channel complexity.*

*It includes one mile of the Crooked River, 1/2 mile of Ochoco Creek, and 1/2 mile of McKay Creek, conserving one of the highest value ecological sites on the Crooked River. Ochoco Preserve provides habitat for salmon and steelhead, small mammals, amphibians, and a host of bird species.*

*The Applicant’s \$200,000 contribution to the DLT to be used to help fund the Ochoco Preserve restoration project is significant, and the Department is very supportive and of the DLT’ and its partner’s efforts to restore the Ochoco Preserve Property. The restoration benefits of the river and stream habitats on the DLT property is an important step in the reintroduction of anadromous salmonids in the Crooked River basin, including for Redband Trout, steelhead trout, and spring-run Chinook Salmon.”*

As further indicated in the FPW application,

*“Specific designs for the restoration are not yet completed, although it is expected that the project would include efforts to lengthen stream reaches in Ochoco and McKay creeks, restore riparian and upland vegetation, reconnect with floodplain, and increase channel complexity. Ochoco*

*Irrigation District, the City of Prineville, and Crook County would fund \$200,000 in habitat restoration at Ochoco Preserve. The total cost of restoration at Ochoco Preserve would depend upon the final design for the project, which is still in the planning/design phase. However, it is anticipated that restoration at the preserve would be a multi-million-dollar project. Currently, funding has not yet been secured for the project implementation.”*

The Department believes the proposed DLT Ochoco Preserve restoration as a mitigation measure will be a valuable habitat improvement and will be beneficial to NMF. The Department’s benefit analysis typically accounts for the proportional benefit realized commensurate with the apportioned contribution to the overall cost of the project. At this time, it is unclear what the Applicant’s \$200,000 contribution to the DLT Ochoco Preserve will accomplish on the ground or what their proportional cost of the proposed mitigation action is and the Department cannot assess the true value of extent of the proposed benefits from this mitigation action.

### **SUMMARY**

Providing fish passage at Bowman Dam would:

- Restore fish passage to approximately 498 miles of habitat for Redband Trout, steelhead trout, spring-run Chinook Salmon, Mountain Whitefish and other NMF species.

The Applicant’s proposed fish passage mitigation actions if implemented will:

- Provide potential enhanced salmonid spawning habitat in the Crooked River directly below Bowman dam.
- Contribute to the improvement of .4 mile of stream habitat at the confluence of Ochoco Creek and the Mainstem Crooked River.
- Contribute to the improvement of .4 mile of NMF stream habitat at the confluence of McKay Creek and the Mainstem Crooked River.
- Contribute to the improvement of .9 mile of mainstem Crooked River NMF habitat. at the confluence of Ochoco Creek and the Mainstem Crooked.
- Contribute to the connectivity of additional 2.5 miles of NMF habitat on Ochoco Creek directly below Ochoco dam.

A comparison of miles of NMF habitat requiring mitigation in relation to the estimated miles of mitigation value achieved through the Applicant’s proposed actions is shown in Table 2.

Table 2. Estimated stream miles benefitted by providing fish passage at Bowman Dam and of proposed FPW mitigation actions.

<b>Fish Passage Benefits Fish Passage at Bowman Dam - Miles of Accessible Habitat</b>	<b>Fish Passage at Bowman Dam - Miles of Accessible Habitat</b>	<b>Proposed Waiver Mitigation Actions. Miles of Stream Habitat Benefit below Bowman Dam**</b>	<b>Miles of Stream Habitat Benefit below Bowman Dam**</b>
Mainstem Crooked River and Tributaries	498 mi. Redband Trout	Mainstem Crooked River Gravel Augmentation (not able to estimate based on information provided)	??
Mainstem Crooked River	63 mi. steelhead trout	Ochoco Creek: Ochoco Creek Passage	2.5 miles
Mainstem Crooked River	Chinook Salmon 57 mi.	McKay Creek – DLT Ochoco Preserve Restoration	.4 mile
	Mountain Whitefish ??	Mainstem Crooked River below Prineville (DLT Ochoco Preserve Restoration))	.9 mile
		Ochoco Creek (DLT Ochoco Preserve Restoration)	.4
Total miles* Based on overall extent of newly accessible habitat or restored habitats.	498 mi.	** Each of these actions will benefit Redband Trout, steelhead trout, and Chinook Salmon	4.2 mi.

### CONCLUSION AND RECOMMENDATION

Department staff have analyzed the mitigation package proposed by the Applicant in lieu of constructing fish passage facilities at Bowman Dam. Despite some positive benefits realized downstream of Bowman Dam that would result from the Applicant’s proposed mitigation package, as compared to the benefits of providing upstream passage for NMF the proposed mitigation is deficient. Fish passage at Bowman Dam would provide access to a substantial amount of additional habitat for steelhead trout, spring-run Chinook salmon and Mountain Whitefish. Access to these habitats could lead to increases in Redband Trout abundance and distribution. There would likely be additional genetic and population viability benefits for these species.

Pursuant to the fish passage statutes (ORS 509.580 through 509.585) and Department administrative rules (OAR 635-412-0020 through 0025), Department staff concludes that the measures proposed by Applicant will not provide a net benefit to native migratory fish populations compared to providing fish passage at Bowman Dam. The Department recommends that a fish passage waiver not be granted.

## SOURCES OF INFORMATION

Bureau of Reclamation, February 2010, “Finding of No Significant Impact,” PN FONSI 10-0, Arthur R. Bowman Dam, Safety Dams Modifications Crooked River Project, Pacific Northwest Region, Oregon, <https://www.usbr.gov/pn/programs/ea/oregon/bowman/bowmandameafonsi.pdf>.

Bureau of Reclamation. 1981, “Project Data Book,” A Water Resource Technical Publication, U.S. Water Resource Service (Bureau of Reclamation), Denver, CO. <https://www.usbr.gov/projects/index.php?id=45>.

Bureau of Reclamation, August 2003, “Prineville Reservoir Resource Management Plan,” Pacific Northwest Region, Lower Columbia Area Office, <https://www.usbr.gov/pn/programs/rmp/prineville/rmp-prineville2003.pdf>

Carmichael, R.W., and B.J. Taylor. 2010. Conservation and recovery plan for Oregon steelhead populations in the middle Columbia River steelhead distinct population segment. Prineville, Oregon.

Mount Hood Environmental (MHE). 2020b. Assessment of Native Migratory Fish Habitat in the Upper Crooked River Subbasin. Technical Report Prepared for Ochoco Irrigation District, City of Prineville, and Crook County. 29 pp.

(ODFW a) (Oregon Department of Fish and Wildlife). 2019. Oregon Middle Columbia Steelhead Conservation and Recovery Plan Implementation Report for 2010 – 2016. Prepared by A.W. Averett. Oregon Department of Fish and Wildlife, East Region, La Grande, Oregon

(ODFW b) (Oregon Department of Fish and Wildlife). ODFW Comments OID Bowman Dam Hydroelectric PAD/Study Requests – June 3, 2019

Stuart, A. M., S. L. Thiesfeld, T. K. Nelson, and T. M. Shrader. 1996. Crooked River Basin Plan. Ochoco Fish District. Oregon Department of Fish and Wildlife.

Stuart, A.M., D. Grover, T.K. Nelson, and S.L. Thiesfeld. 2007. Redband Trout Investigations in the Crooked River Basin. Pages 76–91 in R.K. Schroeder and J.D. Hall, editors. Redband Trout: resilience and challenge in a changing landscape. Oregon Chapter, American Fisheries Society, Corvallis.