

# RECLAMATION

*Managing Water in the West*

Finding of No Significant Impact  
Final Environmental Assessment  
Arthur R. Bowman Dam  
Safety of Dams Modifications  
Crooked River Project, Oregon



U.S. Department of the Interior  
Bureau of Reclamation  
Pacific Northwest Region  
Boise, Idaho

February 2010

## U.S. DEPARTMENT OF THE INTERIOR

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

## MISSION OF THE BUREAU OF RECLAMATION

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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# **FINDING OF NO SIGNIFICANT IMPACT**

## **Arthur R. Bowman Dam Safety of Dams Modifications Crooked River Project, Oregon**

**U.S. Department of the Interior  
Bureau of Reclamation  
Pacific Northwest Region**

**PN FONSI 10-01**

### **Introduction**

The Bureau of Reclamation (Reclamation) prepared this Finding of No Significant Impact (FONSI) to comply with the Council on Environmental Quality's regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA). This document briefly describes the proposed action, the alternatives considered, the scoping process, Reclamation's consultation and coordination activities, and Reclamation's finding. The Final Environmental Assessment (EA) fully documents the analyses.

### **Background**

Arthur R. Bowman Dam (Bowman Dam), completed in 1961, is an earthfill structure on the Crooked River located approximately 20 miles upstream from Prineville, Oregon. Bowman Dam impounds the Crooked River to form Prineville Reservoir. Prineville Reservoir is used to store spring snow runoff for release during the irrigation season. The total storage capacity of the reservoir is 154,700 acre-feet.

Reclamation has determined that dam safety deficiencies exist at Bowman Dam. These deficiencies result in Bowman Dam not meeting Reclamation's Guidelines for Achieving Public Protection (Reclamation 2003a). Investigations conducted under Reclamation's Safety of Dams (SOD) Program determined that during a large flood event Bowman Dam would be overtopped by floodwater, potentially causing dam failure. The large flood event in the Bowman Dam area centers on the drainage area above the dam and assumes that an intense storm with heavy precipitation would be focused on the drainage area. The peak discharge of the resulting flows from the precipitation is estimated to significantly exceed the current discharge capacity of the outlet works and spillway.

Failure of Bowman Dam would result in the loss of stored water for irrigation, recreational opportunities, and fish and wildlife resources as well as possible failure of downstream dams, and potential loss of life.

## **Purpose and Need**

The purpose of the proposed action is to correct safety deficiencies at Bowman Dam. The safety deficiencies are the dam's inability to safely pass floodwaters greater than a 3,800-year flood event without failing. A 3,800-year flood event is a flood event that has a 1 in 3,800 chance of occurring in any given year. The need for action is to prevent potential loss of life, property, water storage, and other project benefits due to failure of the dam. Alternatives have been developed that consider the level of risk reduction to the public, constructability, potential environmental impacts, and cost.

## **Alternatives Considered**

The EA addressed two alternatives: Alternative A – No Action and Alternative B – Parapet Wall Construction (proposed action). A No Action alternative is included for comparative analysis purposes.

### **Alternative A – No Action**

Under the No Action alternative, Reclamation would continue to operate Bowman Dam with no improvements to contain floodwaters. The downstream population would continue to live with elevated risk of dam failure during a significant hydrologic event. Reclamation considers this action to be unacceptable for the long-term safety of Bowman Dam and the areas downstream. This action is included in the EA to evaluate effects of the Preferred Alternative to current conditions and as required under NEPA. Overtopping of the spillway walls and potential dam failure is not considered part of the no action.

### **Alternative B – Parapet Wall Construction**

Under Alternative B, Reclamation would construct a 6-foot-high concrete parapet wall on the upstream side of the dam crest and raise a section of the existing spillway walls.

Construction of the concrete parapet wall would provide approximately 30,000 acre-feet of additional emergency or surcharge storage above the dam crest elevation (Figure 1) to protect up to a 21,000-year flood event. The emergency storage would not be used for any additional project benefits; it is solely to contain floodwaters until they can be safely passed through the spillway. In the absence of flood conditions, there would be no changes from current reservoir operations or the capacity of the reservoir at full pool level. The parapet wall would be a 1-foot-thick, 6-foot-high reinforced concrete wall with an 8-foot-wide, 1-

foot-thick footing. The wall would be keyed into the embankment with 1.5-foot concrete key (Figure 2). The parapet wall would reduce the risk and annualized loss of life at Bowman Dam to 30 percent below Reclamation's guidelines.



Figure 1. Alternative B, concrete parapet wall and modified spillway.

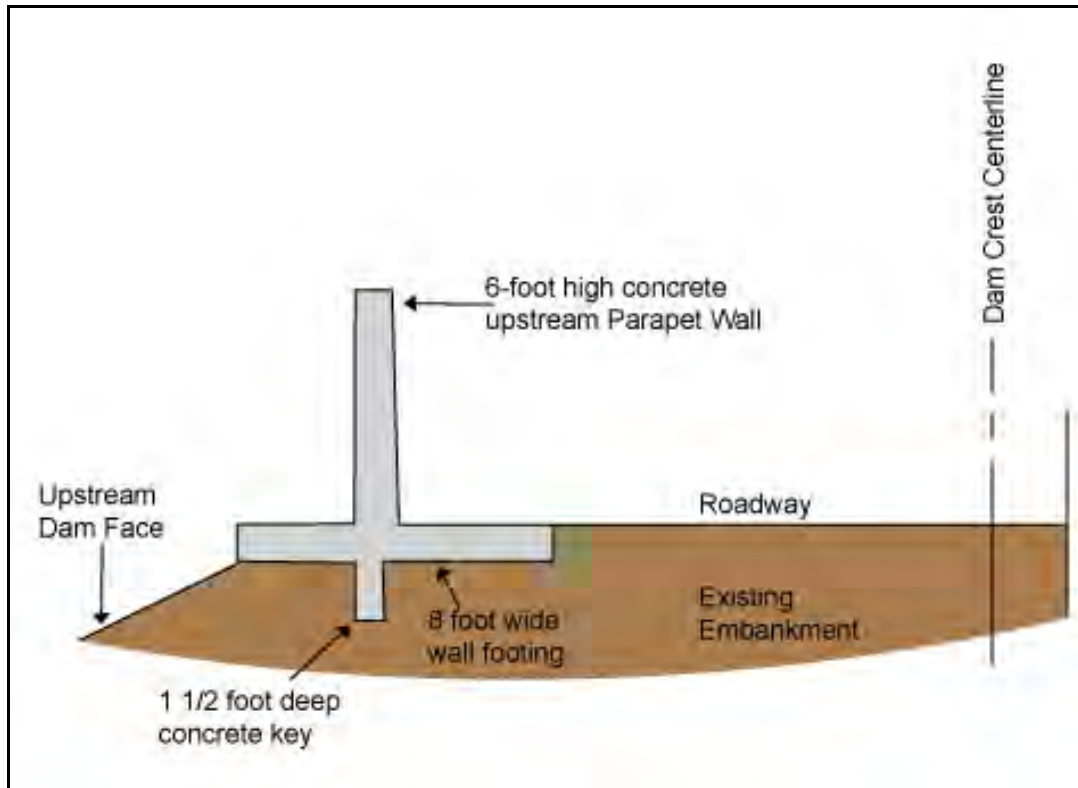


Figure 2. Alternative B, concrete parapet wall section view.

## Recommended Alternative

Reclamation proposes to select Alternative B as the Preferred Alternative, which is a decision to construct a 6-foot-high concrete parapet wall on the upstream side of the dam crest and raise a section of the existing spillway walls.

## Environmental Consequences

The Final EA discusses the affected environment and analyzes the potential environmental impacts of implementing the Preferred Alternative. The resources analyzed include water quality, fish, wildlife, vegetation, threatened and endangered species (terrestrial), transportation, recreation, cultural resources, sacred sites, Indian trust assets, socioeconomics, and environmental justice. Visual resources and public safety were added in response to comments received on the Draft EA.



## **Water Quality**

No changes in water quality from current conditions are anticipated as a result of implementing the Preferred Alternative. Current operation commitments dictate the amount and timing of water delivery to downstream users. These commitments are not expected to change as a result of the parapet wall and the additional emergency storage capacity of the reservoir. Reservoir operations would continue as they have in the past in order to meet water delivery and flood control objectives.

Water quality impacts as a result of construction activities are expected to be negligible. Construction activities would occur at the crest of the dam with the parapet wall being constructed on the upstream side. If water quality impacts were to occur, they would be short term and associated with minor sedimentation or turbidity issues. These issues are typically controlled through the spill prevention, stormwater permit, and construction best management practices. Consequently, there should be negligible water quality impacts associated with the construction of the spillway wall extensions.

## **Fish**

As a result of the Preferred Alternative, a 6-foot-high concrete parapet wall would be constructed on the upstream side of the dam crest providing approximately 30,000 acre-feet of temporary additional emergency storage in case of a large hydrologic event. Due to the infrequency of an event of this magnitude, the reservoir impacts associated with additional temporary pool storage are considered insignificant. No construction-related impacts to aquatic resources would occur under Alternative B. There would be no adverse impacts to aquatic species in Prineville Reservoir and the Crooked River under Alternative B. Standard dam operations would continue and flows would be similar to those released historically from Prineville Reservoir resulting in the Outstandingly Remarkable Values (ORV) of fishery not being affected.

## **Wildlife**

Impacts to wildlife resulting from implementation of the Preferred Alternative would be minimal since the construction would occur in an area generally avoided by wildlife. Short-term noise disturbance from construction activities on the dam and at the Big Bend Campground may affect wildlife, but only for a short period of time until the wildlife acclimate to the disturbance, returning to present levels at the completion of construction.

No impacts would occur to bald eagle nesting sites around Bowman Dam since no trees would be removed. Noise from construction would have little to no impact on eagles since noise levels would be only slightly above normal ambient levels (i.e., vehicular traffic, boats).

## **Vegetation**

Under the Preferred Alternative, construction of the parapet wall would occur on top of the dam where none, or minimal vegetation is present. Staging in the Big Bend Campground would occur on graveled or paved areas where vegetation is non-existent; therefore, no adverse impact to vegetation is expected to occur. The undesirable vegetation on the upstream side of Bowman Dam would most likely be removed during construction.

## **Threatened and Endangered Species (Terrestrial)**

No impacts to terrestrial threatened or endangered species would occur since no species are listed in the project area. No impacts should occur to the Columbia spotted frog, a candidate species, if it occurs in the area of Bowman Dam, since construction activities would not be occurring within the habitat of the species.

## **Transportation**

Under the Preferred Alternative, one lane of Oregon State Highway (OR) 27 across the dam would be closed during construction of the parapet wall. Traffic through this section would most likely be controlled by metering lights until completion of the project. Congestion resulting from the proposed action due to construction would be short-term, thereby minimizing the potential for impacts. Access to the reservoir via the Alfalfa Market and Reservoir roads from the Bend area would not be altered and recreational traffic would not be impacted by construction activities. Normal traffic flow across the dam would resume upon completion of the project.

Because of the rural location of the dam and the low vehicle count on the highway, congestion from the increase in construction traffic would be minimal. Compliance with all Federal and State requirements for transport of oversize loads would ensure there are no significant adverse transportation impacts. All roadway activities and roadway designs would be coordinated with and approved by the Oregon Department of Transportation (ODOT). All roadway users must obey all applicable traffic laws and signage will be posted to notify roadway users of construction activities. Construction activities would take place during normal business hours Monday through Friday, resulting in little or no congestion from construction equipment during the evening hours and on weekends.

There would be no long-term impacts to traffic associated with Alternative B

## **Recreation**

Under Alternative B, the Big Bend Campground would be used as the contractor staging area. Recreation users seeking overnight and day-use accommodations at the campground would continue to be able to use the campground and day-use facilities. Access would be limited in the upstream area where the contractor staging area would be located. The

contractor would have work hours limited to Monday through Friday, thereby reducing disturbances and interaction with weekend users at Big Bend Campground. Weekday users of Big Bend Campground may encounter some disturbance during normal work hours but this would be limited and would only be temporary. Public notification would define the contractor staging area, restrictions for safety concerns, normal work hours, and alternative overnight accommodations available at Poison Butte, Post Pile, Cobble Rock, Chimney Rock, Palisades, Lone Pine, Stillwater, and Castle Rock campgrounds along the Lower Crooked Wild and Scenic River. Given that there are other access points for recreation available and that the campground would not be closed to the public for use, there would be no significant impacts to recreation under the Wild and Scenic Designation.

## **Visual Resources**

Under Alternative B, the view from the top of the dam downstream would not be affected. The two parking areas on the sides of the dam would still be available for people to pull off the road and view the downstream side of the dam. The 6-foot high parapet wall would eliminate the view of the reservoir from the top of the dam. The turnouts south of the dam on OR 27 would continue to provide viewing opportunities of the reservoir and surrounding areas.

The viewshed in the Wild and Scenic River corridor would not be altered and the ORVs would not be affected by the Preferred Alternative. The parapet wall would be marginally visible to people who are viewing the dam from the river corridor or from the reservoir. It is estimated that approximately 4 feet of the wall would be visible from a ½-mile downstream from the dam. From this distance, the 4-foot section of the parapet wall would be very difficult to distinguish on top the 245 foot dam. The view for reservoir users would change for the 800 foot length of the dam but would not change the view of the remaining shoreline.

There would be the need for temporary offices, signage, fences, and flagging in the contractor staging area and on the roadways. These items may temporarily change the viewshed in and around the project area. Upon project completion, all signage, offices, fences, and flagging will be removed.

## **Public Safety**

Under Alternative B, Reclamation would construct a 6-foot-high concrete parapet wall on the upstream side of the dam crest which would provide approximately 30,000 acre-feet of additional emergency storage. This additional emergency and temporary storage would contain a 21,000-year flood event long enough for the water to recede and the flood event to pass. This alternative meets the SOD criteria for protection of life and property.

The construction staging area would be located in the Big Bend Campground and surrounding fencing would be required to secure the contractor's materials and equipment from the public. The contractor would be responsible for posting the appropriate signage, in

the contractor staging area, on all roadways affected by the project, and in and around the construction site notifying the public of safety issues, restricted access, and roadway limitations.

## **Cultural Resources**

As confirmed by the Oregon State Historic Preservation Office (SHPO) in a letter dated September 3, 2009 and by the Oregon State Archaeologist on September 22, 2009 (Appendix C of the Final EA), the proposed project undertakings results in a determination of *No Effect* to historic properties. Therefore, the Preferred Alternative would have no effect on any known cultural resources as no historic properties would be affected. No further considerations concerning the cultural significance of the dam are required.

The Big Bend Campground would be used as a construction staging area, all equipment and materials would need to be confined to the developed campsites and graveled parking areas to avoid impacting the concrete foundation and potential site(s) identified by the Regional Archaeologist in 1990. If avoidance is not possible, subsurface probes will be excavated to determine if subsurface cultural deposits are present, and consultation with the Oregon SHPO and other interested parties, will be undertaken.

## **Culturally-sensitive Plants**

While there are culturally important plants located adjacent to the area of potential effect, they would not be impacted by construction activities associated with the Preferred Alternative. The slope where the plants are growing is too steep for staging of equipment or materials.

## **Indian Sacred Sites**

Indian sacred sites are unlikely to be present in potential areas along the toe of the dam or at the Big Bend Campground because of extensive disturbance to those locations during dam construction and recreational improvements. Therefore, the Preferred Alternative will result in no impacts to sacred sites.

## **Indian Trust Assets**

Under the Preferred Alternative, there would be no impacts on Indian Trust Assets (ITAs) since no known ITAs have been identified in the project area.

## **Socioeconomics**

Under the Preferred Alternative, the majority of the construction work performed would be completed by contractor workforces. The construction would take approximately 6 months and about 10 workers would be employed.

It is likely construction materials would be purchased locally in Prineville potentially creating additional employment opportunities. Additionally, the construction workforce would be from local sources if not regional. The majority of the output, employment, and income impacts would be from the expenditures of the wages earned by the workforce involved in construction activities, including the local workforce used to provide materials. Creation of jobs and any expenditure related to the project would most likely result in an economic benefit.

## **Environmental Justice**

No adverse natural resource or socioeconomic impacts adversely affecting minority and low-income populations have been identified; therefore, there would be no impacts to environmental justice.

## **Cumulative Effects**

Reclamation has assessed past, present, and reasonably foreseeable future projects in the Bowman Dam area for significant cumulative effects. Reclamation's most recent EAs conducted in the Prineville Reservoir area, the Powder House Cove Expansion and the Prineville Reservoir Resource Management Plan, have resulted in a FONSI. The FONSI and the absence of any reasonably foreseeable projects in the Prineville Reservoir area support the conclusion that the Safety of Dams modifications at Bowman Dam would not result in a significant cumulative impact. No projects are scheduled to take place in the project area, presently or in the reasonably foreseeable future. Although the Federal Energy Regulatory Commission (FERC) has received two applications for license to construct a hydroelectric facility at Bowman Dam, these projects are highly unlikely to take place in the reasonably foreseeable future or during the implementation period of this project and were not analyzed for cumulative effects in this EA. Reallocation of the stored water in Prineville Reservoir has been an ongoing issue and would take Congressional authority to accomplish. Due to the lengthy process involved in reallocation, it is also unlikely to take place in the foreseeable future and therefore, was not analyzed for cumulative effects.

## **Consultation and Coordination**

### **Agency Consultation**

The following agencies were consulted in the preparation of this EA:

- Bureau of Land Management (BLM)
- NOAA Fisheries
- Oregon Department of Environmental Quality (DEQ)
- Oregon Department of Fish and Wildlife (ODFW)

- Oregon SHPO
- Oregon Parks and Recreation Department (OPRD)
- Oregon Water Resources Department (OWRD)
- U.S. Fish and Wildlife Service (USFWS)

### ***Endangered Species Act Section 7(a)(2)***

The Endangered Species Act (ESA) requires all Federal agencies to ensure that their actions do not jeopardize the continued existence of listed species or destroy or adversely modify their critical habitat. A list of species that may be present in Crook County, Oregon and are listed under the ESA was obtained from the USFWS web site. However, since none of the listed species occurs in the specific project area, consultation was not initiated.

### ***National Historic Preservation Act Consultation***

In compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended in 1992), Reclamation consulted with the Oregon SHPO to identify cultural and historic properties in the area of potential effect. In a letter dated September 3, 2009, SHPO concurred that the property is not eligible for the NRHP in accordance with 36 C.F.R. Part 60.4 and no historic properties would be affected (Appendix C of the Final EA). In a subsequent letter dated October 8, 2009, the Oregon State Archaeologist agreed that the project will have no effect on any known cultural resources and concurred with the determination of Not Eligible for the historic site located at Big Bend Campground (Appendix C of the Final EA).

### ***National Wild and Scenic Rivers Act***

The National Wild and Scenic Act of 1968 established procedures for protecting outstanding free flowing rivers. The National Wild and Scenic Act require a river to be free flowing and possess one or more ORVs. Congress or the Secretary of the Interior can designate a river and each river is administered by either a State or Federal agency. The Act encourages protective management and enhancement of the values that were the basis of the designation.

A Memorandum of Understanding (MOU) concerning the NEPA process and development of this EA was entered into between BLM and Reclamation. Under this agreement, BLM provided technical information and assistance related to lands which they manage in the general project area. Additionally, BLM provided a review of both the draft and final EA. The MOU does not include a decision by BLM as they do not have a specific Federal action. BLM and Reclamation signed the 1992 Wild and Scenic River Management Plan; subsequently, both agencies share Wild and Scenic River management responsibilities for the Crooked River.

## **Tribal Coordination and Consultation**

A scoping letter was sent to the Confederated Tribes of Warm Springs to involve and address any questions or concerns related to the proposed action. The letter also requested that the tribe inform Reclamation of any Indian Sacred Sites located on or in the vicinity of the project area. No indication was received from the tribe regarding the existence of sacred sites or if they had comments or concerns on the proposed action. Therefore, no further consultation is warranted.

## **Public Comment Summary and Changes to the Final Environmental Assessment**

Reclamation issued a Draft EA for public comment in November 2009. Comment letters were submitted by the USFWS, Central Oregon Flyfishers, Oregon DEQ, ODFW, Native Fish Society, Association of Northwest Steelheaders, the BLM, and two private citizens. The comments were largely in support of the project; however, some comments received included:

- Consideration of measures to address fish passage at the dam, turbidity, and total dissolved gas (TDG) effects in the Crooked River below Bowman Dam.
- Preparation of a Feasibility Study and Environmental Impact Statement (EIS) to evaluate Safety of Dams alternatives and other issues at Bowman Dam, including hydroelectric facilities, unallocated storage, flow augmentation, and release structure upgrades.
- Modification of the existing rule curve for reservoir operations and use the unallocated storage to improve streamflows in the Crooked River for ESA purposes.
- Provision of possible flow augmentation to meet in-stream water needs.
- Consideration of having an independent review of the parapet wall alternative as it is considered a marginal solution and the language used to define flood events, 3,800 year and 21,000 year events, is misleading and should not be used.

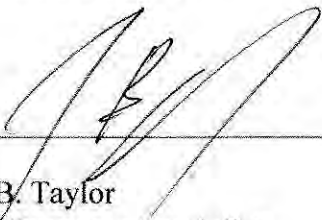
Most of the above issues and concerns cannot be addressed under the proposed action because they are outside the scope of the SOD program. SOD project funds can only be used to correct safety deficiencies and cannot be used for other purposes or to provide any additional benefits. As part of the SOD process, the parapet wall alternative was evaluated in a risk analysis study, by a consultant review board, and by the irrigation district and their consultant and was determined to be an adequate alternative. Language used to describe flood events is given in Reclamation's Public Protection Guidelines (Reclamation 2003a) and refers to the probability of a flood event happening in any given year. Where appropriate, the Final EA has been revised to reflect public and agency comment concerns. Reclamation did

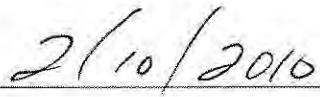
incorporate editorial revisions to clarify aspects of the document and to ensure accuracy. The comment letters are included as an attachment to this FONSI and Final EA as Appendix F.

## Finding

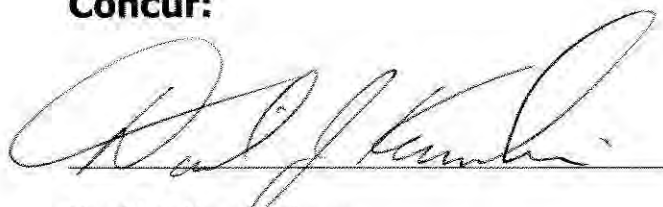
Based on a thorough review of the comments received, analysis of the environmental impacts as presented in the Final EA, Section 106 consultation under NHPA, and coordination with various agencies, Reclamation has concluded that implementation of the Preferred Alternative will have no significant impacts on the quality of the human environment or natural resources. Reclamation, therefore, concludes that preparation of an EIS is not required, and that this FONSI satisfies the requirements of NEPA. Reclamation will issue a Final EA reflecting revisions made to address public comments.

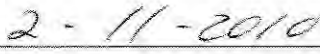
## Recommended:

  
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James B. Taylor  
Natural Resource Specialist

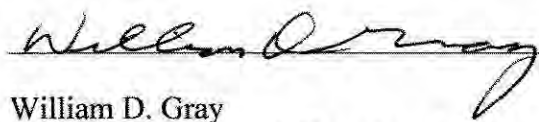
  
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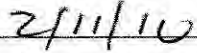
## Concur:

  
\_\_\_\_\_  
David J. Kaunheimer  
Environmental Program Manager

  
\_\_\_\_\_  
Date

## Approved:

  
\_\_\_\_\_  
William D. Gray  
Columbia Cascades Office, Area Manager

  
\_\_\_\_\_  
Date



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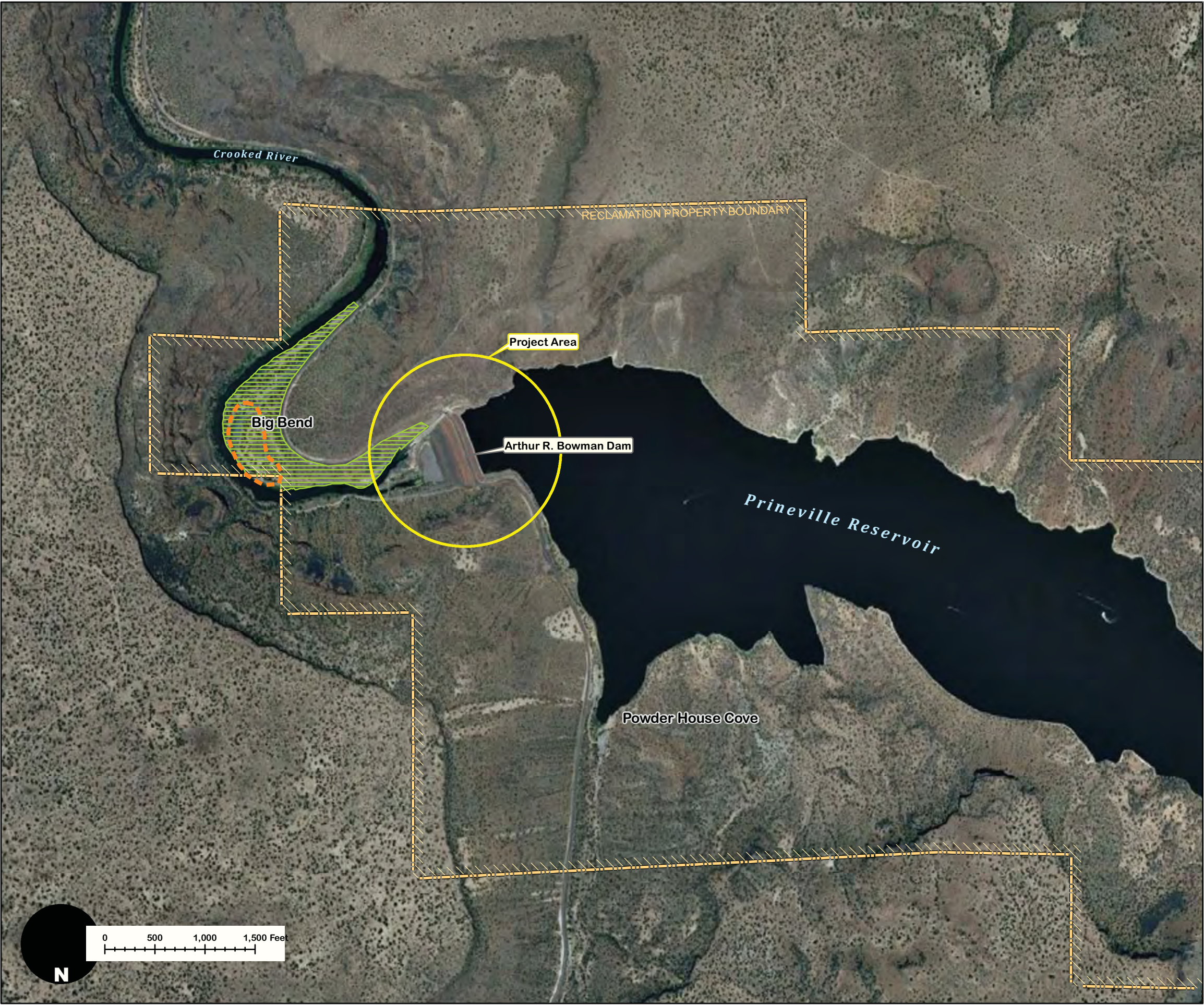


U.S. Department of the Interior  
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Boise, Idaho

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# Arthur R. Bowman Dam General Location

**Area Statistics**  
Reclamation Project: Crooked River  
Reservoir: Prineville  
Crest Elevation of Dam: 3,264 ft.

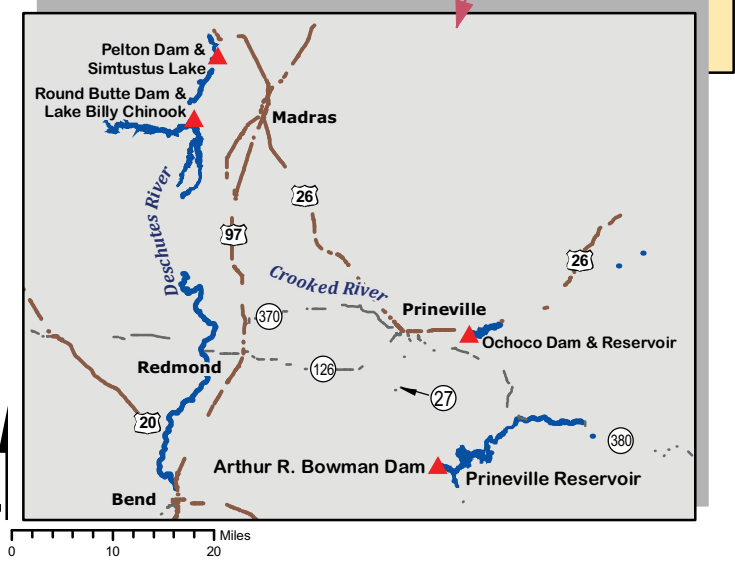
**Area Overview Legend**

- Reclamation Property Boundary
- Recreation Area Managed by Bureau of Land Management
- Contractor Staging Area

**Location Information & Directions**

The Arthur R. Bowman dam is located in central Oregon, south of Prineville.

The primary access to the site is Oregon State Highway 27 off of U.S. Highway 26.



**Disclaimer:** This map is intended for general informational and planning purposes only. It is not intended to be used for descriptive or authoritative definition of location or legal boundary. The Bureau of Reclamation makes no warranty, expressed or implied, as to the completeness, accuracy, or utility of these data and will in no event be liable for their use or mis-use.

**Data Sources:** Bureau of Reclamation Geospatial Data Library, ESRI.

**Prepared by:** Bureau of Reclamation, Pacific Northwest Region GIS, January 2010.  
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# Acronyms and Abbreviations

7Q10	7-day, 10-year frequency flood
ACHP	Advisory Council on Historic Preservation
Act	Reclamation Safety of Dams Act
ADA	American with Disabilities Act
BLM	U.S. Bureau of Land Management
CCC	Civilian Conservation Corps
CFR	Code of Federal Regulations
cfs	cubic feet per second
CTWSR	Confederated Tribes of the Warm Springs Reservation
CWA	Clean Water Act
DEQ	Department of Environmental Quality
EA	Environmental Assessment
EAP	Emergency Action Plan
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FONSI	Finding of No Significant Impact
ITAs	Indian Trust Assets
lbs	pounds
M&I	municipal and industrial
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA Fisheries Service	NOAA's National Marine Fisheries Service
NRHP	National Register of Historic Places
OAR	Oregon Administrative Rules
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OED	Oregon Employment Department

O&M	operation and maintenance
OPRD	Oregon Parks and Recreation Department
OR 27	Oregon State Highway 27
ORV	Outstandingly Remarkable Values
PGE	Portland General Electric
PMF	probable maximum flood
Reclamation	U.S. Bureau of Reclamation
RMP	Resource Management Plan
SHPO	State Historic Preservation Office
SOD	Safety of Dams
TDG	Total dissolved gas
TMDL	Total Maximum Daily Load
USFWS	U.S. Fish and Wildlife Service

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# **Chapter 1    PURPOSE AND NEED**

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## **1.1      Introduction**

The U.S. Bureau of Reclamation (Reclamation) has determined that dam safety deficiencies exist at the Arthur R. Bowman Dam (Bowman Dam). Investigations conducted under Reclamation's Safety of Dams (SOD) Program determined that during a large flood event Bowman Dam would be overtopped by floodwater, potentially causing dam failure. The large flood event in the Bowman Dam area centers on the drainage area above the dam and assumes that an intense storm with heavy precipitation would be focused on the drainage area. The peak discharge of the resulting flows from the precipitation is estimated to significantly exceed the current discharge capacity of the outlet works and spillway.

Failure of Bowman Dam would result in the loss of stored water for irrigation, recreational opportunities, and fish and wildlife resources as well as possible failure of downstream dams, and potential loss of life.

This Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) and analyzes the potential environmental impacts of correcting the safety deficiencies at Bowman Dam.

## **1.2      Purpose and Need for Action**

The purpose of the proposed action is to correct safety deficiencies at Bowman Dam. The safety deficiencies are the dam's inability to safely pass floodwaters greater than a 3,800-year flood event without failing, which does not meet Reclamation's Guidelines for Achieving Public Protection (Reclamation 2003a). A 3,800-year flood event is a flood event that has a 1 in 3,800 chance of occurring in any given year. The need for action is to prevent potential loss of life, property, water storage, and other project benefits due to failure of the dam. Alternatives have been developed that consider the level of risk reduction to the public, constructability, potential environmental impacts, and cost.

## 1.3 Location and Background

Bowman Dam (formerly Prineville Dam) is an earthfill structure on the Crooked River approximately 20 miles upstream from Prineville, Oregon (Frontispiece). Completed in 1961, Bowman Dam has a structural height of 245 feet and a crest length of 800 feet at an elevation of 3264 feet.

Bowman Dam impounds the Crooked River to form Prineville Reservoir. The total storage capacity of the reservoir is 154,700 acre-feet. The spillway and outlet works are located on the right abutment of the dam. When combined, the release capacity of the outlet works (3,300 cubic feet per second (cfs)) and the spillway (8,120 cfs) is 11,420 cfs.

Prineville Reservoir is used to store spring snow runoff for release during the irrigation season. The drainage area for the Crooked River above Bowman Dam is roughly 2,635 square miles. Reclamation SOD studies have concluded that a probable maximum flood (PMF) in the drainage area could result in overtopping of the dam. A PMF is defined as a flood that may be expected from the most severe combination of meteorological and hydrologic conditions that could reasonably occur in the area. For the drainage area above Bowman Dam, a 1984 study determined the PMF would result in a peak flow of 268,000 cfs and would have a total volume of 1,034,000 acre-feet for a 15-day event. Reclamation's Modification Decision Analysis in 1987 determined that a flood greater than 22 percent of the PMF, peak flow of 61,640 cfs, and a 15-day volume of 238,000 acre-feet, would result in overtopping of the dam. Bowman Dam does not have the capacity to store or pass through flows larger than this magnitude. Based on current methodology, an overtopping event would be equivalent to a 3,800-year flood event.

## 1.4 Authority

Bowman Dam and Prineville Reservoir are a part of Reclamation's Crooked River Project. The Crooked River Project was authorized by Congress on August 6, 1956 under Public Law 84-992. The construction of Bowman Dam was authorized as part of the Crooked River Project. The authorized purposes of the dam and reservoir are flood control, irrigation storage, and fish and wildlife. The authorizing act was amended in 1959 to extend the Crooked River Project by increasing the land receiving water, and again in 1964 to permit construction of additional irrigation facilities (Public Law 88-598).

In 1978, Congress passed the Reclamation Safety of Dams Act (Act). The Act provided a means to fund the correction of safety problems at Reclamation dams. In 1984, Congress amended the Act to provide additional funding, but also added a requirement for 15 percent cost sharing by authorized project beneficiaries such as irrigation, hydropower, and

municipal and industrial (M&I). The Act was further amended in 2000, 2002, and again in 2004, mostly for additional funding authority.

## **1.5 Cooperating Agencies**

A Memorandum of Understanding (MOU) concerning this EA was entered into between the U.S. Bureau of Land Management (BLM) and Reclamation (Appendix A). The agencies agreed to cooperate in the NEPA process and development of an EA. Under the agreement, BLM will provide technical information and assistance related to lands which they manage in the general project area and conduct a review of the draft and final EA. The MOU does not include a decision for BLM to make for this NEPA process, since they do not have a specific Federal action. BLM and Reclamation signed the 1992 Wild and Scenic River Management Plan. Both agencies share Wild and Scenic River management responsibilities for the Crooked River.

## **1.6 Scoping**

Scoping requirements under the NEPA includes requesting input from the public and interested parties. Scoping allows the public to help identify issues or concerns related to the project. These issues were considered in the development of the EA.

A public scoping period was held for the EA from July 6, 2009 to August 3, 2009. A statement was released to the media and over 100 letters were sent notifying the public and interested parties of the intent to prepare the EA. The letter included the information on the project, the scoping period duration, comment submittal instructions, and scoping meeting information (Appendix B). A public scoping meeting was held on July 21, 2009 in Prineville, Oregon at the Crook County Fairgrounds Carey Foster Hall. During the meeting, the project need, history, a NEPA overview, and the proposed action were presented and discussed.

Two letters were received during the scoping period. The letters are included in Appendix B. Concerns raised in the letters were a request to provide fish passage and to provide a structural solution to the total dissolved gas problem below the dam. Both of these issues are outside the scope of this EA.

## **1.7 Other Related Actions or Activities**

The Prineville Reservoir and adjacent lands have become increasingly important recreation sites over the years. The city of Prineville is the primary gateway to the reservoir, but access

from the city of Bend has greatly improved with the recent (2001) county upgrade of the Alfalfa Market Road. A Resource Management Plan (RMP) was developed by Reclamation in 1992 and updated in August 2003 to assist with the overall management of Prineville Reservoir due to the increase of recreational use at the reservoir. In 1987, Reclamation entered into a 20-year agreement with Oregon Parks and Recreation Department (OPRD) to manage recreation at Prineville State Park. In 1995, this agreement was amended to include all land and water at Prineville Reservoir with a 50-year lease to expire in 2037. In 2004, OPRD and BLM entered into an agreement for BLM to manage the Big Bend Campground. A concessionaire agreement between Reclamation and a private party to operate at the 190-acre Prineville Reservoir Resort was signed in 1986. Reclamation is currently in the process of negotiating a new agreement. In 1962, Oregon Department of Fish and Wildlife (ODFW) entered into a license agreement with Reclamation to manage the upper end of the reservoir as a State Wildlife Area.

## **1.8 Regulatory Compliance**

Various laws, Executive Orders, and Secretarial Orders apply to the proposed action and are summarized below. The legal and regulatory environment within which the Federal activity would be conducted depends on which alternative is implemented.

### **1.8.1 National Environmental Policy Act**

NEPA requires that the action agency use a public disclosure process to determine whether or not there are any environmental impacts associated with proposed Federal actions. If there are no significant environmental impacts, a Finding of No Significant Impacts (FONSI) can be signed to complete the NEPA compliance.

### **1.8.2 Endangered Species Act**

The Endangered Species Act (ESA) requires all Federal agencies ensure that their actions do not jeopardize the continued existence of listed species, destroy, or adversely modify their critical habitat. As part of the ESA's Section 7 process, an agency must request information from the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NOAA Fisheries Service) on whether any threatened and endangered species occur within or near the action area. The agency then must evaluate impacts to those species. If the action may affect any listed species, the agency must consult with the USFWS or NOAA Fisheries Service.



### **1.8.3 National Historic Preservation Act**

The National Historic Preservation Act (NHPA) of 1966, as amended, requires that Federal agencies consider the effects that their projects have on properties eligible for or on the National Register of Historic Places. The 36 CFR 800 regulations provide procedures that Federal agencies must follow to comply with the NHPA. For any undertaking, Federal agencies must determine if there are properties of National Register quality in the project area, the effects of the project on those properties, and the appropriate mitigation for adverse effects. In making these determinations, Federal agencies are required to consult with the State Historic Preservation Office (SHPO), Native American tribes with a traditional or culturally-significant religious interest in the study area, the interested public, and in certain cases, the Advisory Council on Historic Preservation (ACHP).

### **1.8.4 National Wild and Scenic Rivers Act**

The National Wild and Scenic Rivers Act of 1968 established procedures for protecting outstanding free flowing rivers. The National Wild and Scenic Rivers Act require a river to be free flowing and possess one or more Outstandingly Remarkable Values (ORV). Congress or the Secretary of the Interior can designate a river and each river is administered by either a State or Federal agency. This Act encourages protective management and enhancement of the values that were the basis of the designation.

### **1.8.5 Executive Order 13007: Indian Sacred Sites**

Executive Order 13007, dated May 24, 1996, instructs Federal agencies to promote accommodation of access to and protect the physical integrity of American Indian sacred sites. A “sacred site” is a specific, discrete, and narrowly delineated location on Federal land. An Indian tribe or an Indian individual determined to be an appropriately authoritative representative of an Indian religion must identify a site as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion. However, this is provided that the tribe or authoritative representative has informed the agency of the existence of such a site.

### **1.8.6 Executive Order 12898: Environmental Justice**

Executive Order 12898, dated February 11, 1994, instructs Federal agencies, to the greatest extent practicable and permitted by law, make achieving environmental justice part of its mission by addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low income populations. Environmental justice means the fair treatment of people of all races, income, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and

policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative environmental impacts resulting from the execution of environmental programs.

### **1.8.7 Secretarial Order 3175: Department Responsibilities for Indian Trust Assets**

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States (with the Secretary of the Interior acting as trustee) for Indian tribes or Indian individuals. Examples of ITAs are lands, minerals, hunting and fishing rights, and water rights. In many cases, ITAs are on-reservation; however they may also be found off-reservation.

The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or Indian individuals by treaties, statutes, and executive orders. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that officials from Federal agencies, including Reclamation, take all actions reasonably necessary to protect ITAs when administering programs under their control.

## **Chapter 2 DESCRIPTION OF ALTERNATIVES**

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### **2.1 Introduction**

The proposed action is to correct the safety deficiencies at Bowman Dam. These deficiencies result in Bowman Dam not meeting Reclamation's Guidelines for Achieving Public Protection (Reclamation 2003a). This chapter presents the following alternatives being considered for the SOD modification:

- Alternative A – No Action
- Alternative B – Parapet Wall Construction (Preferred Alternative)

### **2.2 Alternative A – No Action**

Under the No Action alternative, Reclamation would continue to operate Bowman Dam with no improvements to contain floodwaters. The downstream population would continue to live with elevated risk of dam failure during a significant hydrologic event. Reclamation considers this action to be unacceptable for the long-term safety of Bowman Dam and the areas downstream. This action is included in the EA to evaluate effects of the Preferred Alternative relative to current conditions. Overtopping of the spillway walls and potential dam failure is not considered part of the no action.

### **2.3 Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, Reclamation would construct a 6-foot-high concrete parapet wall on the upstream side of the dam crest and raise a section of the existing spillway walls. Construction of the 6-foot-high concrete parapet wall on the upstream side of the dam crest would provide approximately 30,000 acre-feet of additional emergency or surcharge storage above the dam crest elevation (Figure 1) to protect up to a 21,000-year flood event. The emergency storage would not be used for any additional project benefits; it is solely to contain floodwaters until they can be safely passed through the spillway. In the absence of flood conditions, there would be no changes from current reservoir operations or the capacity of the reservoir at full pool level. The parapet wall would be a 1-foot-thick, 6-foot-high reinforced concrete wall with an

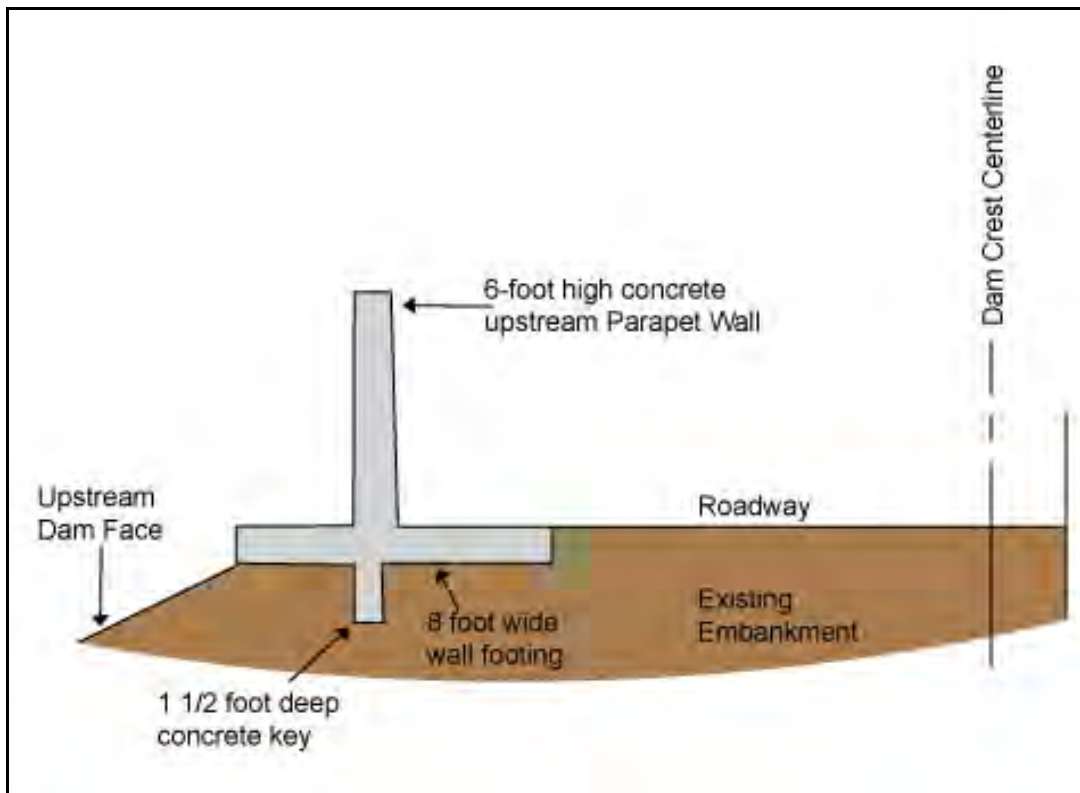
### 2.3 Alternative B – Parapet Wall Construction (Preferred Alternative)

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8-foot-wide, 1-foot-thick footing. The wall would be keyed into the embankment with 1.5-foot concrete key (Figure 2).



**Figure 1. Alternative B, concrete parapet wall and modified spillway.**

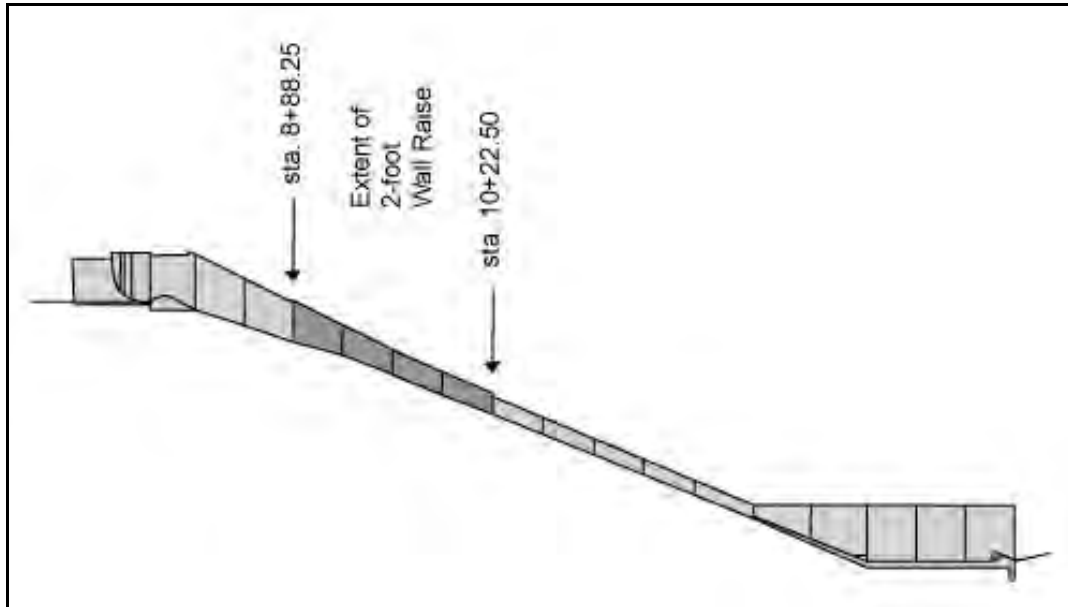


**Figure 2. Alternative B, concrete parapet wall section view.**

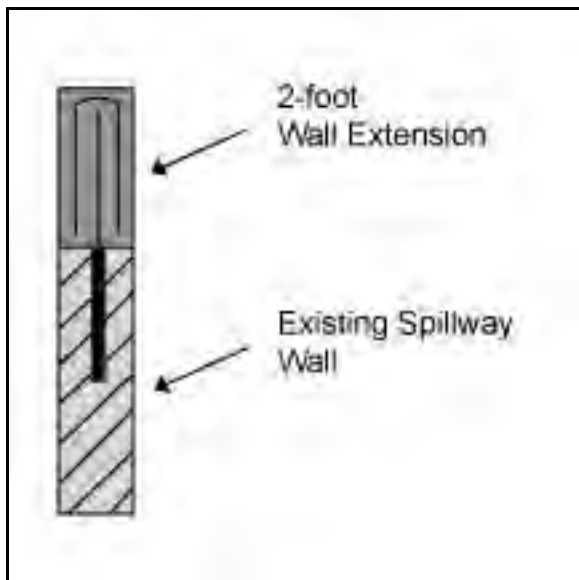
The concrete parapet wall would be keyed into the rock of the right abutment and would extend along the upstream face of the dam to the left end of the embankment. The Oregon State Highway (OR 27) that crosses the crest of the dam would be raised at the left end of the embankment to the elevation of the top of the concrete parapet wall to provide a complete cutoff of the reservoir up to elevation 3270.0 feet. The parapet wall would reduce the risk and annualized loss of life at Bowman Dam to 30 percent below Reclamation's guidelines. Big Bend Campground downstream of Bowman Dam will be used as a staging area for construction activities. The contractor staging area would be the upper portion of the campground. The campground would remain open during the construction period, which is estimated to be from May through October. Construction would be limited to Monday through Friday during normal business hours. The contractor will post signage detailing work hours. The contractor would be responsible for fencing and securing the staging area to provide a measure of safety for campground users.

The capacity of the spillway would increase from 8,120 cfs at elevation 3257.9 feet to about 14,000 cfs at the top of the proposed parapet wall. Studies of the existing spillway indicate that at reservoir levels near the top of the proposed parapet wall, the uncontrolled flow through the existing spillway would overtop the spillway walls along a 134-foot section of

the spillway (Figure 3). In order to prevent the flows from overtopping the spillway walls, a 2-foot reinforced concrete extension would be constructed on both walls along the 134-foot section (Figure 4). Construction of these extensions would be completed in the spillway using scaffolding to set the forms. The concrete would be poured from the top of the dam using a concrete pump truck.



**Figure 3. Alternative B, modification to the existing spillway wall.**



**Figure 4. Alternative B, side view of the modifications to the existing spillway wall.**

## **2.4 Alternatives Eliminated from Further Study**

### **2.4.1 Reservoir Restriction**

A reservoir restriction alternative was not carried forward because it would not provide adequate risk reduction to achieve estimated risk below the Reclamation SOD guidelines; thereby, not meeting the purpose and need for the project. A reservoir restriction alternative would provide additional flood storage in the reservoir to accommodate a portion of the inflow during a remote flood event and subsequently reduce the probability that the dam would be overtopped and fail. Flood volumes in the range of 377,710 to 439,890 acre-feet with a return period of 50,000 years were determined for the Prineville Reservoir watershed and subsequently used for hydrologic analysis. The active capacity of Prineville Reservoir is 152,800 acre-feet. Due to the large size of the watershed upstream of the reservoir (2,635 square miles), the additional flood storage realized by implementing a reservoir restriction would be small relative to the potential size of remote inflow floods. Studies document the resulting risk reduction of a reservoir restriction of 25,000 acre feet (approximately 16 percent of active capacity) in conjunction with operational and structural actions. The risk reduction was documented to be minimal for all analyzed combinations of actions, each of which included the 25,000 acre-foot reservoir restriction.

### **2.4.2 Dam Breach**

The dam breach alternative was not carried forward because this alternative would eliminate project benefits, causing the loss of flood control and thereby, not meet the purpose and need of the project. Under the dam breach alternative, Prineville Reservoir would be drained, the dam would be breached to prevent storage, and OR 27 would be reconstructed including construction of a new bridge over the Crooked River. The dam breach alternative would result in the loss of all irrigation, recreation, flood control, and fish and wildlife project benefits. Draining of Prineville Reservoir would permanently expose approximately 3,000 acres of silted reservoir land which would require rehabilitation in order to mitigate the adverse environmental impacts. The abandonment of agricultural land caused by the loss of irrigation benefits would also have adverse environmental impacts. Environmental impacts of the magnitude resulting from this alternative would require preparation of an Environmental Impact Statement (EIS) to comply with NEPA. Due to the loss of flood control benefits, the downstream flood plain would be subject to more frequent and greater intensity flooding.

### 2.4.3 Tunnel Spillway

The tunnel spillway alternative was not carried forward due to the high cost versus the low reduction of risk and the potential for significant negative impact; thereby, not meeting the purpose and need of the project. The tunnel spillway would be constructed through the right abutment of the dam and would include a concrete circular drop inlet structure, a 20-foot-diameter concrete-lined tunnel, and a concrete dispersion flip bucket located at the tunnel outlet portal. The 6-foot-high concrete parapet wall and the raising of a portion of the existing spillway walls, as identified in the Preferred Alternative, would also be constructed as part of this alternative. There are no lost authorized benefits under this alternative for irrigation, recreation, flood control, or fish and wildlife. Completion of the new tunnel spillway through the right abutment and the parapet wall on the upstream side of the dam crest would reduce the risk at Bowman Dam to a level of at least one order of magnitude below Reclamation's SOD guidelines. The construction of the new tunnel spillway and parapet wall would not impact the operation of the reservoir for irrigation or recreation. There may be minor impacts to flood control during construction which may require additional flood storage space in the event of anticipated high runoff. Construction would require partial closure of the OR 27 that crosses the dam. This alternative would also require preparation of an EIS to comply with NEPA.



## **Chapter 3    AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

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### **3.1      Introduction**

This chapter describes the affected environment and evaluates the environmental consequences of the proposed action and implementation of the Preferred Alternative (Alternative B). The No Action alternative (Alternative A) describes the conditions most likely to occur if the proposed action were not implemented and provides the basis to compare the action alternative.

### **3.2      Water Quality**

#### **3.2.1    Affected Environment**

Water quality of Prineville Reservoir and the Crooked River are managed by the State of Oregon under the framework of the Clean Water Act (CWA). Oregon has established water quality standards for specific physical and chemical parameters in order to provide suitable conditions to support designated and potential uses. These uses include irrigation, domestic water supply, livestock water, industrial water supply, fish and aquatic life, boating, wildlife, hunting, fishing, water contact recreation, and aesthetics (DEQ 2007). The designated fish uses of the upper Crooked River and Prineville Reservoir include salmon and trout rearing and migration. No spawning uses have been designated for these water bodies by the State.

Section 303(d) of the CWA requires states and tribes to identify water bodies that do not meet water quality standards. States and tribes must publish a list of these impaired waters every 2 years. The most recent approved 303(d) list for the State of Oregon is the 2004/2006 Integrated Report approved by the U.S. Environmental Protection Agency (EPA) on February 26, 2007 (DEQ 2007). For lakes, rivers, and streams identified on this list, states and tribes must develop water quality improvement plans known as total maximum daily loads (TMDLs). These TMDLs establish the amount of a pollutant a water body can carry and still meet water quality standards. The primary water quality problem identified in the Crooked River below Bowman Dam that would require the development of a TMDL is total dissolved gas (TDG). This pollutant was identified on the 1998 listing as a result of gas bubble trauma in fish data collected in 1989. Temperature is also a pollutant listed for the

Crooked River requiring TMDL development; however, the listed river segments are upstream from the reservoir and the lower 51 miles of the Crooked River, and are therefore outside of the affected environment area. The State's 303(d) list also identifies turbidity, chloride, and ammonia as potential concern but not requiring a TMDL. Pollutants that fall into this category may require TMDL development if additional data is collected that substantiates a water quality problem.

Oregon Department of Environmental Quality (DEQ) has indicated that they have initiated data collection, analysis, and report writing phase of the TMDL development in the upper Crooked River subbasin. A timeline for the completion of proposed TMDLs is currently unavailable.

### **Applicable Water Quality Standards**

Oregon Administrative Rules (OAR) 340-041-0001 through OAR 340-041-0350 contain the water quality standards for the State of Oregon (DEQ 2009). A specific criterion for TDG has been developed. The TDG is measured by the concentration of TDG relative to atmospheric pressure (as a percent saturation). The State of Oregon TDG criterion specifies that at the point of sample collection TDG may not exceed 110 percent; however, there are some exceptions that may apply. The TDG criterion does not apply when the river flow exceeds the 7-day, 10-year frequency flood (7Q10). Also, in waters of less than 2 feet in depth, the TDG concentration may not exceed 105 percent.

### ***Prineville Reservoir***

Water quality conditions in Prineville Reservoir currently support the designated and potential beneficial uses; no pollutants have been identified that require the development of a TMDL. However, in the upper watershed tributaries, high summer water temperatures are common. These temperatures are a result of low instream flow and degraded riparian plant communities. These conditions can affect fish production and restrict fish movement. The upper Crooked River, North Fork, South Fork, Beaver Creek, Bear Creek, and many tributaries are included on the 2004/2006 Integrated Report for exceeding summer rearing temperatures. Sedimentation also causes water quality problems in the drainage. Erosion from the main stem Crooked River and tributaries contributes to turbidity and sediment loads in Prineville Reservoir. In addition, there may be inactive mercury (cinnabar) mines located at the headwaters that may adversely impact water quality.

As part of an ongoing reservoir monitoring program for operating projects, Reclamation collects water quality data every 3 years from Prineville Reservoir. These samples are analyzed for chemical, physical, biological, and trace metal parameters.

### ***Crooked River Downstream of Bowman Dam***

The water quality of the Crooked River downstream of Bowman Dam (river miles 51 to 70) is influenced by a variety of point and non-point sources such as logging, grazing, irrigated and non-irrigated agriculture, confined animal feeding operations, and recreation. Flow in the lower Crooked River is regulated by releases from the Prineville Reservoir. Water quality in the Crooked River deteriorates as it moves downstream from the reservoir release point.

Cold-water reservoir releases strongly influence water temperatures in the Crooked River below Bowman Dam. Due to the nature of the release point, water discharged from the reservoir rarely exceeds water quality standards during the warm summer months. Additionally, suspended sediment loads from the upper watershed are typically settled out in the reservoir and do not contribute to the turbidity seen in the lower river segments. However, outlet discharge and spill causes TDG saturation to exceed water quality standards. Standards are exceeded when water is spilled over Bowman Dam or volumes released through the outlet structure exceed approximately 800 cfs. This threshold is based on an unpublished draft of a Reclamation study of spill and TDG below Bowman Dam conducted in 2006 and 2007 (Reclamation 2008).

## **3.2.2 Environmental Consequences**

### **Alternative A – No Action**

Under the No Action alternative, no safety improvements to Bowman Dam will be constructed and Reclamation will continue operating the dam with the current maintenance and water delivery commitments. Water quality conditions are not expected to change as a result of the No Action alternative. TDG generation will still occur at Bowman Dam during spill events and discharge events through the outlet works in excess of 800 cfs. If the reservoir were overtopped, discharge will likely exceed the 7Q10 flood frequency flow and TDG generation will be exempt from water quality standards.

The environmental consequence of the No Action alternative on temperature conditions within Prineville Reservoir and the reach of the Crooked River below Bowman Dam are not expected to change over the life of the dam due to operation and maintenance (O&M) of the dam. Turbidity issues in Prineville Reservoir and in the segment of the Crooked River below the dam are not expected to change under the No Action alternative operating commitments already in place.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, no changes in water quality from current conditions are anticipated. Current operation commitments dictate the amount and timing of water delivery to downstream users. These commitments are not expected to change as a result of the parapet wall and the additional emergency storage capacity of the reservoir. Reservoir operations would continue as they have in the past in order to meet water delivery and flood control objectives. TDG would continue to be generated by any spill event and discharge through the outlet works that is in excess of 800 cfs.

Water quality impacts as a result of construction activities are expected to be negligible. Construction activities would occur at the crest of the dam with the parapet wall being on the upstream side. Excavated materials may spill into the reservoir during construction and excavation for the parapet wall. If water quality impacts were to occur, they would be short term and associated with minor sedimentation or turbidity issues. However, these issues are typically controlled through the spill prevention, stormwater permit, and construction best management practices. Construction of the spillway wall extensions can be accomplished within the spillway with scaffolding and by pumping concrete to the forms. Consequently, there should be negligible water quality impacts associated with the construction of the spillway wall extensions. The contractor would be responsible for obtaining a stormwater discharge permit, developing a stormwater pollution prevention plan, and for developing and implementing best management practices.

### **3.3 Fish**

#### **3.3.1 Affected Environment**

The Crooked River is a tributary of the Deschutes River. Runs of spring Chinook and summer steelhead migrated into the headwaters of the Crooked River before construction of Round Butte and Pelton dams on the Deschutes River, and Opal Springs Dam and Bowman Dam on the Crooked River (ODFW 1996). Round Butte and Pelton dams are co-owned by Portland General Electric (PGE) and the Confederated Tribes of the Warm Springs Reservation (CTWSR). Opal Springs Dam, operated by Deschutes Valley Water District, is a small hydroelectric dam about 1 mile upstream of Lake Billy Chinook on the Crooked River. Pelton Dam prevents downstream migration of smolts. Adults are able to migrate through this structure. Round Butte, Opal Springs, and Bowman dams were constructed without fish passage facilities. The three facilities currently block anadromous fish runs from the upper Crooked River subbasin. Other anadromous species such as sockeye salmon, coho, and Pacific Lamprey may have been present, but are undocumented in any historical accounts.

As part of the relicensing process of PGE and the CTWSR hydroelectric facilities on the Deschutes River, restoration of fish passage around Round Butte and Pelton dams is underway. Outplants of juvenile Chinook and steelhead salmon have already occurred in the lower Crooked River subbasin, with the adults expected to return to collection facilities below Round Butte Dam beginning in 2010 to 2011.

The Crooked River downstream from Bowman Dam presently consists almost exclusively of native Interior redband trout, mountain whitefish, and mottled sculpin. Small numbers of native largescale suckers are present as well as periodic observations of rainbow trout, smallmouth bass, brown bullhead, and black crappie entrained from the reservoir during periods of high flow or low reservoir storage. The 260 cfs release of cool water from the bottom of the reservoir during the summer months for irrigation has created favorable conditions for salmonids resulting in fisheries being listed as one of the Outstandingly Remarkable Values (ORV) under the Wild and Scenic designation. The 15-mile reach of the Crooked River between Bowman Dam and the Crooked River Feed Canal diversion supports a quality trout fishery as a result of:

- Cool water released from Bowman Dam
- Quality river environment, and
- Habitat availability (Reclamation 1992)

Temperature and high nutrient loads result in an extremely diverse and productive macroinvertebrate population that supports a large biomass of salmonids. Recent data from 2006 indicate a decline in the redband population. Studies are ongoing in an effort to explain the drop in redband trout numbers.

Interior redband trout, a species of concern, is a subspecies of rainbow trout adapted to the arid conditions east of the Cascade Mountains and tolerant of high water temperatures (ODFW 1996). Redband trout spawn in rivers and streams during the spring. Incubation occurs from April through early July, and fry emerge in June and July (Marx 1998). Redband trout in the Crooked River downstream from Bowman Dam have considerably faster growth rates than those found in other reaches of the Crooked River (ODFW 1996).

The Crooked River trout population downstream from the Feed Canal Diversion is not as healthy as the upriver population as a result of low flow conditions, warm water temperatures, and limited quality habitat.

The USFWS listed bull trout as threatened under the ESA in 1998. Bull trout historically used the lower Crooked River as far upstream as the city of Prineville (ODFW 1996). Opal Springs Dam has been a near complete barrier to migrating game fish, including redband and bull trout since the 1982 dam renovation and retrofitting. Efforts are ongoing to provide fish passage at Opal Springs Dam to support the reintroduction of anadromous fish into the

Crooked River subbasin. Recently, the USFWS proposed critical habitat for bull trout in the lower Crooked River below Highway 97.

Operation of Bowman Dam creates the following fish production problems in the Crooked River downstream from the dam:

- Nitrogen gas supersaturation
- Low flows and turbidity
- Release fluctuations from Bowman Dam

#### **Nitrogen Gas Supersaturation**

Variable discharges from Bowman Dam create problems unique to the Crooked River. Nitrogen supersaturation occurs when water spills over Bowman Dam or high volume releases discharge through the outlet works. High levels of nitrogen supersaturation appear to remain in the river several weeks following high volume releases. High levels of nitrogen supersaturation cause mortality in egg and fry stages and serious fin erosion and disease in older age classes of fish (Reclamation 1992). A high-water event in April 1989 resulted in gas bubble disease in over 85 percent of the rainbow trout captured from the Crooked River during surveys between Bowman Dam and the city of Prineville (ODFW 1996). The ODFW recommended modification of the outlet works structure, spillway, and stilling basin to eliminate this problem.

#### **Low Flows and Turbidity**

Fish and aquatic insects become stranded and the mortality rate increases when inspection and repair of the stilling basin reduce flows from Bowman Dam. Annual inspections of gates and the stilling basin have stopped releases from Bowman Dam for up to 2 hours. Concrete in the stilling basin often becomes damaged as a result of reservoir releases. Closing the outlet works gates allows for dewatering of the stilling basin and repair of the concrete. Flow released via the outlet bypass (capacity about 14 cfs) meets the 10 cfs minimum flow requirement and prevents dewatering of the downstream channel. Major repairs and/or low flow conditions extending into the winter months occasionally compounds the situation (Reclamation 1992).

In December 2006, a splitter wall was installed in the outlet works to alleviate problems associated with annual O&M. The splitter wall allows one gate to be closed and worked on while the other gate remains open to pass necessary flows greater than 14 cfs. If the stilling basin needs to be dewatered, a bulkhead with a 36-inch-diameter bypass pipe can be installed along one side of the splitter wall providing up to 37 cfs flows downstream. Installation of the splitter wall reduces the risk of stranding and mortality to fish and aquatic insects.

Summertime irrigation releases from Bowman Dam are generally high and provide adequate instream flow for approximately 12 miles downstream to the Crooked River Feed Canal diversion.

Downstream from this canal to near the Highway 97 crossing, generally low summer streamflow and high water temperatures create unfavorable conditions for fish (Reclamation 1992). Before construction of Bowman Dam, typical streamflows were high in late winter and low in summer and early fall. Irrigation diversions result in low flow conditions in the lower Crooked River.

Occasional releases from Bowman Dam are made for the North Unit Irrigation District pumps located about 45 to 50 miles downstream from the dam. These releases alleviate some of the low flow conditions downstream from the Crooked River Feed Canal diversion. The North Unit Irrigation District's daily pumping requests from the Crooked River, as measured between 1977 to 1997 averaged 59.2 cfs, and from 2001 to 2008 averaged 66.2 cfs. The capacity of the pumps limits pumping to 150 cfs.

Winter releases from Bowman Dam as low as 10 cfs have been made. Reclamation administratively adopted a 75 cfs minimum instream flow objective downstream from Bowman Dam in February 1990 by using natural flow and uncontracted storage without impacting contractual obligations (Reclamation 1992). An instream flow study conducted for ODFW (Hardin 1993) identified minimum instream flows of approximately 75 to 150 cfs for fry and juvenile redband trout while optimal production for spawning of adult redband trout occurs at flows exceeding 200 cfs (ODFW 1996).

### **Release Fluctuations from Bowman Dam**

Fluctuation in releases from Bowman Dam impacts fish and habitat in the Crooked River. An immediate decrease in flows can strand fish and/or incubating eggs in shallow pools and gravel beds. Stranded fish often are lost to predation, exposure to temperature extremes, or total depletion of water. Severe long-term low flow conditions limit food production and habitat and increase water temperatures to levels too warm for optimal salmonid growth (ODFW 1996). Reduced releases from Bowman Dam occur after the end-of-irrigation season and flood control seasons. Low flow conditions occur throughout much of the winter.

### ***Prineville Reservoir Fishery***

Prineville Reservoir supports populations of hatchery rainbow trout, smallmouth bass, largemouth bass, brown bullhead, and black crappie. Nongame species include mountain whitefish, northern pikeminnow, chiselmouth, dace, redband shiner, sucker, and sculpin. ODFW currently manages Prineville Reservoir for smallmouth bass, largemouth bass, brown bullhead, and annually supplements the reservoir with hatchery rainbow trout (ODFW 1996). ODFW considers Prineville Reservoir to be one of the best year-round cold and warmwater

fisheries in Oregon (Marx 1998). Natural reproduction fully sustains largemouth and smallmouth bass populations. Largemouth bass are found mostly in the upstream half of the reservoir while smallmouth bass are common throughout the reservoir.

Annual water fluctuations in Prineville Reservoir create impacts to the fishery and habitat. Extreme drawdown such as occurred in 1991 and 1992 due to severe drought, limits food production and living space for all fish species. Additional habitat limitations for fish include:

- Low to moderate concentrations of nutrients in the water,
- High suspended sediments which limit photosynthesis,
- Low abundance of aquatic vegetation,
- Lack of structural complexity, and
- Variable water temperatures – too cold for optimal warmwater fish production and too warm for optimal trout growth (ODFW 1996).

Heavy loads of silt and clay entering the reservoir during spring runoff limit fish production. The majority of this material remains in suspension year-round decreasing light penetration and benthic (macroinvertebrate) production (Reclamation 1992). This results in a reduced phytoplankton population. Zooplankton feed on phytoplankton and their abundance is dependent on the abundance of phytoplankton. Zooplankton are the major food sources for juvenile rainbow trout (spring and fall), juvenile black crappie, and juvenile bass. Zooplankton densities are generally low in the reservoir, a reflection of the poor phytoplankton production (ODFW 1996).

Largemouth bass are the warmwater species in Prineville Reservoir most sensitive to reservoir fluctuations. They spawn at relatively shallow depths (3 to 13 feet) typically during the first of June. A critical 15-day period occurs between the start of spawning and fry leaving the nest. Reservoir drawdown of just over 2 inches per day during this critical period should have no impact on spawning success. Smallmouth bass spawn at a wider range of depths and experience less impact from reservoir drawdown. Crappie spawn deeper than both bass species and experience even fewer impacts than the smallmouth bass (Marx 1999).

### **3.3.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, Reclamation will continue to operate Bowman Dam with no improvements to contain floodwaters. There will be no impacts to either the reservoir or the downstream fishery. There will be no adverse impacts to aquatic species in Prineville Reservoir and the Crooked River under Alternative A. Standard dam operations will continue and flows will be similar to those released historically from Prineville Reservoir.



### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, Reclamation would construct a 6-foot-high concrete parapet wall on the upstream side of the dam crest which would provide approximately 30,000 acre-feet of temporary additional emergency storage above the dam crest elevation. The pool volume during a large hydrologic event would increase by 30,000 acre-feet over the original design of Bowman Dam. Due to the infrequency of an event of this magnitude, the reservoir impacts associated with additional temporary pool storage are considered insignificant. In virtually all years, standard dam operations would continue and downstream flows would be similar to those released historically from Prineville Reservoir. As a result, the proposed action would not alter flow or habitat conditions in the Crooked River, including the reach proposed for designation as bull trout critical habitat. Consequently, the proposed action would have no effect on the proposed critical habitat. No construction-related impacts to aquatic resources would occur under Alternative B. There would be no adverse impacts to aquatic species in Prineville Reservoir and the Crooked River under Alternative B.

## **3.4 Wildlife**

### **3.4.1 Affected Environment**

Waterfowl use the reservoir for nesting, resting, and feeding. There are commonly 300 to 400 Canada geese on the reservoir during the fall and about 50 nesting pairs during the spring and summer. Mallards, cinnamon teal, blue-winged teal, and mergansers also nest in and around Prineville Reservoir (Reclamation 1991).

Ospreys use the reservoir in the spring and summer, but do not nest there. Golden eagles are present in the area and have been seen foraging in the vicinity of the dam. Bald eagles winter in the reservoir area and in the river canyon downstream of the dam (Reclamation 1991). In the Prineville area, research has shown a strong preference for conifers that are isolated from human activities. Daytime roost sites are located along foraging areas in emergent trees and snags. A large wintering population of bald eagles is located at the eastern edge of Prineville Reservoir. This wintering group, which extends from the eastern edge of Prineville Reservoir up the Crooked River to the Rager Ranger Station (a total of approximately 95 miles), has been estimated to be as large as 115 birds (Reclamation 2003b).

The mudflats in the upper part of the reservoir provide forage for a variety of shorebirds. Upland game birds include chuckar and valley quail. Songbirds can also be found around the reservoir and along the river (Reclamation 1991).

Small mammals inhabiting the area include the mountain cottontail and blacktail jack rabbit. Bobcat, coyote, mink, muskrat, beaver, and an occasional river otter also depend on the

reservoir for food and cover. Mule deer are present year-round, with an estimated winter population ranging from 500 to 700 animals. ODFW has stated that the area is an important wintering area for mule deer. About 50 elk winter on the lands south of the reservoir. Antelope are seen only occasionally around the reservoir (Reclamation 1991).

Within the project area, most wildlife will avoid the area due to vehicle traffic and lack of suitable vegetation.

### **3.4.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, no safety improvements to Bowman Dam will be constructed. There will be no impacts to wildlife associated with the No Action alternative.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, impacts to wildlife from construction of a parapet wall would be minimal since the construction would occur in an area generally avoided by wildlife. Short-term noise disturbance from construction activities on the dam and at the campground may affect wildlife, but only for a short period of time before the wildlife acclimate to the disturbance, then return to present levels at the conclusion of construction.

No impacts would occur to eagle nesting sites around Bowman Dam since no trees would be removed. Noise from construction would have little to no impact on eagles since noise levels would be only slightly above normal ambient levels (i.e., vehicular traffic, boats, etc.) and construction would be completed before the nesting period would begin.

## **3.5 Vegetation**

### **3.5.1 Affected Environment**

Vegetation in the reservoir area prior to filling consisted of juniper-covered canyons and some hayfields adjacent to the river. The upper one-half of the reservoir consists of mudflats with willow thickets along a high water line. The lower portion of the reservoir is rocky and steep and shoreline vegetation is minimal. Vegetation in the area surrounding the dam consists of juniper, sagebrush, rabbitbrush, and bunchgrass (Reclamation 1991). There is some undesirable vegetation, such as cheatgrass, mullen, etc., on the shoulder of the road.

### **3.5.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, no safety improvements to Bowman Dam will be constructed. There will be no impact to vegetation associated with the No Action alternative.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, construction of the parapet wall would occur on top of the dam where none, or very little, vegetation is present. Staging in the Big Bend Campground would occur on graveled or paved areas where vegetation is non-existent; therefore, no adverse impact to vegetation is expected to occur. The undesirable vegetation on the upstream side of Bowman Dam would most likely be removed during construction.

## **3.6 Threatened and Endangered Species (Terrestrial)**

### **3.6.1 Affected Environment**

No terrestrial threatened and endangered species listed by the USFWS in Crook County, Oregon occur in the vicinity of the proposed project (USFWS 2009) (see Table 1). The USFWS did list bull trout as threatened under the ESA in 1998; however, bull trout do not occur in the project area. There is one candidate species listed in Crook County, the Columbia spotted frog.

The Columbia spotted frog requires cool, permanent, quiet water, such as a spring, pond, lake, or slow stream with abundant associated vegetation and a bottom layer of decaying vegetation. Spotted frogs do not occupy ponds with bullfrogs (*Rana catesbeiana*) or predatory fish, such as bass (*Micropterus spp.*). The presence of bass in Prineville Reservoir, especially near the mouths of tributaries, would preclude the occurrence of spotted frogs in the reservoir itself; however, the frogs could exist farther up tributary creeks (Reclamation 2003b).

**Table 1. Federally-listed, proposed, candidate species and species of concern under the jurisdiction of the USFWS which may occur within Crook County, Oregon (USFWS 2009).**

Scientific Name	Common Name	Status
<b>Fish</b>		
Bull trout	<i>Salvelinus confluentus</i>	Listed
Pacific lamprey	<i>Lampetra tridentata</i>	Species of concern
<b>Reptiles and Amphibians</b>		
Columbia spotted frog	<i>Rana luteiventris</i>	Candidate species
Northern sagebrush lizard	<i>Sceloporus graciosus graciosus</i>	Species of concern
<b>Mammals</b>		
<i>Terrestrial</i>		
Pygmy rabbit	<i>Brachylagus idahoensis</i>	Species of concern
Pallid bat	<i>Antrozous pallidus pacificus</i>	Species of concern
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>	
Spotted bat	<i>Euderma maculatum</i>	Species of concern
California wolverine	<i>Gulo gulo luteus</i>	Species of concern
Silver-haired bat	<i>Lasionycteris noctivagans</i>	Species of concern
Small-footed myotis bat	<i>Myotis ciliolabrum</i>	Species of concern
Long-eared myotis bat	<i>Myotis evotis</i>	Species of concern
Long-legged myotis bat	<i>Myotis volans</i>	Species of concern
Yuma myotis bat	<i>Myotis yumanensis</i>	Species of concern
Preble's shrew	<i>Sorex preblei</i>	Species of concern
<b>Birds</b>		
Northern goshawk	<i>Accipiter gentilis</i>	Species of concern
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	Species of concern
Ferruginous hawk	<i>Buteo regalis</i>	Species of concern
Greater sage grouse	<i>Centrocercus urophasianus</i>	Species of concern
Black tern	<i>Chlidonias niger</i>	Species of concern
Olive-sided flycatcher	<i>Contopus cooperi</i>	Species of concern
Willow flycatcher	<i>Empidonax traillii adustus</i>	Species of concern
Yellow-breasted chat	<i>Icteria virens</i>	Species of concern
Lewis' woodpecker	<i>Melanerpes lewis</i>	Species of concern
Mountain quail	<i>Oreortyx pictus</i>	Species of concern
White-headed woodpecker	<i>Plcooides alolarvatus</i>	Species of concern
<b>Invertebrates</b>		
<i>Insects</i>		
Cascades apatanian caddisfly	<i>Apatania tavalala</i>	Species of concern
<b>Plants</b>		
Henderson rice grass	<i>Achnatherum hendersonii</i>	Species of concern
Wallowa rice grass	<i>Achnatherum wallowaensis</i>	Species of concern
Henderson's bentgrass	<i>Agrostis hendersonii</i>	Species of concern
Estes' artemisia	<i>Artemisia ludoviciana ssp. estesii</i>	Species of concern
Bastard kentrophyta	<i>Astragalus tegetarioides</i>	Species of concern
Crenulate grape fern	<i>Botrychium crenulatum</i>	Species of concern
Mountain grape fern	<i>Botrychium montanum</i>	Species of concern
Peck's mariposa lily	<i>Calochortus longebarbatus var. peckii</i>	Species of concern
Cusick's buckwheat	<i>Eriogonum cusickii</i>	Species of concern
Ochoco lomatium	<i>Lomatium ochocense</i>	Species of concern
Disappearing monkeyflower	<i>Mimulus evanescens</i>	Species of concern
Howell's thelypody	<i>Thelypodium howellii ssp. howellii</i>	Species of concern

### **3.6.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, no safety improvements to Bowman Dam will be constructed. There will be no impact to ESA-listed threatened or endangered species associated with the No Action alternative.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, construction of the parapet wall would occur on top of the dam and the construction staging area would be at Big Bend Campground. No impacts to terrestrial threatened or endangered species would occur since no species are listed in the project area (Table 1). No impacts should occur to the Columbia spotted frog, if it occurs in the area of Bowman Dam since construction activities would not be occurring within the habitat of the species. Impacts to bull trout and proposed bull trout critical habitat were previously assessed under Section 3.3 Fish.

## **3.7 Transportation**

### **3.7.1 Affected Environment**

Bowman Dam is located on the Crooked River southeast of the city of Prineville, Oregon. OR 27 provide the only improved road access to the dam from Prineville. It runs from the city of Prineville south for approximately 45 miles until it ends at U.S. Highway 20. OR 27 proceeds along the crest of Bowman Dam, which is approximately 21 miles on the highway south of Prineville. A short distance south of the dam, OR 27 ceases to be paved and remains a gravel road until it ends at U.S. Highway 20. Eight miles of OR 27 were designated as a National Back Country Byway by BLM in 1989. Alfalfa Market Road and Reservoir Road are county roads that provide access to Prineville Reservoir from the city of Bend, Oregon. The paved two-lane roads are used mostly for recreational traffic and have no length, width, or height restrictions.

There are four bridges with maximum weight limits on OR 27. Three of these bridges are located along the stretch from Prineville to the dam and the other is south of the dam at road mile 27.2. The weight limits in pounds (lbs) for each bridge are given in Table 2 (ODOT 2009). The highway has a length restriction of 60 feet from approximately mile marker 6 to its junction with U.S. Highway 20.

**Table 2. OR 27 bridge weight limits.**

Bridge*	Single Axle (lbs)	Tandem Axle (lbs)	Tri-Axle (lbs)
1.90	21,500	43,000	60,000
2.88	21,500	43,000	60,000
4.59	21,500	43,000	60,000
27.23	20,000	34,000	**
* Location given by closest mile post. Mile posts originate from the beginning of OR 27 in Prineville.			
** Bridge has a gross vehicular weight of 105,500 pounds. No weight limit given for tri-axle.			

Traffic studies are conducted by the Oregon Department of Transportation (ODOT) to determine the use of a road and frequency of maintenance. These studies count the number of vehicles on a roadway simultaneously in both directions. The majority of the traffic on OR 27 during the summer months is recreational, coming to and from the reservoir. The most recent traffic count for OR 27 is given in Table 3 (Farnsworth 2009). The traffic counts are given as the annual average daily traffic.

**Table 3. 2009 OR 27 traffic counts.**

Mile Post*	Vehicle Trips Per Day
1.92	360
9.16	160
12.55	130
25	30
* Location given by closest mile post	

Traffic counts for the Alfalfa Market Road are completed by the Deschutes County Development Department. The most recent available count was completed in 2006 and shown below in Table 4.

**Table 4. 2006 Alfalfa Market Road traffic counts.**

Location of Count	Vehicle Trips Per Day
0.1 Miles East of Powell Butte Road	2,851
0.1 Miles East of Stewkemp Road	1,813
0.5 Miles East of Dixon Loop	1,723
0.1 Miles West of Walker/Johnson Road	1,035

### **3.7.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, no safety improvements to Bowman Dam will be constructed. Reclamation will continue normal operations of the dam and access across the crest via OR 27 will not be altered. Normal traffic patterns and the current traffic volume will not be altered.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, construction of the parapet wall would require the closure of one lane of OR 27 across the dam. The traffic through this section would most likely be controlled by metering lights until completion of the project. Congestion resulting from the proposed action due to construction would be short-term, thereby minimizing the potential for impacts. Work on the dam would most likely not be conducted on the weekends, which is when the majority of the recreational traffic across the dam occurs. Access to the reservoir via the Alfalfa Market and Reservoir roads from the Bend area would not be altered and recreational traffic would not be impacted by construction activities. Normal traffic flow across the dam would resume upon completion of the project.

Approximately ten workers would be employed to perform the safety improvements on Bowman Dam. Workers would either be commuting to and from the dam from Prineville or Bend. This would add approximately ten additional daily vehicle trips on OR 27, Alfalfa Market Road, or Reservoir Road to and from the dam. In addition to the construction workers, construction equipment and concrete trucks would either travel on OR 27, Alfalfa Market Road, or the Reservoir Road during times when the parapet wall is being poured. It is estimated that during this time eight to ten concrete trucks a day would be traveling to the top of the dam. All construction equipment and truck traffic during construction would have to comply with the weight limits and length restrictions on OR 27.

Given the rural location of the dam and the low vehicle count on the highway, congestion from the increase in construction traffic would be minimal. Compliance with all Federal and State requirements for transportation of oversize loads would be required and would reduce or eliminate the potential for any adverse impacts. All roadway activities and roadway designs would be coordinated with and approved by ODOT. All roadway users must obey all applicable traffic laws and signage will be posted to notify roadway users of construction activities. Construction activities would take place during normal business hours, Monday through Friday, resulting in little or no congestion from construction equipment during the evening hours and on weekends.

There would be no long-term impacts to traffic associated with Alternative B.

## **3.8 Recreation**

### **3.8.1 Affected Environment**

#### **Land Ownership and Management**

The recreation portion of the EA mainly covers the Big Bend Campground below the dam. Big Bend Campground is located within the Reclamation zone below the dam along an 8-mile stretch of the lower Crooked River between Bowman Dam and mile marker 12 of OR 27, also referred to as the Chimney Rock Segment. The Chimney Rock Segment has eleven developed recreation sites, in which nine are campgrounds and two are day-use areas; all but Big Bend Campground is on BLM land. In 1987, Reclamation and OPRD entered into an agreement to manage Prineville Reservoir, which included Big Bend Campground. This section was designated by Congress in October 1988 as a National Wild and Scenic River and classified as a Recreational River Area. In 2004, OPRD and BLM entered into an O&M agreement which stated that BLM will manage Big Bend Campground for park and recreation purposes in accordance with applicable State and Federal statutes. Recreation is one of the ORVs specified in the Wild and Scenic designation. Goals for managing this resource are defined in the Crooked River Wild and Scenic Management Plan.

#### **Existing Facilities**

Prineville Reservoir is a popular destination for boating, fishing, camping, and group use activities. The two major development areas on the lake are Prineville State Park Campground and Day-use Area, and Prineville Reservoir Resort. Prineville State Park Campground and Day-use Area received approximately 199,000 visitors in 2009 and Prineville Reservoir Resort received approximately 35,000 visitors in 2000. Each area offers several amenities which includes electrical and non-electrical campsites, concessions, and restrooms.

OPRD also operates semi-primitive campgrounds and day-use areas along the reservoir. The ODFW manages a Fish and Wildlife Area in cooperation with OPRD who manages these recreation sites located along the north section of the reservoir.

Big Bend Campground has 15 RV campsites, (including 1 campsite for persons with disabilities), 1 large accessible group picnic site, accessible trail to the river, and 2 accessible vault toilets. Electricity for a campground host site at Big Bend was added in 2008. Recreation is one of the categories under the Wild and Scenic Designation for the Crooked River. Big Bend Campground is within the viewshed of the Wild and Scenic area and provides access to recreational opportunities on the river.



## Demand

Prineville Reservoir covers 18 miles of the Crooked River and is primarily an irrigation storage water body, with secondary objectives of Crooked River flood control and public recreation. Its relative location to Bend, Oregon (population 77,181); Prineville, Oregon (population 10,075); and Redmond, Oregon (population 25,445) makes it a very popular retreat in Central Oregon. It is located near the geographic center of Oregon and is 21 miles south of Prineville and 25 miles east of Bend. The increasing population of central Oregon and the location of the reservoir make it a prime location compared to other water-based recreation opportunities in the area. Usage rates for the Big Bend Campground are shown in Table 5.

**Table 5. Usage rates of Big Bend Campground.**

	2007	2008	2009
Big Bend Visitor Days	3,610	3,647	2,119*
* The drop in use for 2009 was mostly a result of resetting the assumption in the use formula that calculates user days from number of fee envelopes.			

### 3.8.2 Environmental Consequences

#### Alternative A – No Action

Under the No Action alternative, Reclamation will continue to operate Bowman Dam with no improvements to contain floodwaters. There will be no impacts to either the reservoir or the downstream fishery and therefore, no impacts to recreation.

#### Alternative B – Parapet Wall Construction (Preferred Alternative)

Under Alternative B, the Big Bend Campground would be used as the contractor staging area. Recreation users seeking overnight and day-use accommodations at the campground would continue to be able to use the campground and day-use facilities. Access would be limited in the upstream area where the contractor staging area would be located. The contractor would have work hours limited to Monday through Friday, thereby reducing disturbances and interaction with weekend users at Big Bend Campground. Weekday users of Big Bend Campground may encounter some disturbance during normal work hours but this would be limited and would only be temporary. Public notification would define the contractor staging area, restrictions for safety concerns, normal work hours, and alternative overnight accommodations available at Poison Butte, Post Pile, Cobble Rock, Chimney Rock, Palisades, Lone Pine, Stillwater, and Castle Rock campgrounds along the Lower Crooked Wild and Scenic River. Given that there are other access points for recreation

available and that the campground would not be closed to the public for use, there would be no significant impacts to recreation under the Wild and Scenic Designation.

## **3.9 Visual Resources**

### **3.9.1 Affected Environment**

The center crest of Bowman Dam is the boundary of the Wild and Scenic River corridor. The corridor continues downstream of the dam on the Crooked River. Visual resources (scenic) are one of the ORV specified in the Wild and Scenic designation. BLM and Reclamation have created a Wild and Scenic Management Plan that defines goals for protecting and managing these ORVs. The reservoir side of the dam provides a view of the reservoir and the surrounding area. On both sides of the dam, there are two areas where people can stop and observe both the upstream and downstream views from the dam. There is no walkway or footpath across the crest of the dam to accommodate pedestrians. There are also additional turn outs along OR 27, south of the dam, which provide a view of the reservoir and its surroundings.

### **3.9.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, Reclamation will continue to operate Bowman Dam with no improvements to contain floodwaters. There would be no changes to the viewshed above or below the dam.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, Reclamation would construct a 6-foot-high concrete parapet wall on the upstream side of the dam crest. The view from the top of the dam downstream would not be affected. The two parking areas on the sides of the dam would still be available for people to pull off the road and view the downstream side of the dam. The 6-foot high parapet wall would eliminate the view of the reservoir from the top of the dam. The turnouts south of the dam on OR 27 would continue to provide viewing opportunities of the reservoir and surrounding areas.

The viewshed in the Wild and Scenic River corridor would not be altered and the ORV would not be affected by the Preferred Alternative. The parapet wall would be marginally visible to people who are viewing the dam from the river corridor or from the reservoir. It is estimated that approximately 4 feet of the wall would be visible from a ½-mile downstream from the dam. From this distance, the 4-foot section of the parapet wall would be very

difficult to distinguish on top the 245 foot dam. The view for reservoir users would change for the 800 foot length of the dam but would not change the view of the remaining shoreline.

There would be the need for temporary offices, signage, fences, and flagging in the contractor staging area and on the roadways. These items may temporarily change the viewshed in and around the project area. Upon completion of the project, all signage, offices, fences, and flagging will be removed.

## **3.10 Public Safety**

### **3.10.1 Affected Environment**

Prineville Reservoir is located approximately 20 miles upstream from the city of Prineville on the Crooked River. SOD studies have determined that a PMF in the drainage area above Prineville Reservoir would result in overtopping of the dam, potentially resulting in dam failure. Failure of the dam would not only result in loss of project benefits and property but could also result in loss of life.

### **3.10.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, Reclamation will continue to operate Bowman Dam with no improvements to contain floodwaters. The downstream population will continue to live with elevated risk of dam failure during a significant hydrologic event. Reclamation considers this action to be unacceptable for the long-term safety of Bowman Dam and the areas downstream.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, Reclamation would construct a 6-foot-high concrete parapet wall on the upstream side of the dam crest which would provide approximately 30,000 acre-feet of additional emergency storage. This additional emergency and temporary storage would contain a 21,000-year flood event long enough for the water to recede and the flood event to pass. This alternative meets the SOD criteria for protection of life and property.

The construction staging area would be located in the Big Bend Campground and surrounding fencing would be required to secure the contractor's materials and equipment from the public. The contractor would be responsible for posting the appropriate signage, in the contractor staging area, on all roadways affected by the project, and in and around the

construction site notifying the public of safety issues, restricted access, and roadway limitations.

## **3.11 Cultural Resources**

### **3.11.1 Affected Environment**

Cultural resources are historic and traditional cultural properties that reflect a group's heritage. Federal law and regulation define historic properties to include prehistoric and historic sites, buildings, structures, districts, and objects that are included in, or eligible for, inclusion in the National Register of Historic Places (NRHP). Traditional cultural properties are locations that have special heritage value to contemporary communities because they are associated with the historical practices or beliefs needed to maintain cultural identity, and are eligible to the National Register.

Numerous laws and regulation require agencies to identify cultural resources on Federal land or that will be impacted by a Federal undertaking, and to take action to address the effects of undertakings on properties eligible to the NHRP. The NHPA is the principal law defining Federal cultural resource management responsibilities. Section 106 of the NHPA and its implementing regulation (36 CFR 800) define a phased, consultative process to implement responsibilities for Federal undertakings.

In 1948, a cultural resources reconnaissance of the area to be inundated by Prineville Reservoir was conducted by the Smithsonian Institution's River Basin Surveys (Osborne 1948). Nine prehistoric archaeological sites, one human burial, and rock rings were recorded and/or discussed in the resulting survey report. The 1948 survey did not address historic period resources. A pre-inundation topographic map illustrates that historic-period ranching features were present in the area within and around the reservoir.

Cultural resource inventories aimed at identifying and documenting cultural sites around Prineville Reservoir commenced in 1993, resulting from commitments made in the Prineville Reservoir RMP. As of 2002, most lands with a high or moderate probability for site occurrence have been surveyed – approximately 2,945 acres under Reclamation jurisdiction. Surveys focused on the north shore upstream of the county boat ramp, much of the south shore upstream of Juniper Point, Big Bend recreational use area below the dam, and the Powder House Cove Boat Ramp and Day-use area. One hundred forty sites – prehistoric and historic – have been documented as of August 2009, and most can be characterized as low-density scatters of lithic debitage, simple flake tools, projectile point fragments, and ground stone. Sites ranged in size from less than 1,500 square meters to approximately 30,000 square meters. Thirteen are historic sites – nine twentieth century trash scatters, two historic building foundations, the Bowman Dam, and the powder house at Powder House Cove. Ten

sites have been tested and, based on consultation with the Oregon SHPO, declared eligible to the NRHP. The majority of sites, however, have not been formally evaluated for eligibility.

Bowman Dam is a historic site as work commenced on the structure in 1958, with the ribbon-cutting ceremony that officially recognized completion of the dam held in 1962. Constructed of earthfill with rock facing, the concrete spillway runs down the right abutment into a stilling basin that was modified in 1987 and in 2007.

The area of the dam toe and plunge pool were entirely excavated and filled during initial dam construction. There is no possibility that intact cultural deposits could still be present given the amount of ground disturbance in that area.

Bowman Dam was evaluated for eligibility to the NRHP in August 2009 (Doncaster 2009). For a site to be individually eligible to the NRHP, at least one of the NRHP Criteria must apply while having integrity. The four NHRP Criteria are:

- A. [Be] associated with events that have made a significant contribution to the broad patterns of our history; or
- B. [Be] associated with the lives of persons significant to our past; or
- C. [E]mbody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. [H]ave yielded, or may yield, information important to prehistory or history (NPS 1991)

The following elements addressing integrity are considered: location, setting, design, materials, workmanship, feeling, and association.

Bowman Dam does maintain integrity of location and setting, having retained its original location and the setting for the dam has remained unchanged since the reservoir has been filled. Bowman Dam still retains its original design, materials, and workmanship. Only minor modifications were undertaken in 1987 in the bottom of the stilling basin and outlet tunnel. The association of the dam is complete as it is still used for impounding water in Prineville Reservoir to irrigate the Crooked River Project. Likewise, the historic feeling of Bowman Dam is unchanged as it retains its original location and use.

However, Bowman Dam does not meet any of the four NHRP Criteria described below:

- The Crooked River Project is not associated with events that have made a significant contribution to the broad patterns of history (Criteria A) as it is not the largest or most significant Reclamation project in Oregon, and was an addition to an existing irrigation project within the lands of the Ochoco Valley.

- It is not associated with the lives of persons significant to the past (Criteria B);
- It is not representative of any distinctive design or construction techniques or innovative or unusual technology (Criteria C).
- It is not likely to yield information important in history beyond the documents that were generated subsequent to dam construction and available through the Archives of the Bureau of Reclamation (Criteria D).

Therefore, while the integrity of the dam and dam site is intact, it is not a significant local, regional, or national constructed historical feature, and has been determined to be not eligible for the NRHP. In a letter dated September 3, 2009, SHPO concurred that the property is not eligible for the NRHP in accordance with 36 C.F.R. Part 60.4 and no historic properties would be affected (Appendix C). In a subsequent letter dated October 8, 2009, the Oregon State Archaeologist agreed that the project will have no effect on any known cultural resources and concurred with the determination of *Not Eligible* for the site (Appendix C).

The proposed construction staging area at Big Bend is located 1,500 feet downstream of the dam, on a west-facing river terrace above Crooked River. Ethnographic information concerning inhabitants of the Great Basin and Plateau cultural areas and archaeological excavations indicate that similar river terraces were often the focus of intensive human use. They were usually the locations of winter villages, and short-term habitation occurred on the river.

The Big Bend area was used as an equipment and materials staging area during initial dam construction. Reclamation's concrete and earth laboratory was located in this area during the construction period. The terrace had been graded, graveled, and heavily disturbed during the construction, and has been subjected to recreational use up to the present. The Big Bend area was surveyed, at a reconnaissance level of intensity, for cultural resources in 1990 by Reclamation's Regional Archaeologist (Reclamation 1991). No sites were observed, although several lithic flakes from prehistoric lithic tool reduction were found in less disturbed portions of the riverine terrace, near the concrete foundation. The BLM Prineville District also conducted a reconnaissance survey of the Big Bend area in 2007, prior to initiating upgrades to the popular camping area. No prehistoric sites were documented, although remains of the concrete foundation from the concrete and earth laboratory were also noted. The concrete foundation is in the process of being documented and determined for eligibility to the NRHP (as of August 2009).

#### **Culturally-sensitive Plants**

On April 19, 2006, a field visit to the Powder House Cove area by elders of the CTWSR was sponsored by OPRD. Reclamation was represented by P. Claeysens (archaeologist for the Deschutes and Ochoco National Forests, contracted by Reclamation for tribal consultation). Purpose of the visit was to solicit input and concerns regarding the proposed Powder House

Cove Boat Ramp and Day-use Area improvements project. The tribal elders stated that the Prineville Reservoir area was a “root digging” area, primarily for the harvesting of Bitterroot (*Lewisia rediviva*) and Canby’s Desert Parsley (*Lomatium canbyi*). Both species were located immediately east of the proposed improvements, and upslope from the south-southeast of the parking area. Other possible traditional resources were present in limited quantities, such as juniper and Yellow Bells (*Fritillaria pudica*). However, there were no indications that the Powder House Cove area was used as a traditional root camp in historic, ethnographic, or pre-contact times (Claeyssens 2006).

### **3.11.2 Environmental Consequences**

Law and regulation require that cultural resources that may be affected by a project be identified, evaluated, and taken into consideration during project planning. To meet Reclamation’s legal obligations, the possible staging areas and the dam have been inventoried, as discussed in the previous section. Any other locations not described previously but identified as areas of potential effect will be inventoried. Whenever possible, Reclamation would avoid significant sites by relocating a project feature or activity area. If such sites cannot be avoided, Reclamation would consult with the SHPO and ACHP concerning appropriate mitigation of impacts on the sites. Native American groups or other interested parties that have historic or cultural affiliation with the area would be invited to participate in the consultation process leading to a Memorandum of Agreement.

#### **Alternative A – No Action**

Under the No Action alternative, no safety improvement to Bowman Dam will be constructed. The No Action alternative will have no effect upon cultural resources, since no change will occur to existing conditions.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

##### ***Cultural Resources***

As confirmed by the Oregon SHPO in a letter dated September 3, 2009 and by the Oregon State Archaeologist on September 22, 2009, the proposed project undertakings results in a determination of *No Effect* to historic properties. Therefore, Alternative B would have no effect on any known cultural resources as no historic properties would be affected. No further considerations concerning the cultural significance of the dam are required.

The Big Bend Campground would be used as a construction staging area, all equipment and materials would need to be confined to the developed campsites and graveled parking areas to avoid impacting the concrete foundation and potential site(s) identified by the Regional Archaeologist in 1990. If avoidance is not possible, subsurface probes will be excavated to

determine if subsurface cultural deposits are present, and consultation with the Oregon SHPO and other interested parties, will be undertaken.

#### *Culturally-sensitive Plants*

While there are culturally important plants located adjacent to the area of potential effect, they would not be impacted by construction activities associated with Alternative B. The slope where the plants are growing is too steep for staging of equipment or materials.

## **3.12 Indian Sacred Sites**

Executive Order 13007, dated May 24, 1996, instructs Federal agencies to promote accommodation of access to and protect the physical integrity of American Indian sacred sites. A “sacred site” is a specific, discrete, and narrowly delineated location on Federal land. An Indian tribe or an Indian individual determined to be an appropriately authoritative representative of an Indian religion must identify a site as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion. However, this is provided that the tribe or authoritative representative has informed the agency of the existence of such a site.

### **3.12.1 Affected Environment**

No information is available indicating that Indian sacred sites are present in the Bowman Dam and Prineville Reservoir vicinity. During the EA scoping period, Reclamation notified the CTWSR of the proposed action and requested that they inform Reclamation if sacred sites are located in or near the area of potential effect. No response was received from the tribes or any other interested parties.

### **3.12.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, no safety improvements to Bowman Dam will be constructed. There will be no impacts to sacred sites under the No Action alternative.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, Reclamation anticipates that Indian sacred sites are unlikely to be present in potential areas along the toe of the dam or at the Big Bend Campground because of extensive disturbance to those locations during dam construction, recreational improvements, and the artificial conditions that have existed since the dam was completed.



## **3.13 Indian Trust Assets**

ITAs are legal interests in property held in trust by the United States (with the Secretary of the Interior acting as trustee) for Indian tribes or Indian individuals. Examples of ITAs are lands, minerals, hunting and fishing rights, and water rights.

### **3.13.1 Affected Environment**

In many cases, ITAs are on-reservation; however, they may also be found off-reservation. Consequently, the majority of the area in and surrounding the project area is within lands ceded in the June 25, 1855 Treaty of Wasco. The treaty established the Warm Springs Indian Reservation and reserved certain rights and privileges:

...The exclusive right of taking fish in the streams running through and bordering said reservation is hereby secured to said Indians; and at all other usual and accustomed stations, in common with citizens of the United States, and of erecting suitable houses for curing the same; also the privilege of hunting, gathering roots and berries, and pasturing their stock on unclaimed lands, in common with citizens, is secured to them. (Article I)

There are no known ITAs or treaty rights exercised by tribes in the area, and no reservation or trust lands border Bowman Dam.

### **3.13.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, no safety improvements to Bowman Dam will be constructed. The No Action alternative will have no effect on ITAs since no known ITAs have been identified in the project area. This includes effects associated with both construction and long-term impacts.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, there would be no impacts on ITAs since no known ITAs have been identified in the project area. This includes effects associated with both construction and long-term impacts. Additionally, construction activities associated with this alternative are generally limited to the footprint of the dam itself. No short or long-term impacts to assets such as streamflow, fishing, hunting, or gathering would result from construction activities.

## 3.14 Socioeconomics

### 3.14.1 Affected Environment

The primary area of this assessment is Crook County located in central Oregon. Crook County is “severely distressed” according to the Oregon Business Development Department. A designation of “severely distressed” is based on four measures of economic health used to create an index for counties in Oregon: employment change, average wage change, annual unemployment rate relative to state, and per capita personal income relative to the state. It is useful to compare the economic data from Oregon and other counties with that of Crook County. In 2008, Crook County was one of 16 severely distressed counties in Oregon and had the fourth most distressed index of all Oregon counties. According to the Oregon Employment Department (OED) and shown below in Table 6, Crook County currently has the highest unemployment rate of all 36 counties in Oregon (for both seasonally adjusted and unadjusted rates), with July and June 2009 seasonally adjusted rates of 18.7 percent and 22.4 percent, respectively, while comparable rates for the State of Oregon are 11.9 percent and 12.0 percent, and 9.4 percent and 9.5 percent for the United States, respectively (OED 2009).

**Table 6. OED data for Crook County, State of Oregon, and the United States (OED 2009).**

Category	Crook County	State of Oregon	United States
Population, 2008 estimate	23,023	3,790,060	304,059,724
Population density per square mile	8	39	86
Population change from 2000 to 2008	20.0%	10.8%	8.0%
Median household income, 2007	\$44,951	\$47,385	\$50,007
Percent persons below poverty, 2005-2007	14.7%	13.5%	13.3%

The economy of central Oregon is based on agriculture, forest products, small manufacturing, and tourism. Approximately 10 percent of those employed in Crook County are in agriculture and forestry, with another 22 percent employed in manufacturing. Much of the manufacturing is wood products. Three of the five largest manufactures are wood products companies, employing about 1,000 of Crook County’s total employment of 10,500. As of 2007, there were about 622 farms totaling 761,548 acres in Crook County. The total number of land in farms decreased from 937,628 acres in 2002 to 761,548 in 2007. Tourism and outdoor recreation are increasing parts of the economy, and leisure and hospitality employment represents about 6.3 percent of total employment in recent years (2005 to 2007) (OED 2009).

The recreational opportunities provided by central Oregon's forests, streams, mountains, and deserts attract increasingly numbers of visitors to the area. About 90 percent of central Oregon is in forest and rangeland with over one-half of the total land area in public ownership, mostly Federal.

Per capita income is one of the better measures of economic well-being and can also provide an indication of the level of economic activity within a local economy. County personal income is divided by total county population to arrive at the county per capita income. Personal income is made up of net earnings, dividends, interest, rent, and transfer payments. In 2007, per capita income in Crook County was \$25,158, an increase of 2.5 percent over the previous year. Crook County ranked 34 out of 36 Oregon counties in terms of per capita income in 2007 and was 72 percent of the State of Oregon per capita income of \$35,143.

Although central Oregon comprises one of Oregon's most rapidly growing areas, this growth has had a widely varying impact on income development. Over the decade of 1997 through 2007, per capita personal income in Crook County varied from its highest rank of 28th among Oregon counties in 1999 to its lowest rank of 34 in 2007. Local per capita personal incomes generally remain well below the 2008 statewide average of \$35,956, which is elevated by the large population and the high per capita personal income of the Portland Metropolitan Area (\$38,842 in 2007).

In 2000, Oregon's per capita personal income was about equal to 94 percent of the U.S. average (U.S. Census Bureau 2000). However, the severe impact of the current recession on Crook County's and Oregon's economy may be causing a widening gap to occur between income levels in the county, the state, and the nation as a whole. Oregon's 2008 per capita personal income is only 90 percent of the 2008 U.S. average of \$39,751 (OED 2009).

Forty-four percent of Crook County's population resides in the city of Prineville, which is the major city and county seat (with 10,085 residents). The city is a preferred retirement location in central Oregon. Timber product industries, agriculture-related industries, governmental positions, and service establishments provide most of the employment. Many businesses have been established in recent years to provide services to the increasing numbers of recreationists attracted to the area, caused in part by Prineville Reservoir. Table 7 provides a breakdown of employment and industry in the study area.

**Table 7. Industry, employment, and labor income for 2007 for the Crook County area.**

<b>Industry</b>	<b>Employment</b>	<b>Payroll</b>	<b>Average Payroll</b>
Natural Resources & Mining	176	\$5,669,055	\$32,211
Construction	412	\$15,869,763	\$38,519
Manufacturing	1,203	\$37,398,632	\$31,088
Wholesale Trade	*	*	*
Retail Trade	556	\$12,253,424	\$22,039
Transportation, Warehousing, and Utilities	1,864	\$75,775,840	\$40,652
Information	35	\$1,018,451	\$29,099
Financial Activities	190	\$5,785,331	\$30,449
Professional & Business Services	351	\$11,502,752	\$32,771
Education & Health Services	689	\$22,157,377	\$32,159
Leisure & Hospitality	632	\$8,700,991	\$13,767
* listed as "confidential" by the Oregon Employment Department			

### 3.14.2 Environmental Consequences

#### Alternative A – No Action

Under the No Action alternative, no safety improvements to Bowman Dam will occur; therefore, there will be no impacts to socioeconomics.

#### Alternative B – Parapet Wall Construction (Preferred Alternative)

Under Alternative B, the majority of the construction work performed under Alternative B would be completed by contractor workforces. The construction would take approximately 6 months and it is estimated that 10 workers would be employed.

It is assumed that construction materials, such as concrete, would be purchased locally in Prineville possibly creating additional employment opportunities. It is anticipated the construction workforce would be from local sources if not regional. The majority of the output, employment, and income impacts would be from the expenditures of the wages

earned by the workforce involved in construction activities, including the local workforce used to provide materials. Creation of jobs and any expenditure as a result of the project would be beneficial economically.

## 3.15 Environmental Justice

Executive Order 12898, dated February 11, 1994, requires agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities as well as the equity of the distribution of the benefits and risks. Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group should bear a disproportionate share of negative impacts.

### 3.15.1 Affected Environment

The area around Bowman Dam and Prineville Reservoir is located in Crook County; therefore, the county was selected as the local study area. Table 9 provides the numbers and percentages of population for seven racial categories (White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other Race, and Two or More Races), and the Hispanic or Latino population (U.S. Census Bureau 2000). The Hispanic or Latino population of the study area is less than the State, 5.6 percent and 8.0 percent, respectively.

**Table 8. Race and ethnicity for the Crook County area.**

	Number	Percent
Total population	19,182	–
Population of one race	18,907	98.6
White	17,830	93
Black or African American	8	–
American Indian and Alaska Native	250	1.3
Asian	82	0.4
Native Hawaiian and other Pacific Islander	6	–
Some other race	731	3.8
Population of two or more races	275	1.4
Hispanic or Latino	1,082	5.6

Low-income populations are identified by several socioeconomic characteristics. As categorized by the 2000 Census, specific characteristics include income (median family and per capita), percentage of the population below poverty (families and individuals), unemployment rates, and substandard housing. Table 9 provides income, poverty, unemployment, and housing information for each county and the State (U.S. Census Bureau 2000).

**Table 9. Income, poverty, unemployment, and housing.**

	<b>Study Area Crook County</b>	<b>State of Oregon</b>
Income		
Median family income	\$44,951	\$47,385
Per capita income	\$21,313	\$25,097
Percent below poverty levels		
Families	12.4	9.3
Individuals	14.7	13.5
Percent unemployed for July 2009	18.7	11.9
Percent of housing		
1.01 or more occupants per room *	1.4	2.0
Lacking complete plumbing facilities	0.7	0.6
* 1.01 is an official category or unit classification used by the U.S. Census Bureau		

Median family income and per capita income for Crook County is \$44,951, less than the State's average of \$47,385. When compared to the State of Oregon, the study area has a greater percentage of families and individuals below the poverty level.

Other measures of low-income, such as unemployment and substandard housing also characterize demographic data in relation to environmental justice. In July 2009, the seasonally adjusted unemployment rate for Crook County was 18.7, greater than the State's 11.9 percent unemployment rate (OED 2009).

Substandard housing units are overcrowded and lack complete plumbing facilities. The percentage of occupied housing units with 1.01 or more occupants per room was 1.4 percent, less than the 2.0 percent for the State. The percentage of housing units lacking complete plumbing facilities in the study area was slightly greater than the State percentage.

### **3.15.2 Environmental Consequences**

#### **Alternative A – No Action**

Under the No Action alternative, no safety improvements to Bowman Dam will be constructed; therefore, there will be no impact to environmental justice.

#### **Alternative B – Parapet Wall Construction (Preferred Alternative)**

Under Alternative B, no adverse natural resource or socioeconomic impacts adversely affecting minority and low-income populations have been identified; therefore, there would be no impacts to environmental justice.

## **3.16 Cumulative Effects**

Reclamation has assessed past, present, and reasonably foreseeable future projects in the Bowman Dam area for significant cumulative effects. Reclamation's most recent EAs conducted in the Prineville Reservoir area, the Powder House Cove Expansion and the Prineville Reservoir Resource Management Plan, have resulted in a FONSI. The FONSI and the absence of any reasonably foreseeable projects in the Prineville Reservoir area support the conclusion that the Safety of Dams modifications at Bowman Dam would not result in a significant cumulative impact. No projects are scheduled to take place in the Bowman Dam area, presently or in the reasonably foreseeable future. Although the Federal Energy Regulatory Commission (FERC) has received two applications for license to construct a hydroelectric facility at Bowman Dam, these projects are highly unlikely to take place in the reasonably foreseeable future or during the implementation period of this project and were not analyzed for cumulative effects in this EA. Reallocation of the stored water in Prineville Reservoir has been an ongoing issue and would take Congressional authority to accomplish.

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## **Chapter 4 CONSULTATION AND COORDINATION**

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### **4.1 Agency Consultation**

#### **4.1.1 National Historic Preservation Act**

In compliance with Section 106 of the NHPA of 1966 (as amended in 1992), Reclamation consulted with the Oregon SHPO to identify cultural and historic properties in the area of potential effect. In a letter dated September 3, 2009, SHPO concurred that the property is not eligible for the NRHP in accordance with 36 C.F.R. Part 60.4 and no historic properties would be affected (Appendix C). In a subsequent letter dated October 8, 2009, the Oregon State Archaeologist agreed that the project will have no effect on any known cultural resources and concurred with the determination of *Not Eligible* for the historic site located at Big Bend Campground (Appendix C).

#### **4.1.2 Endangered Species Act (1973) Section 7 Consultation**

The ESA requires all Federal agencies to ensure that their actions do not jeopardize the continued existence of listed species or destroy or adversely modify their critical habitat. A list of species that may be present in Crook County, Oregon and are listed under the ESA was obtained from the USFWS web site. However, none occurs in the specific project area; therefore, consultation was not initiated.

#### **4.1.3 National Wild and Scenic Rivers Act**

In compliance with Section 7 of the Nation Wild and Scenic Rivers Act, Reclamation consulted with the river-administering agency, BLM, to determine if the proposed action would diminish any of the ORVs. In a letter dated February 9, 2010 BLM concurred that no ORVs would be diminished upon implementation of the proposed action. The letter is included as Appendix D.

### **4.2 Tribal Coordination and Consultation**

A scoping letter was sent to the CTWSR to involve and address any questions or concerns related to the proposed action. The letter also requested that the tribe inform Reclamation of any Indian Sacred sites located on or near the project area. No indication was received from

the tribe that any sacred sites existed or if they had any comments or concerns on the proposed action. Therefore, no further consultation was warranted.

### 4.3 Public Involvement

As part of the NEPA process, Reclamation submitted a press release to local radio and newspapers giving the dates of the scoping period and location and time of the public meeting. A scoping letter was sent to Federal and State agencies, Tribal Government, and local city and county officials soliciting comments, concerns, and issues related to the proposed action. A copy of the scoping letter is included in Appendix B. Two responses to the scoping letter or the press release were received during the July 6, 2009 to August 3, 2009 comment period. Both letters are included in Appendix B. Issues mentioned in the letters either supported the proposed action addressed in this EA or were outside the scope of the SOD program. A public scoping meeting was held in Prineville, Oregon on July 21, 2009. Thirty members of the public attended the meeting and thirteen of those asked questions during the question and answer period. No written comments were received during the meeting.

Reclamation issued a Draft EA for public comment in November 2009. The Draft EA was distributed to local, State, and Federal agencies, Tribes, land owners, and interested parties for public comment (Appendix E). Comment letters were submitted by the U.S. Fish and Wildlife Service (USFWS), Central Oregon Flyfishers, Oregon Department of Environmental Quality (ODEQ), Oregon Department of Fish and Wildlife (ODFW), Native Fish Society, Association of Northwest Steelheaders, the Bureau of Land Management (BLM), and two private citizens. Comments included:

- Consideration of measures to address fish passage at the dam, turbidity, and total dissolved gas (TDG) effects in the Crooked River below Bowman Dam.
- Preparation of a Feasibility Study and Environmental Impact Statement (EIS) to evaluate SOD alternatives and other issues at Bowman Dam, including hydroelectric facilities, unallocated storage, flow augmentation, and release structure upgrades.
- Modification of the existing rule curve for reservoir operations and use of unallocated storage to improve streamflows in the Crooked River for ESA purposes
- Provision of possible flow augmentation to meet in-stream water needs.
- Consideration of having an independent review of the parapet wall alternative as it is considered a marginal solution and the language used to define flood events, 3,800 year and 21,000 year events, is misleading and should not be used.

The comment letters are included as an attachment to this FONSI and Final EA as Appendix F. Where appropriate, the Final EA has been revised to reflect public and agency comment concerns. Reclamation did incorporate editorial revisions to clarify aspects of the document and to ensure accuracy.

## Chapter 5 LITERATURE CITED

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### Parenthetical Reference

### Bibliographic Citation

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Marx 1998	Marx, Steve. 1998. Fish Biologist. Oregon Department of Fish and Wildlife. Personal communication. December 16.
Marx 1999	Marx, Steve. 1999. Fish Biologist. Oregon Department of Fish and Wildlife. Personal communication. Email regarding the Prineville Reallocation Study. December 19.

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- Reclamation 1991 Bureau of Reclamation. 1991. *Finding of No Significant Impact and Final Environmental Assessment: Arthur R. Bowman Dam Safety of Dam Project, Crooked River Project, Oregon*. Pacific Northwest Region, Boise, ID.
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- Reclamation 2003a Bureau of Reclamation. 2003a. *Guidelines for Achieving Public Protection in Dam Safety Decisionmaking*. U.S. Department of the Interior. U.S. Bureau of Reclamation. Denver, Colorado. June 15.
- Reclamation 2003b Bureau of Reclamation. 2003b. *Final Environmental Assessment for the Prineville Reservoir Resource Management Plan and Master Plan*. Pacific Northwest Region. Boise, Idaho.
- Reclamation 2008 Bureau of Reclamation. 2008. *Draft Total Dissolved Gas Monitoring Summary Report Crooked River, Oregon, 2006 & 2007*. Pacific Northwest Region, Boise, Idaho.
- U.S. Census Bureau 2000 U.S. Census Bureau. 2000. 2000 Census American FactFinder: [Http://factfinder.census.gov](http://factfinder.census.gov)
- USFWS 2009 US Fish and Wildlife Service. 2009. Federally Listed, Proposed, Candidate Species and Species of Concern Under The Jurisdiction Of The Fish And Wildlife Service Which May Occur Within Crook County, Oregon. <http://www.fws.gov/oregonfwo/Species/Lists/Documents/County/CROOK%20COUNTY.pdf>. Last updated October 19, 2009.

# APPENDICES

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**Appendix A   Memorandum of Understanding  
between Bureau of Land Management and  
Bureau of Reclamation**

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## **Memorandum of Understanding**

**09 MU 1U 7175**

**Between**

**United States Department of the Interior  
Bureau of Land Management  
Prineville District Office**

**And**

**United States Department of the Interior  
Bureau of Reclamation  
Columbia-Cascades Area Office**

### **Background**

The Bureau of Reclamation (Reclamation) is proposing to implement a corrective action modification to meet the safety of dams needs at Arthur R. Bowman Dam located south of Prineville, Oregon. Reclamation has conducted analyses and produced reports over the past few years to develop the corrective action alternatives under Reclamation's Safety of Dams program.

From the Corrective Action Alternative Study, management identified the alternative that will be evaluated for environmental compliance prior to construction as required by the National Environmental Policy Act (NEPA). The preferred alternative to be analyzed is a six foot parapet wall along the upstream crest of the dam coupled with an enhanced emergency action plan. An Environmental Assessment (EA), which will encompass the entire project area, is anticipated to be the appropriate level of NEPA documentation.

Reclamation has authority under the Reclamation Act of June 17, 1902 (32 Stat. 388) to fund and perform construction on Reclamation lands. The geographic scope of the EA will include lands managed by the Bureau of Land Management (BLM). The Big Bend Campground, managed by BLM and located downstream of Arthur R. Bowman Dam will be analyzed as a potential staging area for construction activities. The Crooked Wild and Scenic River corridor will also be taken in to the evaluation as applicable. Based on existing agreements between Reclamation and BLM that include the National Interagency Agreement (1983) and the Lower Crooked Wild and Scenic River Management Plan (1992) and the presence of BLM managed lands within the project area, Reclamation seeks to have BLM as a cooperating agency for this NEPA process.

### **Purpose**

The purpose of this MOU is to identify the respective roles of Reclamation and BLM for NEPA compliance for the Arthur R. Bowman Safety of Dams Modification Environmental Assessment.

## Objectives

This MOU defines general and collective responsibilities for Reclamation as the lead agency and BLM as a cooperating agency for the Arthur R. Bowman Safety of Dams Modification Environmental Assessment which geographic scope encompasses Reclamation lands, BLM lands, and lands under BLM management.

## Implementing Actions

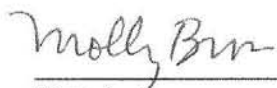
1. Reclamation will:
  - a. Be the lead agency responsible for completing the EA and associated activities;
  - b. Consult with BLM on the project and management activities related to the Big Bend Campground and other associated activities;
  - c. Provide a schedule for the NEPA process.
  - d. Provide a preliminary draft EA, preliminary final EA, and preliminary FONSI for review.
2. BLM will:
  - a. Be a cooperating agency for the EA in order to provide the NEPA compliance needed to evaluate construction and related activities on land under management by BLM;
  - b. Provide technical information and assistance to Reclamation related to lands affected which are managed by BLM, in a timely manner;
  - c. Conduct a review of the preliminary draft EA and preliminary final EA in accordance with the schedule developed by Reclamation, and provide comments as necessary to Reclamation.
  - d. Provide own funding for actions as a cooperating agency.

## General Provisions

1. Nothing herein shall or shall be construed to obligate Reclamation to expend or involve the United States of America in any contract or other obligation for the future payment of money in excess of appropriations authorized by law and administratively allocated for the purposes and projects contemplated hereunder.
2. No member of or delegate to Congress, or resident Commissioner, shall be admitted to any share or part of this MOU or to any benefit that may arise out of it.
3. Either party may terminate this MOU by providing 60 days written notice to the other party. Unless so terminated, this MOU will expire on 12/31/2012.

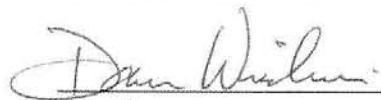
## Signatures

for  
Bureau of Land Management

 7/21/09

Signed \_\_\_\_\_ Date \_\_\_\_\_  
Molly Brown  
Deschutes Resource Area Manager

for  
Bureau of Reclamation

 7/21/09

Signed \_\_\_\_\_ Date \_\_\_\_\_  
Dawn Wiedmeier  
Acting Columbia-Cascades Area Manager

## Appendix B Scoping Correspondence

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IN REPLY REFER TO:

## United States Department of the Interior

BUREAU OF RECLAMATION  
Columbia-Cascades Area Office  
1917 Marsh Road  
Yakima, Washington 98901-2058



PN-3822  
ENV-6.00

JUL 6 2009

Interested Parties (See Enclosed List)

Subject: Public Scoping Meeting for the National Environmental Policy Act (NEPA)  
Process for the Safety of Dam Modification to the Arthur R. Bowman Dam,  
Crooked River Project, Oregon

Dear Ladies and Gentlemen:

Your input is requested to begin the environmental evaluation of the proposed corrective action modification to Arthur R. Bowman Dam. The proposed corrective action modification is a federal action subject to the NEPA and other environmental laws and regulations. Under the proposed action, Bureau of Reclamation would implement modifications to Arthur R. Bowman Dam that consists of a six foot parapet wall along the upstream crest of the dam and enhanced emergency action plan to correct safety deficiencies during a large flood event which were identified through a safety of dams study.

A public scoping meeting has been scheduled so individuals and organizations may present their ideas, views, and comments on the proposal and the impacts to be considered.

- **Tuesday July 21, 2009** beginning at 7:00 p.m. in **Prineville, Oregon**, at the Crook County Fairgrounds, 1280 S. Main St., Carey Foster Hall. Facilities are wheelchair accessible. If additional accommodations or language interpretation are required, please contact Mr. Larry Wolf, as indicated below, at least seven days prior to the meeting.

We also invite you to send your written comments on this proposal to Mr. Larry Wolf, Civil Engineer, U.S. Bureau of Reclamation, Pacific Northwest Regional Office, Mailstop PN-3250, 1150 S. Curtis Road, Suite 100, Boise ID 83706. Comments must be received by Monday August 3, 2009. If you have any questions concerning the proposal or the NEPA process, contact Mr. Larry Wolf at 208-378-5220 or [lwolf@usbr.gov](mailto:lwolf@usbr.gov).

Sincerely,

Gerald W. Kelso  
Area Manager

Enclosures







IN REPLY REFER TO:

CCA-1614  
ENV-6.00

United States Department of the Interior  
BUREAU OF RECLAMATION  
Columbia-Cascades Area Office  
1917 Marsh Road  
Yakima, Washington 98901-2058

JUL 13 2009

Honorable Mr. Ron Suppah  
Tribal Council Chairman  
P.O. Box 1299  
Warm Springs, OR 97761

Subject: Public Scoping Meeting for the National Environmental Policy Act (NEPA)  
Process for the Safety of Dam Modification to the Arthur R. Bowman Dam,  
Crooked River Project, Oregon

Dear Honorable Mr. Suppah:

The Bureau of Reclamation is requesting input to begin the environmental evaluation of the proposed corrective action modification to Arthur R. Bowman Dam. The proposed corrective action modification is a federal action subject to the NEPA and other environmental laws and regulations. Under the proposed action, Reclamation would implement modifications to Arthur R. Bowman Dam that consist of a six-foot parapet wall along the upstream crest of the dam and enhanced emergency action plan to correct safety deficiencies during a large flood event.

A public scoping meeting has been scheduled so individuals and organizations may present their ideas, views, and comments on the proposal and the impacts to be considered.

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We also invite you to send your written comments on this proposal to Mr. Larry Wolf, Civil Engineer, U.S. Bureau of Reclamation, Pacific Northwest Regional Office, Mailstop PN-3250, 1150 S. Curtis Road, Suite 100, Boise ID 83706. Comments must be received by Monday August 3, 2009. If you have any questions or concerns please contact Mr. Corey Carmack, Tribal Liaison, at 509-575-5848, extension 210 or [ccarmack@usbr.gov](mailto:ccarmack@usbr.gov).

Sincerely,

*151 Dawn Wiedmeier*

Dawn A. Wiedmeier  
Acting Area Manager

Enclosures

OFFICIAL FILE COPY		
DATE	SURNAME	COI
7/6	Carmack	1614
7/13	Wiedmeier	1600
7/9/09	Wiedmeier	1000
Classification		
Project		
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Folder I.D. 09045777		



Identical Letter Sent To:

Mr. Bobby Brunoe  
Director, Natural Resources  
Confederated Tribes of Warm Springs  
1233 Veterans St.  
Warm Springs, OR 97761

Ms. Jody Calica  
Confederated Tribes of Warm Springs  
P.O. Box C  
Warm Springs, OR 97761

Mr. Brad Houslet  
Confederated Tribes of Warm Springs  
P.O. Box C  
Warm Springs, OR 97761

Ms. Deepak Sehgal  
Confederated Tribes of Warm Springs  
P.O. Box C  
Warm Springs, OR 97761

Mr. Jim Manion  
Confederated Tribes of Warm Springs  
General Manager  
P.O. Box 960  
Warm Springs, OR 97761

Mr. Delford Johnson  
Confederated Tribes of Warm Springs  
P.O. Box C  
Warm Springs, OR 97761

Mr. Roy Spino  
Confederated Tribes of Warm Springs  
P.O. Box 1196  
Warm Springs, OR 97761

bc: PN-3250 (Wolf), PN-3032 (Hessman), CCA-1000 (Wiedmeier), CCA-1600 (Kaumheimer),  
CCA-1704, BFO-1413 (Horting-Jones)

WBR:CCarmack:EGalvez:07/09/09:509-575-5848, Ext. 210  
U:/msword/eg/corey/Bowman Scoping Ltr.-Mod. To Arthur R. Bowman



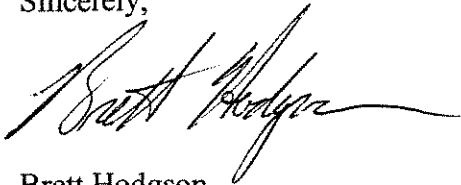


The tailrace section of the Crooked River is inhabited by an important conservation level population of redband trout which supports an extremely popular recreational fishery. Furthermore, as part of the effort to reintroduce anadromous species into the Upper Deschutes River basin, this reach will be inhabited by federally threatened Mid-Columbia summer steelhead beginning in spring 2010. The Department recommends construction activity associated with the Safety of Dams project should also remedy water quality and fish health issues associated with operation of Bowman Dam.

The Department will need to review more detailed designs to evaluate the scope of the magnitude of construction of a six foot parapet wall. Upon this review, if it is determined the proposed activity constitutes greater than a 30% modification of the existing structure then this serves as a trigger for fish passage requirements. ORS 509.585 states “a person owning or operating an artificial obstruction may not construct or maintain an artificial obstruction across any waters of the state that are inhabited, or historically inhabited by native migratory fish without providing passage for native migratory fish”. In lieu of passage, an owner or operator of an artificial obstruction may submit an application to the Fish and Wildlife Commission for a passage waiver or exemption. A waiver requires mitigation that results in a net benefit to fisheries, while an exemption states there would not be a benefit to native migratory fish species gained through passage.

The Department appreciates the opportunity to comment on the Bureau’s Safety of Dams project on Arthur R. Bowman Dam and we look forward to continued dialogue as the process moves forward. Please feel free to contact me at 541-388-6363 or [brett.l.hodgson@state.or.us](mailto:brett.l.hodgson@state.or.us) if you would like to discuss this matter.

Sincerely,

A handwritten signature in black ink, appearing to read "Brett Hodgson", with a long, sweeping horizontal line extending to the right.

Brett Hodgson  
Deschutes District Fish Biologist

C Stuart, Apke, Harrington – ODFW  
Rieber – BOR  
McSwain – BLM  
Lickwar – USFWS  
Kasberger - OID

July 12, 2009

Mr. Larry Wolf  
Civil Engineer  
Bureau of Reclamation  
1150 North Curtis Road  
Suite 100  
Boise, ID 83706-1234

Dear Mr. Wolf,

We strongly encourage you to make the proposed modifications to Prineville Reservoir's Bowman Dam, specifically, to extend its height by at least six (6) feet. We are the owners of 10 rental homes in Prineville, which are located at these addresses:

- 705 SE Elm, Prineville, OR 97754
- 2075 NE Elk Street, Prineville, OR 97754
- 281 SW 3<sup>rd</sup> Street, Prineville, OR 97754
- 726 NE Lookout Avenue, Prineville, OR 97754
- 268 Dunham, Prineville, OR 97754
- 515 NE Black Bear St., Prineville, OR 97754
- 2800 Slayton Court, Prineville, OR 97754
- 1242 SE 8<sup>th</sup> Street, Prineville, OR 97754
- 1465 Mason Drive, Prineville, OR 97754
- 989 Snowberry, Prineville, OR 97754

If the dam breaks, many of these homes will be flooded. Most have families with small children; two have elderly people. Certainly, we are concerned about the value of our property, but also about the safety of our renters, many of which have been with us over a "long term".

In recent years, Central Oregon has seen unusual weather events which have produced golf ball-sized hail, downpours and violent thunderstorms that activated the Emergency Broadcasting System. In the late 1990s, we experienced a "freak flood" caused by the build-up and collapse of an ice dam on Ochoco Creek. At that time, many homes were flooded. It devastated our little community. We remain concerned about flooding in Prineville. It is for that reason that we strongly encourage you to extend the Bowman Dam's height by **at least** six feet.

Thank you very much for considering our testimony.

Toby and Michel Bayard  
20555 Bowery Lane  
Bend, OR 97701



## **Appendix C   State Historic Preservation Office Correspondence**

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# Oregon

Theodore R. Kulongoski, Governor

## Parks and Recreation Department

State Historic Preservation Office

725 Summer St. NE, Suite C

Salem, OR 97301-1266

(503) 986-0707

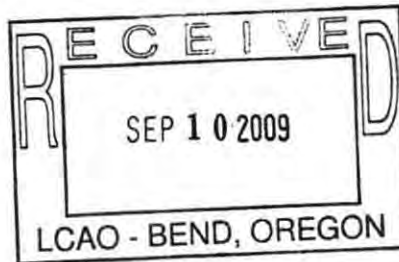
FAX (503) 986-0793

[www.hcd.state.or.us](http://www.hcd.state.or.us)

September 03, 2009

Ms. Chris Horting-Jones  
BOR LCAO BFO  
1375 SE Wilson STE 100  
Bend, OR 97702-1435

RE: SHPO Case No. 09-1928  
Crooked River Proj/Bowman Dam  
17S 16E 11, , Crook County



Nature  
HISTORY  
Discovery

Dear Ms. Horting-Jones:

We have reviewed the materials submitted on the project referenced above, and we concur with the determination that the property is not eligible for the National Register of Historic Places in accordance with 36 CFR Part 60.4. Additionally, there will be no historic properties affected for this undertaking.

Our response here is to assist you with your responsibilities under Section 106 of the National Historic Preservation Act (per 36 CFR Part 800). Please feel free to contact me if you have further questions, comments or need additional assistance.

Sincerely,

Stephen P. Poyser, Ph.D.  
Review and Compliance Specialist  
(503) 986-0686 or [Stephen.Poyser@state.or](mailto:Stephen.Poyser@state.or).

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# Oregon

Theodore R. Kulongoski, Governor

## Parks and Recreation Department

State Historic Preservation Office

725 Summer St. NE, Suite C

Salem, OR 97301-1266

(503) 986-0707

FAX (503) 986-0793

[www.hcd.state.or.us](http://www.hcd.state.or.us)

9/22/2009

Ms. Chris Horting-Jones  
BOR LCAO BFO  
1375 SE Wilson STE 100  
Bend, OR 97702-1435



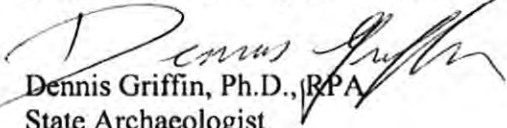
Nature  
HISTORY  
Discovery

RE: SHPO Case No. 09-1928  
Crooked River Proj/Bowman Dam  
17S 16E 11, Crook County

Dear Chris:

Thank you very much for getting in touch with our office this morning regarding the above project. According to the information you have shared with us, the earlier proposed Big Bend Campground staging area has been removed from the above project. My earlier letter noted that our office did not have a copy of a 2007 survey for the campground area which you have graciously offered to send us a copy. This is greatly appreciated. Given that the campground area has been removed from the proposed project, and you have provided clarification regarding other earlier surveys in the area I concur with your recommendation that the project will have no effect on any known cultural resources. No further archaeological research is needed with this project.

Please be aware, however, that if during development activities you or your staff encounters any cultural material (i.e., historic or prehistoric), all activities should cease immediately and an archaeologist should be contacted to evaluate the discovery. Under state law (ORS 358.905-955) it is a Class B misdemeanor to impact an archaeological site on public or private land in Oregon. Impacts to Native American graves and cultural items are considered a Class C felony (ORS 97.740-760). If you have any questions regarding any future discovery or my letter, feel free to contact our office at your convenience.

  
Dennis Griffin, Ph.D., RPA  
State Archaeologist  
(503) 986-0674  
[dennis.griffin@state.or.us](mailto:dennis.griffin@state.or.us)

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# Oregon

Theodore R. Kulongoski, Governor

## Parks and Recreation Department

State Historic Preservation Office

725 Summer St NE, Ste C

Salem, OR 97301-1266

(503) 986-0671

Fax (503) 986-0793

[www.oregonheritage.org](http://www.oregonheritage.org)



10/8/2009

Ms. Chris Horting-Jones  
BOR CCAO BFO  
1375 SE Wilson STE 100  
Bend, OR 97702-1435

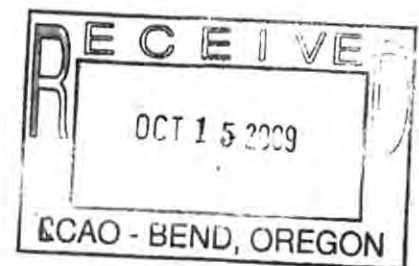
RE: SHPO Case No. 09-1928  
Crooked River Proj/Bowman Dam  
17S 16E 11, Crook County

Dear Chris:

Our office recently received a copy of the 2009 BLM survey report for the Big Bend Campground area and the newly recorded site. I have reviewed this report (SHPO# 22772) and site form (35CR1308) and agree that the project will have no affect on any known cultural resources. Our office concurs with your determination of Not Eligible for the site. No further archaeological research is needed with this project.

Please be aware, however, that if during development activities you or your staff encounters any cultural material (i.e., historic or prehistoric), all activities should cease immediately and an archaeologist should be contacted to evaluate the discovery. If you have any questions regarding any future discovery or my letter, feel free to contact our office at your convenience.

Dennis Griffin, Ph.D., RPA  
State Archaeologist  
(503) 986-0674  
[dennis.griffin@state.or.us](mailto:dennis.griffin@state.or.us)



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## **Appendix D Wild & Scenic Rivers Act: Section 7 Determination**

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**United States Department of the Interior  
BUREAU OF LAND MANAGEMENT**

**Prineville District Office  
3050 NE Third Street  
Prineville, Oregon 97754**



**In Reply Refer to:**  
8351(ORP060)

FEB 9 2010

James B. Taylor  
Bureau of Reclamation  
Pacific Northwest Region  
1150 N. Curtis Rd., Suite 100  
Boise, ID 83706-1234

**Bureau of Reclamation Proposed  
Bowman Safety of Dams Modification  
Wild & Scenic Rivers Act: Section 7 Determination**

**Background:**

The agency administering the Wild & Scenic River (WSR) is responsible for evaluating the effects of a project that has the potential to affect the designated section when proposed by another federal agency. The effects of the project are evaluated to assure that the values for which the river was designated in the national system are protected. In the analysis process, opportunities for improved design may lessen impacts on river resources and allow better connection of the river with its floodplain. (Wild and Scenic Rivers Coordinating Council. 1997. *Technical Report: Wild & Scenic Rivers Act: Section 7.*)

**1. Definition of Proposed Activity**

The United States Bureau of Reclamation (BOR) is proposing to make Safety of Dams Modifications to the Arthur R. Bowman Dam which is located immediately above and partially within the Lower Crooked Wild and Scenic River, Oregon. The Bureau of Land Management (BLM), which has management authority for this section of river, is cooperating in the NEPA process and development of the Environmental Assessment (EA) for this project.

The proposed action is to add a six foot high concrete parapet wall to the upstream side of the existing structure and a 2 foot reinforced concrete extension to the spillway walls to provide temporary storage to protect the structure from up to a 21,000-year flood event. The parapet wall is located outside but immediately adjacent to the WSR boundary and the spillway is located within the boundary. Project work would be conducted in the spring through fall of 2011. The effects of the project would not be expected to extend beyond the immediate vicinity of the dam. The project would not be expected to affect the scenic, recreation, fish or wildlife values of the Lower Crooked River. Scenic, recreation and fish are identified outstandingly remarkable values (ORVs) for this river. Wildlife is not identified as an ORV for this river segment.

The proposed dam modifications are in compliance with the management goals for the river as described in the Lower Crooked WSR (Chimney Rock Segment) Management Plan, (October, 1992.)

## **2. Effects on Within-Channel Conditions**

The proposed activity is located on the dam at the upper end of the WSR corridor. Information on the project impact on flood storage and flows is contained in the project EA. For an event exceeding a 3,800 year flood event, the project would prevent dam failure which would have significant impacts on channel conditions. The project would not be expected to affect within-channel conditions including water quality parameters.

## **3. Effects on Riparian and/or Floodplain Conditions**

The proposed action would not be expected to affect riparian areas, vegetation or soil properties within the existing reservoir and spillway capacity to accommodate a flood event. For an event exceeding the 3,800 year flood, the project would prevent dam failure which would have significant impacts on riparian and floodplain conditions. Temporary impacts to the recreation ORV during construction, including Big Bend and the Scenic Byway, are described in the EA. These impacts would be mitigated by limiting the construction staging area to the upstream portion of the campground and restricting work hours to weekdays. These temporary impacts would not exceed the 6 month period, May through October, of project construction.

## **4. Effects on Upland Conditions**

Access to the project site would be by existing roads. The dam modification would have no effect on upland conditions including vegetation, soil and upland hydrologic properties, nor would the project influence archaeological, cultural, wildlife, scenic or other identified significant resource values.

## **5. Effects on Existing Hydrologic or Biologic Processes.**

The project is designed to prevent failure of the dam structure in the event of a catastrophic flood. The project would not be expected to affect the amount or timing of flow in the channel, subsurface flow, flood storage, nor biological processes that would occur within the existing dam operational capacity. In the extremely unlikely event of a flood exceeding the existing dam's storage capacity, the no action alternative might allow for dam failure which in turn would cause significant impacts to the WSR's ORVs. The proposed action would likely prevent dam failure and thus provide mitigation of high discharge impacts to the ORVs.

## **6. Potential Off-Site Changes**

The affects of the project would not be expected to extend beyond the immediate vicinity of the dam except as noted in the event of dam failure. Views upstream of the dam would be obstructed by the wall, but this impact is outside the WSR corridor. Views downstream toward and within the WSR would be temporarily affected during construction activity, however -upon project completion- the spillway wall extension would not alter the existing visual character. Views of the upper 4 foot of the parapet would be marginally visible from a ½ mile down steam of the dam; however this would not alter the existing visual character of the 245 foot high dam structure.



#### **7. Time Scale**

The project is expected to be completed within one year from initiation and will have no long term or cumulative impacts on the WSR corridor except as noted in the event of dam failure.

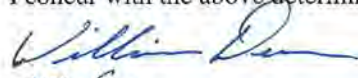
#### **8. Effects on Management Goals**

The proposed dam modifications are in compliance with the management goals for the river as described in the Lower Crooked WSR (Chimney Rock Segment) Management Plan, dated October, 1992. This includes maintaining the ORVs for which the river was designated in the National Wild and Scenic River System and those specifically required under Section 7 of the Act.

#### **9. Section 7 Determination**

Based on the information received by the applicant, the proposed dam modifications are not expected to affect the free flowing nature of the WSR, water quality, riparian areas and floodplain conditions, the outstandingly remarkable values and river classification.

I concur with the above determination.

 2/9/10  
Acting For

Molly M. Brown  
Field Manager, Deschutes Resource Area

For more information, please contact Henry Mottl, Recreation Planner, at the Prineville District Office, 541-416-6700.

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## **Appendix E   EA Distribution List**

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## **FEDERAL AGENCIES**

Miles Brown  
Bureau of Land Management  
3050 NE 3rd Street  
Prineville, OR 97754

Molly Brown  
Bureau of Land Management  
3050 NE 3rd Street  
Prineville, OR 97754

Scott Carlon  
NOAA Fisheries Service  
1201 NE Lloyd Blvd, Suite 1100  
Portland, OR 97232

Donald Chambers  
U.S. Army Corps of Engineers  
P.O. Box 2946  
Portland, OR

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Vance Tong  
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558 N Main Street  
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## **Appendix F   Public Comment Letters**

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Jim Taylor  
Natural Resource Specialist  
U.S. Bureau of Reclamation  
1150 North Curtis Road, Suite 100  
Boise, ID 83706-1234

Dear Mr Taylor,

On November 13 we received a copy of the Draft Environmental Assessment (EA) for proposed safety modifications to the Arthur R. Bowman Dam on the Crooked River south of Prineville Oregon.

We are supportive of the goals of the project, and are committed to assisting BOR with analysis of effects to determine whether or how to proceed with the proposed action.

As stated in the EA, the BLM and BOR signed a memorandum of understanding (MOU) regarding the preparation of this EA. The MOU states BOR will provide a preliminary draft EA, preliminary final EA, and preliminary Finding of No Significant Impact (FONSI). The intent of preliminary document reviews was to ensure that both BLM and BOR were comfortable with the EA prior to releasing the EA to the public. Please be sure that the Prineville BLM has an opportunity to review preliminary copies of the final EA and FONSI before they are released to the public.

As a reminder, since BOR is the lead agency, rather than a joint lead with BLM, the BLM will need to “adopt” BOR’s EA and issue its own FONSI and Decision Record.

I have attached our specific comments on the EA. Please do not hesitate to call me if you have any questions.

Sincerely,

Molly Brown, Field Manager  
Prineville District BLM

**Attachment 1:** BLM comments on Draft EA, Arthur R Bowman Safety of Dam Modifications

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# Attachment 1

## BLM comments on Draft Environmental Assessment for Arthur R. Bowman Safety of Dam Modifications

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### Map

It would be helpful if the map also showed BLM managed public land.

### Chapter 1

#### *Purpose & Need*

We are in full agreement that safety should be a high priority at this dam. However, the safety risk posed by a 3,500 year flood event seems remote. If this 3,500 year standard is a state or national requirement, it would be good to state that requirement here. Or maybe the purpose and need could include a more pressing problem or opportunity. Perhaps there are funds available for such work but only if it is done in the next year? Or does the proposed action provide additional water storage for irrigation? The purpose and need should tell us, Why this project, Why here, and Why now. Unless we do a good job of narrowing the Purpose and Need statement, we will have to entertain way too many reasonable alternatives of achieving the project goals. See additional discussion below under Alternatives Eliminated from Detailed Study.

#### *Cooperating Agencies*

It is true that "BLM also has Wild and Scenic River management responsibility for the Crooked River." It might be more forthcoming to state, "The BLM and BOR jointly adopted the existing Wild and Scenic River Management Plan. The BOR was a joint planning partner in preparation of the WSR plan and jointly signed the plan with BLM in 1992."

Since BOR is the lead agency on this EA, rather than a joint lead with BLM, the BLM will need to "adopt" BOR's EA and issue its own FONSI and Decision Record. It will be important to explain somewhere in Chapter 1 the decisions to be made, and clarify which decisions will be made by BOR, and which will be made by BLM. This clarification will need to be very clear in our separate FONSI and Decision Records.

Since we will be adopting the EA, we will need to post this EA to the BLM website, and store the EA in our archives. It would be useful if the EA cover page included a reference to the BLM NEPA Register Number assigned to this project: **DOI-BLM-OR-P060-2010-0016-EA.**

#### *Other Related Actions or Activities*

Add Reservoir Road to the sentence that references Alfalfa Market Road.

#### *Regulatory Compliance*

The list should also include the Wild & Scenic Rivers Act.

## Chapter 2

### *Introduction*

“Safety deficiencies” is a very broad term. Define this term related to the proposed actions and why they are necessary.

### *Alternative B*

The preferred alternative should also include a thorough on-site inspection of the existing dam outlet works; pipes, valves, etc., to determine if any are deficient, worn out, or not performing at safe operation ranges. If a pipe or valve is not operating in a safe operating range, this is the opportunity to get them replaced as part of this proposed action. Failure to include this field inspection and possible replacement could potentially result in dam failure, defeating the proposed action to bring the Bowman Dam into safe operation.

### *Alternatives Eliminated from Further Study*

There are very specific criteria that allow us to eliminate alternatives (see page 52 of the BLM NEPA Handbook). The rationale provided in this section should be limited to these criteria instead of straying into a comparison of environmental effects. If you are comparing environmental effects, this is a clue that your Purpose and Need might be too broad.

If “safety” remains as the sole purpose and need, there are additional alternatives that will need to be considered.

### *Miscellaneous Ch 2 comments*

What sort of erosion control measures would be employed at construction/temporary recreation sites to ensure eroded sediment from these activities does not reach the river?

## Chapter 3

### *Outstandingly Remarkable Values of the Wild & Scenic River*

This segment of the Crooked River, from the center line of Bowman Dam downstream for some distance, is a congressionally designated Wild and Scenic River. While the actual work to the dam will be outside the current boundary, much of the support work will occur within the corridor. As such, all Outstandingly Remarkable Values (ORVs) must be addressed and a determination made as to how the work will impact those values as we are required to protect and enhance same. The values, in this case, are scenic, fisheries and recreation. While the EA addressed fisheries and recreation, I saw only a brief reference to the W&S River designation in the recreation section, and no reference to its ORVs, or the joint BLM/BOR Wild and Scenic River Management Plan and its goals in the EA. This chapter should describe the outstandingly remarkable values (ORVs) that have been identified for this river, and how the alternatives would affect these values.

The EA should disclose if Section 7 of the Wild and Scenic Rivers Act has been followed. Section 7 requires the designated administering agency, the BLM, to review all federally assisted water resource projects within designated segments to ensure that such projects would not have a direct and adverse effect on the values for which these rivers were established.

### *Public Safety*

If the purpose and need is to prevent loss of life, etc due to dam failure, then there should be a section in Chapter 3 on Public Safety. The EA needs to include the effects of overtopping the spillway and/or a dam failure in the No Action Alternative. Since overtopping would occur from a 3,500 year flood event, the urgency and need to do something now needs to be answered (why here, why now). Is the real purpose and need to correct safety deficiencies by taking advantage of funding opportunities that are available now?

### *Wildlife*

Are there raptor/eagle nesting activities in the cliff areas close to the dam? If so, the timing of work could impact those species.

### *Transportation*

Add Reservoir Road with the mention of the Alfalfa Market Road.

Would the project necessitate any road improvements below the dam or on the State Highway? Will the equipment used to modify the top of the dam exceed ODOT bridge weight limits? The bridge weight limit tables are displayed in the EA, but there is no mention of answering this question. Would Highway 27 ever be closed during this operation? Would there be vehicle width restrictions? Potential effects to ranchers, homeowners, recreationists, commercial users, etc. should be discussed. Are the proposed activities on State Highway 27 coordinated with the Oregon Dept. of Transportation?

### *Recreation*

What is the expected window of or length of time the dam upgrades would occur? This could have varying impacts on river users.

No mention of the use of Highway 27 for recreational driving/sightseeing and bicycling. How will the proposed parapet wall affect bicycle use crossing the dam? Sightseeing is a major recreation activity in the project area therefore the analysis needs to address visual impacts.

Although the document states that workers would be commuting to the work site from close-by communities, will there be a need for any of the workers to use existing campgrounds rather than commute? We would like to work with BOR to identify a suitable time period for when and to what degree workers would use campsites, to avoid displacement of the general public. Displacement would be least likely if construction was in the winter. An alternative site other than BLM campgrounds would need to be identified if needed for worker's use during the summer period.

How is recreation user safety addressed? Use of the highway for the heavy trucks will create a safety issue for both motorized and bicycle users of State Highway 27.

How will the public be informed of the work, and subsequent potential impacts to their use of the river corridor?

### *Visual Resources*

This section should be added.

There is no description of the existing visual environment, existing visual character, key observation points (river, reservoir, backcountry byway, observation platform at the dam itself, etc..., or visual resource management goals and standards (BLM or State Parks plan direction). There appears to be no identification of the State Highway being a designated backcountry byway.

There is no analysis of visual impacts of the project. Would the view of the reservoir from the highway be blocked completely? Would this then increase the number of people stopping and parking on the upstream end of the bridge? People park there now, and it's a very small parking area. When people first get to the dam/reservoir, a lot of people want to stop and take in the view. There is a blue interpretive/education/project sign at the dam above the spillway. People park here, but it seems like this would no longer be a reservoir view? It would be good if the project could maintain scenic view opportunities and providing better interpretive opportunities. Could a raised walkway be placed next to the wall so that pedestrians could cross the dam and view the wall safely?

For the spillway wall extensions, how well will the new concrete walls match the existing? Will there be two colors of wall? The concrete used to elevate the proposed dam top and other proposed concrete structures need to be colored and or textured to blend in with the surrounding rock, to avoid visual contrasts with the surrounding landscape and the rocks that make Bowman Dam.

Given that scenery an ORV, visual resource management class inventory and contrast rating would be needed. Even though the actual wall construction will be just outside the W&S boundary, will there be visual impacts to the river users and/or reservoir users?

### *Cumulative Effects*

This section needs to be added.

Does the proposal for hydroelectric generation at this dam need to be discussed here? Are there other past, present or reasonably foreseeable future actions that might be relevant?

## **Chapter 4, Consultation and Coordination**

Add Section 7 W&S Rivers Act consultation.

## **Appendix C, EA Distribution List**

The BOR was a co-signer on the 1992 Lower Crooked River Wild and Scenic River Management Plan. Pages 6-11 of this plan list the federal, state, and local entities that have a role in management of this river. Not all of the entities on this list appear on the current EA's mailing list. For example, it does not appear that any coordination was done with the Oregon Division of State Lands or the Oregon State Police.

In addition, there are many people who have asked the BLM to allow them to comment on any project occurring on BLM managed public land on the Crooked River. Not all of these names appear on the current EA distribution list. Please contact us for a list of names to be added to the EA distribution list.

**From:** [Mike Ogle](#)  
**To:** [Taylor, James B](#)  
**Subject:** bowman dam  
**Date:** Thursday, December 24, 2009 3:57:28 PM

---

I would like to comment on the safety problems of Bowman dam. This should be a comprehensive overview of a very important asset (a full eis), since water quality of the Crooked River needs to be addressed. Water is very valuable in the arid regions of Oregon and The Crooked has water that is unallocated. We taxpayers and rate payers are spending hundreds of millions of dollars to bring back Steelhead and Chinook salmon to their traditional spawning grounds above the reservoir and fish passage needs to be addressed.

Sincerely,

Mike Ogle

2415 NE Jenni Jo Ct.

Bend, Oregon

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**From:** [Steve Memminger](#)  
**To:** [Taylor, James B](#)  
**Subject:** Comments for Bowman Dam upgrades  
**Date:** Monday, January 04, 2010 4:57:08 PM

---

Jim,

I'm Steve Memminger the Park Manager at Prineville Reservoir in Oregon. I was informed by the local BOR office that I needed to leave any comments with you regarding the EA for the Bowman Dam project. I previously talked with Mark Healy about this.

The only comment I had related to using the Powder House Cove parking area as a staging ground for the construction. I recommended that they not use this area for staging due to the amount of parking area it would eliminate during the peak use season. The area is heavily used and fills to capacity. Also, the park was recently paved and striped and we do not want heavy equipment on site that could degrade the pavement. I recommended to Mark that they look at using the highway shoulder wide spots if ODOT would allow or the area below the dam called Big Bend.

Steve Memminger, Park Manager  
Prineville Reservoir State Park  
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## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

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Reply To: 7625.016  
File Name: BOR Draft EA  
TS Number: 10-282  
TAILS: 13420-2010-CPA-0018

December 22, 2009

Ms. Dawn Wiedmeier  
Acting Area Manager  
U.S. Bureau of Reclamation  
1917 Marsh Road  
Yakima, WA 98901-2058

Re: Draft Environmental Assessment for Safety of Dams Modification at Bowman Dam

Dear Ms. Wiedmeier:

The U.S. Fish and Wildlife Service (Service) has reviewed the Bureau of Reclamation's (BOR) November, 2009, Draft Environmental Assessment Arthur R. Bowman Safety of Dams Modifications (Draft EA). The dam is located at about river mile 70 on the Crooked River in central Oregon, which is a major tributary of the Deschutes River. The BOR's preferred alternative "B" proposes constructing a six-foot high concrete parapet wall on the upstream side of the existing rock-fill dam. The parapet would provide an additional 30,000 acre-feet of emergency storage, and help protect against up to a 21,000 year flood event. The Crooked River downstream of the dam supports native fish including redband rainbow trout, as well as reintroduced steelhead and spring Chinook. Bull trout and Pacific Lamprey were historically present, but are currently extirpated. Steelhead and bull trout are both listed under the Endangered Species Act (ESA) as threatened species. The Service has ESA management responsibility for bull trout, while steelhead are administered by NOAA Fisheries.

The Draft EA notes that the Bowman Dam's flow releases over 800 cubic-feet-per-second cause elevated levels of Total Dissolved Gas (TDG), and that these effects will continue after the parapet is constructed. These TDG levels exceed State of Oregon standards for water quality, and the Oregon Department of Fish and Wildlife has found that the TDG has caused gas bubble disease in fish downstream of the dam. They found that as a result of Bowman Dam flow releases in 2006, some 67 percent of redband in the two-mile reach downstream of the dam had symptoms of gas bubble disease, which killed or injured some rainbow trout. It is likely that steelhead could be similarly affected.



Printed on 100 percent chlorine free/60 percent post-consumer content paper.

The Draft EA notes that bull trout are ESA listed, were historically present in the Crooked River, but are currently extirpated from the Crooked River downstream of Bowman Dam. This information is correct; however, please note that bull trout are present in the Crooked River downstream of the Opal Springs Hydro Project at about river mile 0.6. Based on this information, your document finds that the proposed parapet construction would not have any impacts to bull trout. In 2004 the Service concluded ESA consultation with the BOR regarding the operation and maintenance of its four Deschutes River basin projects, which included Bowman Dam, and concurred with the BOR's "may affect, not likely to adversely affect" finding for bull trout. The actions proposed in the Draft EA do not alter our previous effects concurrence. However, as fish passage is installed at various Crooked River diversions, including Opal Springs, we expect that bull trout will reoccupy the Crooked River in the area affected by Bowman Dam TDG. When this occurs, we recommend that you contact us to discuss possible effects to bull trout.

The Service recommends that the BOR consider measures to address TDG effects as part of their proposed action and Final EA analysis. It is our understanding that design alternatives that would help reduce TDG levels were considered in the BOR's 2006 value engineering study. Taking action to reduce TDG during parapet construction would take advantage of the equipment and staff mobilization already occurring. This would minimize costs, and also minimize environmental impacts by eliminating the need to remobilize in the future to take separate actions regarding TDG.

The Service appreciates the opportunity to comment on the Draft EA. We look forward to working the BOR on this project, and other projects currently in process. If you have any questions regarding this letter please contact me or Peter Lickwar of my staff at (541) 383-7146.

Sincerely,



Nancy Gilbert  
Field Supervisor

cc:  
Scott Carlon, NOAA  
Brett Hodgson, ODFW  
Brad Houslet, CTWS

**From:** [Greg D Apke](#)  
**To:** [Taylor, James B](#)  
**Cc:** [Brett Hodgson](#); [APKE Greg D](#); [Ray Hartlerode](#); [Rick Kepler](#)  
**Subject:** Bowman Dam DRAFT  
**Date:** Friday, December 18, 2009 6:15:59 PM

---

Mr. Jim Taylor (US BOR),

I have recently reviewed the Bowman Dam DRAFT EA (Crooked River, Oregon) and have an additional comment to add to an existing Oregon Department of Fish and Wildlife (ODFW) letter issued to the BOR Dec. 1, 2009.

After a more thorough review of the DRAFT EA I now have a more clear understanding of the preferred alternative to raise the dam height an additional 6-feet through the use of a parapet wall. Based on the information presented in the DRAFT EA, the activities described in the preferred alternative will "trigger" Oregon Fish Passage Statutes (ORS 509.585).

These Statutes and corresponding Administrative Rules require fish passage to be addressed @ the Arthur R. Bowman Dam. Activities that "increase storage capacity" at and existing fish passage artificial obstruction require the owner-operator of the artificial obstruction to address fish passage prior to the trigger event (construction). Oregon Fish Passage Law (ORS 509.580-509.910) requires ODFW review and approval of a fish passage plan prior to the trigger event, which in this case would be the construction of the proposed parapet wall. The BOR should contact Brett Hodgson or me so we can follow up on seeking solutions to the fish passage issue(s) which are not addressed in the DRAFT EA.

Oregon Fish Passage statutes allow fish passage to be addressed through:

1. provide fish passage to native migratory fish species at the artificial obstruction
2. seek a fish passage waiver at the artificial obstruction
3. seek a fish passage exemption at the artificial obstruction

If you have any questions, please contact me. Can you please forward along this ODFW comment to the appropriate staff, which I believe is Dawn Wiedmeir, Acting Area Manager with the BOR?

Thank you Jim.

**Greg Apke**

\*\*\*\*\*

**Greg Apke**

Oregon Department of Fish & Wildlife - Fish Division

Statewide Fish Passage Program Leader

3406 Cherry Ave NE

Salem, Oregon 97303

503-947-6228 office

503-931-4361 cell

<mailto:greg.d.apke@state.or.us>

[Fish Division: Fish Passage - Oregon Department of Fish and Wildlife](#)

\*\*\*\*\*

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## **Association of Northwest Steelheaders**

*PO Box 22065 • 6641 SE Lake Road • Milwaukie OR 97269*

**503-653-4176 • fax 503-653-8769**

[www.nwsteelheaders.org](http://www.nwsteelheaders.org)

December 17, 2009

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Contributions to ANWS are  
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Mr. Jim Taylor, Natural Resources Specialist  
US Bureau of Reclamation  
1150 N. Curtis Rd, Suite 100  
Boise, ID 83706-1234

**Subject:** Comments on the Draft EA for the Bowman Dam Modifications

Dear Mr. Taylor:

With the reintroduction of Chinook salmon and the ESA listed steelhead above Pelton-Round Butte (PRB) Dams, it is imperative that the USBR prepare and distribute for review a feasibility report and EIS that evaluates the Safety of Dams alternative modifications. This must also address the impact of USBR facilities and water extraction activities on fish and fish habitat and mitigation alternatives.

There are several topics that should be addressed. Such as:

- In-stream water need (possible need for flow augmentation to maintain minimum habitat needs);
- Total dissolved gas/nitrogen levels below the dam; and
- Fish passage

The timing of the needed Bowman Dam modifications with reintroduction of salmon and steelhead create a great opportunity and responsibility to make or prepare to make the project modifications part of the basin's restoration effort. The Association of Northwest Steelheaders looks forward to assisting in taking advantage of this opportunity.

Sincerely,

Paul Cathcart,  
Executive Director

Cc: Governor Ted Kulongoski  
Senator Ron Wyden  
Senator Jeff Merkley

Congressman Greg Walden  
Senator Doug Whitsett  
Representative George Gilman

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## Central Oregon Flyfishers

PO Box 1126 Bend, Oregon 97709

Received In Mailroom ENV-6.

DEC 14 2009

Yakima, Washington

December 7, 2009

Dawn Wiedmeir  
Acting Area Manager  
U.S. Bureau of Reclamation  
Columbia-Cascades Area Office  
1917 Marsh Road  
Yakima, WA 98901-2058

Re: Draft EA Safety of Dam Modification, Arthur R. Bowman Dam

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The Central Oregon Flyfishers (COF), an active fly fishing club with more than 240 members, have reviewed the Bureau of Reclamation's (BOR) Draft Environmental Assessment, Arthur R. Bowman Safety of Dam Modifications, Crooked River Project, Oregon (EA). In our discussions of this draft EA with the Oregon Department of Fish and Wildlife (ODFW), we both have common concerns about two issues: The elevated total dissolved gas (TDG) levels in the Crooked River below Bowman Dam and the potential need to accommodate fish passage at the dam.

We understand that the BOR's preferred alternative (Alternative B – the construction of a 6 foot high concrete parapet wall) would provide approximately 30,000 acre feet of additional emergency storage to protect up to a 21,000-year flood event. We recommend the BOR consider utilizing the increased storage capacity in Prineville Reservoir to modify the rule curve and increase flexibility in management of storage during the October-April non-irrigation season. This would result in improved stream flow in the Crooked River and increased redband trout and summer steelhead production. As you know, the redband trout are a State sensitive species and the population in the tailrace section supports a very popular recreational fishery. Also, the Mid-Columbia summer steelhead population is part of the ongoing effort to reintroduce steelhead in the Upper Deschutes River basin above the Pelton Round Butte Dam complex. This Mid-Columbia steelhead population is listed as threatened under the Endangered Species Act (ESA).

The draft EA preferred alternative would result in no water quality changes from the current condition. Presently, elevated TDG is generated by any spill event or discharge through the outlet works in excess of 800 cfs. TDG levels would continue to exceed the State of Oregon standard of 110% (OAR 340-041-0001 and OAR 340-041-0350). We understand the ODFW documented redband trout injury and mortality from gas bubble disease linked with the elevated TDG levels in 1989 and 2006. During the 2006 sampling activities, ODFW observed that 67% of the redband observed exhibited symptoms of gas bubble disease. The ODFW drift boat electrofishing operation documented a significant decline in the redband trout density in the two-mile reach of the Crooked River below Bowman Dam (591 trout >8 inches/mile vs. 8,026/mile in 1994) after the 2006 flood release. Fishing success of long time anglers indicates that the 2006 gas bubble disaster



## Central Oregon Flyfishers

PO Box 1126 Bend, Oregon 97709

was responsible for a massive kill of nearly all WF and RBT over 8 - 10 inches throughout the entire 8 miles of the Wild and Scenic reach. Elevated levels of TDG likely will need to be addressed in future ESA Section 7 consultations between the BOR and NOAA Fisheries re: the steelhead reintroduction. We understand that the BOR will undoubtedly need to periodically release large volumes of water from Bowman Dam to meet flood control requirements in the future. Until actions are taken by the BOR to mitigate these flood releases, flood releases exceeding 800 cfs will continue to result in elevated TDG levels leading to gas bubble disease and injury and mortality to both redband and listed summer steelhead.

From our ongoing discussions of the TDG issue on the Crooked River, we know that ODFW participated in the BOR's value engineering study which identified a series of design alternatives to mitigate the higher levels of TDG. The COF strongly recommends that the BOR heed the ODFW comments and take advantage of the opportunity the significant construction associated with the proposed dam modification project affords to address the TDG issue. Corrective action would bring the BOR in compliance with State water quality standards and eliminate this source of fish mortality on redband and summer steelhead.

According to the ODFW, the construction proposed in Alternative B would not modify the dam such that the 30% threshold would be reached and invoke ODFW's fish passage requirements (OAR 509.585). However, if ODFW's review of the draft engineering plan determines the construction exceeds the 30% benchmark, we understand that the BOR would enter into fish passage negotiations with the ODFW. The COF strongly supports the construction of a fish passage structure on Bowman Dam. Historically, before dams were constructed on the Deschutes and Crooked rivers, summer steelhead spawned in areas of the Crooked River above the current location of the Prineville Reservoir.

The COF appreciates the opportunity to comment on the BOR's proposed actions. We look forward to continued participation in this important project.

Sincerely yours,

*Dennis L. Rockwell*  
Dennis Rockwell  
President

Central Oregon Flyfishers  
P.O. Box 1126, Bend, OR 97709





December 10, 2009

Dawn Wiedmeir  
Acting Area Manager  
U.S. Bureau of Reclamation  
Columbia-Cascades Area Office  
1917 Marsh Road  
Yakima, WA 98901-2058

Re: Draft EA Safety of Dam Modification  
Arthur R. Bowman Dam

Dear Ms Wiedmeir:

The Oregon Department of Environmental Quality (DEQ) has reviewed the Bureau of Reclamation's (Reclamation) Draft Environmental Assessment, Arthur R. Bowman Safety of Dam Modifications, Crooked River Project, Oregon (EA). We would like to provide comments on some of the water quality impacts of Prineville Reservoir and Bowman Dam.

The Crooked River below Bowman Dam is included on the State's 303(d) list for not meeting water quality standards for total dissolved gas (TDG). According to a TDG generation curve developed by Reclamation, TDG levels in the Crooked River will exceed the state TDG standard of 110% (OAR 340-041-0031(2)) at flows greater than 800 cfs. This could either be flows due to a spill event or under normal operations through the outlet works. A second portion of the TDG standard also states that gas levels should not be deleterious to fish or other aquatic life (OAR 340-041-0031(1)). The Oregon Department of Fish and Wildlife has documented redband trout injury and mortality from gas bubble disease linked with elevated TDG levels in 1989 and 2006. During the 2006 sampling, 67% of redband trout observed exhibited symptoms of gas bubble disease.

As part of the development and implementation of the Total Maximum Daily Loads (TMDLs) for the Crooked River, Reclamation will be responsible for implementing management alternatives to ensure that the water quality standard for TDG is not exceeded as a result of Reclamation activities. The draft EA states that the preferred alternative would result in no water quality changes from the current condition and that structural solutions to the TDG problem below the dam were outside of the scope of the Safety of Dam Modification Project. We strongly recommend that Reclamation take advantage of the opportunity the significant construction associated with the safety of dam modification project affords to address the TDG issue. Corrective action would bring the Bureau in compliance with State water quality standards and eliminate this source of fish mortality on redband trout and summer steelhead.

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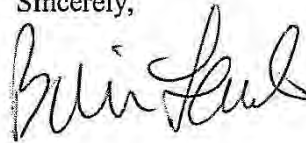
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Dawn Wiedmeir  
Acting Area Manager  
U.S. Bureau of Reclamation  
Columbia-Cascades Area Office  
Page 2

We would also like to comment on the turbidity observed in the Crooked River downstream of Bowman Dam. As you acknowledge in the draft EA, erosion from the upper Crooked River and associated tributaries contributes to turbidity and sediment loads in Prineville Reservoir. However, we do not agree with your later statement that the loads which are settled out in the reservoir do not contribute to the turbidity seen in the lower river segments. From my knowledge of the system, so much sediment has accumulated behind the dam, that the water released from the dam contains a high sediment load and turbidity, which impacts the lower river as soon as it is released from the dam. While this issue may be beyond the scope of this project, it is an issue which may need to be addressed in the future.

We appreciate the opportunity to comment on Reclamation actions and value our collaborative partnership in the Deschutes Basin. I can be reached at (541) 633-2027 or [lamb.bonnie@deq.state.or.us](mailto:lamb.bonnie@deq.state.or.us) if you would like to discuss this matter further.

Sincerely,

A handwritten signature in black ink, appearing to read "Bonnie Lamb", written in a cursive style.

Bonnie Lamb  
Deschutes Basin TMDL Coordinator

Cc: Brett Hodgson, ODFW



# Oregon

Theodore R. Kulongoski, Governor

Department of Fish and Wildlife

High Desert Region

61374 Parrell Road

Bend, OR 97702

(541) 388-6363

Yakima, Washington FAX (541) 388-6281

ENV-6.00

DEC 17 2009

December 11, 2009

Dawn Wiedmeir  
Acting Area Manager  
U.S. Bureau of Reclamation  
Columbia-Cascades Area Office  
1917 Marsh Road  
Yakima, WA 98901-2058

Re: Draft EA Safety of Dam Modification, Arthur R. Bowman Dam

Dear Ms Wiedmeir:

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The Department participated in the Bureau's 2006 value engineering study which identified a series of design alternatives to mitigate TDG levels. We strongly recommend the Bureau heed comments previously submitted during the scoping process and take advantage of the opportunity the significant construction associated with the safety of dam modification project affords to address the TDG issue. Corrective action would bring the Bureau in compliance with State water quality standards and eliminate this source of fish mortality on redband trout and summer steelhead.

The Department recommends the staging area for construction equipment and materials associated with the Safety of Dams project is located outside of the National Wild and Scenic River boundaries established for the Crooked River. The river reach below the stilling basin contains superior spawning gravel which is used extensively by redband trout. Staging activities could result in increased sediment loads negatively impacting spawning success and fish production.

The parapet wall would be a 1 foot thick, 6 foot high reinforced concrete wall with an 8 foot wide, 1 foot thick footing. It does not appear that dam modification of this magnitude would reach the 30% threshold and invoke ODFW's fish passage requirements (OAR 509.585). However, if upon Department review of draft engineering plans it is determined the construction exceeds the 30% benchmark it is anticipated the Bureau would enter into fish passage negotiations with the Department. We appreciate the opportunity to comment on Bureau actions and value our collaborative partnership in the Deschutes Basin. Please contact me at 541-388-6363 or [brett.l.hodgson@state.or.us](mailto:brett.l.hodgson@state.or.us) if you would like to discuss this matter further.

Sincerely,



Brett Hodgson  
Deschutes District Fish Biologist  
[brett.l.hodgson@state.or.us](mailto:brett.l.hodgson@state.or.us)

Cc Stuart, Harrington, Apke – ODFW  
McSwain, Smith – BLM  
Gilbert, Lickwar – USFWS  
Carlon – NOAA  
Houslett – CTWSOR  
Gorman – OWRD  
Lamb – DEQ  
Kasberger – OID  
Keil – PGE  
McCabe – Crook County  
Swift – American Rivers  
Priestly – Waterwatch  
Miller, Staab – Trout Unlimited  
Davis – Native Fish Society  
Heisler – Deschutes River Conservancy  
Seitz, Anderson – Central Oregon Flyfishers





December 15, 2009

Mr. Jim Taylor, Natural Resources Specialist  
US Bureau of Reclamation  
1150 N. Curtis Rd, Suite 100  
Boise, ID 83706-1234

**Subject:** Comments on the Draft EA for the Bowman Safety of Dam Modifications

The Draft EA is well written and easy to understand and that is appreciated.

There are a number of additional, but closely related Bowman Dam issues that are currently under consideration, so a comprehensive USBR feasibility report and EIS are essential. These should address the Crooked River and tributaries, the impact of USBR facilities and irrigation activities on it and the mitigation alternatives. These are particularly important with the reintroduction of Chinook salmon and the ESA listed steelhead above the Pelton-Round Butte (PRB) Dam complex.

I'll try to be brief.

1. **Numerous issues** regarding Prineville Reservoir are in play right now and attempting to avoid them by sidestepping on this important Safety of Dams project is not only a missed opportunity, but also likely to be a costly exercise in prematurely choosing a poor alternative.
2. The **total dissolved gas** (TDG) water quality problem caused by Bowman releases is very important and now is the time to address it. Moving forward and not doing so as suggested in the EA is not a good strategy from both cost and efficiency perspectives.
3. **Fish passage** at Bowman is essential for the reintroduction and habitat restoration of the ESA listed steelhead to be successful. Before upstream diversions and habitat damage began over a century ago the majority of steelhead spawning and rearing habitat in the Crooked River system occurred above Bowman and Ochoco dams. This critical habitat must be made available to steelhead once again. A major part of the over \$300 million being invested by the public and PGE is for Crooked River steelhead, so this points unequivocally toward passage at Bowman.
4. Utilizing the Big Bend Campground as a **staging area** would involve excessive disturbance close to the River and the riparian - stream bank areas. This should not be a staging area for construction, regardless of the eventual nature of the project.
5. The PGE proposal for a **hydroelectric facility** at Bowman must be considered in a feasibility evaluation of all the projects that can address the numerous challenges and needs, and in an EIS.
6. Over 82,000 acre-feet of **unallocated storage** is available in Prineville Reservoir. Much of that should be allocated to the ESA listed steelhead for downstream flow, including from Bowman Dam to PRB in the winter and below the Crooked River Feed Canal during the summer when water temperatures are a problem. This would also provide an important economic windfall – a 12- to 15-mile tailwater fishery below Bowman. For comparison the four-mile tailwater fishery in New Mexico's San Juan River below the USBR Navajo Dam provides \$20 to \$30 million annually in economic values according to the State.  
[http://www.wildlife.state.nm.us/recreation/fishing/documents/SanJuanRiverWhitePaperFinal\\_11-20-08.pdf](http://www.wildlife.state.nm.us/recreation/fishing/documents/SanJuanRiverWhitePaperFinal_11-20-08.pdf)

*Native Fish Society – Upper Deschutes; 69217 Tapadero, Sisters, OR 97759; 541 542 1222 – [tomlin2@bendcable.com](mailto:tomlin2@bendcable.com)*

7. The Crooked River irrigation diversions and Bowman Dam have resulted in a complex flow system from Bowman to Lake Billy Chinook (LBC). One important aspect of the needed feasibility study is to evaluate the delivery alternatives for **flow augmentation in various reaches** of the River system. The objective would be to preclude and eliminate thermal blockages to steelhead, Chinook and bull trout passage by providing cold water at critical release points. Using the existing water delivery systems, such as the North Unit Canal, and new delivery systems should be evaluated.
8. The **release structures** should be upgraded so that flow releases can always be at least 70 cfs.
9. Based on my cursory review, the "**parapet wall**" alternative appears to be a marginal solution. Given the threat to Prineville from any type of failure, I recommend an independent review of the structural and hydraulic aspects. This alternative may appear to obviate the need to consider passage, but it is possibly shortsighted and counterproductive.
10. The USBR determined the **probable maximum flood (PMF)** for Bowman Dam. I'm familiar with the methodology having performed PMF studies for potential dam sites in the Umatilla basin while working at the Bureau in the mid '60s. It is misleading and technically inaccurate to say the PMF is equivalent to a 3500-year event. Data is not available for a period long enough to compare deterministic/stochastic results with such statistics. This also applies to the comparison on page 7 involving a 21,000-year event.

The Crooked-Ochoco system is complex and the reintroduction of Chinook and ESA listed steelhead makes it essential to look at solutions to all the water/fish related opportunities and problems. The stumbling blocks are many, but there are many economic, biologic, endangered species and safety opportunities. This is the time to professionally examine them.

The Native Fish Society would be glad to help obtain funding for such a feasibility study and the implementation of win-win solutions.

Thank you,

*Tom Davis*

H. Tom Davis, PE

Native Fish Society  
Volunteer River Steward - Upper Deschutes

CC –  
Trout Unlimited  
Association of Northwest Steelheaders  
Central Oregon Flyfishers  
Water Watch of Oregon  
American Rivers  
ODEQ  
ODFW

Governor's office  
Senator Wyden  
Senator Merkley  
Congressman Walden  
NOAA - NMFS  
Crooked River Watershed Council  
Deschutes River Conservancy





**From:** [dicksuekellogg@aol.com](mailto:dicksuekellogg@aol.com)  
**To:** [Taylor, James B](#)  
**Subject:** Bowman Dam EA  
**Date:** Friday, December 18, 2009 10:23:08 AM

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December 18, 2009

Jim Taylor  
Natural Resources Specialist  
Bureau of Reclamation  
1150 North Curtis Road, Suite 100  
Boise, Idaho 83706-1234

Dear Jim,

Fish Passage at Bowman is essential for the reintroduction and habitat restoration of the ESA listed steelhead to be successful. Before upstream diversions and habitat damage began over a century ago the majority of steelhead spawning and rearing habitat in the Crooked River system occurred above Bowman and Ochoco dams. This critical habitat must be made available to steelhead once again. A major part of the over \$300 million being invested by the public and PGE is for Crooked River steelhead, so this points unequivocally toward passage at Bowman. This must now be examined by a comprehensive USBR feasibility evaluation.

The Crooked-Ochoco system is complex and the reintroduction of Chinook and ESA listed steelhead makes it essential to evaluate possible solutions to all the water/fish related opportunities and problems. There are many economic, biologic, endangered species and safety opportunities. This is the time to examine these issues.

Sincerely,

Dick Kellogg  
26247 Metolius Meadows Drive  
Camp Sherman, OR

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