



— BUREAU OF —
RECLAMATION

2020 Annual Report

**Bureau of Reclamation Report on Monitoring and Implementation
Activities Associated with the U.S. Fish and Wildlife Service 2005
Biological Opinion for Operation and Maintenance of the Bureau of
Reclamation Projects in the Snake River Basin above Brownlee Reservoir**



U.S. Department of the Interior
Bureau of Reclamation
Columbia-Pacific Northwest Region
Snake River Area Office
Boise, Idaho

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Mission Statements

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper.

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.

Cover Photograph: A ranging horse crosses the North Fork Malheur River above the inflow to Beulah Reservoir, Malheur County, Oregon. (Photograph taken by Amy Goodrich).

Acronyms and Abbreviations

Acronym or Abbreviation	Description
af	acre-feet
cfs	cubic feet per second
CPUE	Catch Per Unit Effort
eDNA	Environmental DNA
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
IDFG	Idaho Department of Fish and Game
ITS	Incidental Take Statement
NOAA	National Oceanic and Atmospheric Administration
O&M	Operations and Maintenance
Opinion	Biological Opinion
Reclamation	Bureau of Reclamation
RPM	Reasonable and Prudent Measure
T&C	Terms and Conditions
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WY	Water Year

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Table of Contents

1.	Introduction.....	1
1.1	Bull Trout.....	2
1.2	Snake River Snails	3
1.3	Yellow-billed Cuckoo.....	4
2.	Summary of 2020 Operations.....	4
2.1	Idaho	5
2.1.1	Boise River Basin Operational Indicators	5
2.1.2	Payette River Basin Operational Indicators.....	11
2.2	Oregon	14
2.2.1	Malheur River Basin Operational Indicators	14
2.2.2	Powder River Basin Operational Indicators.....	17
3.	Bull Trout	20
3.1	Boise River Basin.....	20
3.1.1	Boise River Basin Data Collection.....	21
3.1.2	Fish Sampling	21
3.1.3	Other Activities	22
3.2	Payette River Basin – Deadwood River System.....	24
3.2.1	Data Collection in the Deadwood River Basin	24
3.3	Malheur River Basin – Beulah Reservoir and the North Fork Malheur River.....	25
3.3.1	Temporary Water Lease	25
3.3.2	Trap-and-Haul Efforts	25
3.3.3	Other Activities	26
3.3.4	Malheur River – Redd Counts.....	26
3.4	Powder River Basin – Phillips Reservoir	27
3.4.1	Bull Trout Monitoring.....	27
3.4.2	Other Activities	28
4.	Snake River Physa	28

5. Literature Cited..... 29

List of Figures

Figure 1. Known distribution of bull trout populations (shaded areas on map) associated with Reclamation facilities in the Upper Snake River basin (Reclamation 2004)..... 3

Figure 2. Anderson Ranch Reservoir elevation (feet above sea level) for WY20..... 7

Figure 3. Anderson Ranch Reservoir storage volume (af) for WY20. The straight line represents Reclamation’s Operational Indicator minimum threshold of 62,000 af of storage..... 7

Figure 4. Arrowrock Reservoir storage volume (af) for WY20. The straight red line represents Reclamation's Operational Indicator of reservoir volume of 200,000 af. Reservoir volume should exceed this minimum at the end of June. On June 30, 2020, Arrowrock Reservoir storage volume was 236,608 af. 10

Figure 5. Arrowrock Reservoir surface elevation (feet above sea level) for WY20 and discharge (cfs). The straight red line represents Reclamation’s fall minimum elevation threshold (September 15-October 31) of 3,100 feet. 11

Figure 6. Deadwood Reservoir storage volume (af) for WY20. The straight red line represents Reclamation’s Operational Indicator minimum threshold of 50,000 af of storage..... 13

Figure 7. Beulah Reservoir storage volume (af) for WY20. The straight red line represents Reclamation’s Operational Indicator minimum threshold of 2,000 af of storage. Lowest reservoir volume during reporting period occurred September 30, 2020 (7,286 acre feet)..... 16

Figure 8. Phillips Reservoir storage volumes (af) for WY20. Minimum active storage occurs when pool elevation reaches 4,009 feet above sea level (3,100 af of storage), corresponding to the point of inactive storage indicated by the red line. 19

Figure 9. Phillips Reservoir surface elevation (feet above sea level) for WY20. The operational indicator spring/summer minimum for mean daily reservoir elevation of 4,048 is indicated by the red line..... 19

Figure 10. Powder River inflows to Phillips Reservoir in WY20 measured in cfs and recorded at USGS Gage #13275105, Powder River at Husdpeth Lane near Sumpter, Oregon.....20

Figure 11. Data on bull trout redd trends observed in the North Fork Malheur River watershed (North Fork Malheur River) and carryover storage at the start of the Water Year in Beulah Reservoir, Water Years 1992–2018. The number of redds observed after 2007 has been adjusted by one to reflect the reduced size of the area surveyed. No redd count data exist for 2012, 2014, 2015, 2019 or 2020. See footnote 7 as this graph has been modified and corrected for previous years.....27

List of Tables

Table 1. Summary of amount or extent of anticipated take of bull trout associated with Reclamation’s Anderson Ranch Dam and Reservoir facility operations during the 2020 reporting period.6

Table 2. Summary of amount or extent of incidental take of bull trout associated with Reclamation’s Arrowrock Dam and Reservoir facility operations during the 2020 reporting period.8

Table 3. Summary of amount or extent of anticipated take of bull trout associated with Reclamation’s Deadwood Dam and Reservoir facility operations during the 2020 reporting period. 12

Table 4. Summary of amount or extent of anticipated take of bull trout associated with Reclamation’s Agency Valley Dam and Beulah Reservoir facility operations during the 2020 reporting period. 15

Table 5. Summary of amount or extent of anticipated take of bull trout associated with Mason Dam and Phillips Reservoir facility operations during the 2020 reporting period, as included in the monitoring and reporting plan finalized in 2016..... 18

Table 6. Fish stocking by IDFG in WY 2020 in the Boise River basin for all fish types 23

Table 7. Fish stocking by IDFG in 2020 in Deadwood Reservoir for all fish types.....25

1. Introduction

The Bureau of Reclamation (Reclamation) consulted with the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 7 of the Endangered Species Act (ESA) on 12 proposed actions involving the effects of future operations and routine maintenance at 12 Federal projects in the Upper Snake River basin on six different listed species known to occur in the area at that time (Reclamation 2004). In March 2005, USFWS completed a non-jeopardy Biological Opinion (2005 Opinion) for Reclamation's operations and maintenance (O&M) activities in the Snake River basin above Brownlee Reservoir (USFWS 2005). The 2005 Opinion contained a 30-year incidental take statement (ITS) for bull trout and corresponding reasonable and prudent measures (RPMs) that outlined nondiscretionary actions to minimize take of species listed under the ESA that may be impacted by Reclamation's operations (USFWS 2005). USFWS determined incidental take by correlating frequencies and magnitudes of streamflow and reservoir conditions at specific facilities with an estimate of population effects during critical seasonal time periods in the bull trout's life history. USFWS then described the amount or extent of incidental take at each facility based on operational thresholds.

At the time of the 2005 Opinion, bull trout (*Salvelinus confluentus*) were not known to exist in Phillips Reservoir¹ on the Powder River and, therefore, were not included in the 2005 Opinion or associated documents. In 2011, two bull trout were documented in Phillips Reservoir, necessitating that Reclamation consult with USFWS for bull trout in this area (Reclamation 2013). USFWS completed a non-jeopardy Biological Opinion in June 2014 (2014 Opinion) for Reclamation's O&M activities in the Powder River (USFWS 2014) as a companion document to the 2005 Opinion. The 2014 Opinion contains a 21-year ITS corresponding to the 2005 ITS and RPMs that outlines nondiscretionary actions to minimize take of bull trout in Phillips Reservoir.

The 2014 Opinion also included consultation on bull trout critical habitat for the same area analyzed in the 2005 Opinion. USFWS concluded that Reclamation's O&M of the Upper Snake River projects is not likely to destroy or adversely modify designated critical habitat for bull trout.

In addition to bull trout, the 2005 Opinion also included consultation on the Snake River physa (*Physa* [*Haitia*] *natricina*, hereafter physa). Monitoring for physa was reinitiated in 2012 in response to the Minidoka Dam spillway replacement project. Project construction was completed during the summer of 2015. Reclamation consulted on project operations following construction of the spillway. The consultation addressed Reclamation's impact to physa located in the Snake River above Brownlee Reservoir, including the Minidoka Dam spillway. Reclamation received a Biological Opinion (2015 Opinion) on May 8, 2015, finding that Reclamation's proposed operations are likely to adversely affect physa in the Minidoka Dam spillway. An ITS with associated Terms and Conditions (T&Cs) and RPMs was provided. The

¹ Phillips Reservoir was referred to as Phillips Lake in the 2004 Assessment.

consultation was aligned with ongoing actions associated with the long-term O&M of the current 2005 Opinion (USFWS 2005) and is considered a supplement to the 2005 Opinion.

The ITS in the 2005 Opinion has two main components: 1) T&Cs that incorporate a monitoring component to ensure the action agency does not exceed the amount or extent of incidental take described in the ITS, and 2) RPMs to minimize the amount or extent of take without altering the basic design, location, scope, duration, or timing of the action. The 2005 Opinion requires Reclamation to provide an annual report to USFWS by December 31 of each year that documents incidental take monitoring efforts and implementation status of all T&Cs and RPMs. At Reclamation's request (a letter dated November 13, 2007), USFWS agreed to permanently change the submittal date from December 31 to March 31 of the following year.

This document is submitted as Reclamation's annual report for Water Year (WY) 2020 (October 1, 2019, to September 30, 2020).

1.1 Bull Trout

This section summarizes annual water operations at bull trout projects and describes population monitoring and other relevant work associated with projects that address specific RPMs. In addition, this report may discuss other relevant bull trout work that is not managed by Reclamation but is directly relevant to bull trout or bull trout critical habitat within Reclamation's projects.

In its Monitoring and Implementation Plan (Reclamation 2006), Reclamation identified methods to monitor bull trout throughout the duration of the 2005 Opinion. Monitoring elements include evaluating RPMs through operational indicators and tracking population trends. These monitoring methods are continually reassessed and adjusted, as appropriate, to incorporate study findings and new technologies and methodologies as they are developed. To monitor compliance with the operational thresholds defined in the ITS, Reclamation monitored, evaluated, and summarized operations for WY20 in Reclamation's Hydromet system.² Operational thresholds affecting the amount or extent of anticipated take are described in Section 3.

Bull trout have been documented in five of Reclamation's facilities in the Upper Snake River basin. This report covers the four facilities assessed in Reclamation's 2004 Biological Assessment (BA) and 2005 Opinion (Anderson Ranch Dam and Reservoir; Arrowrock Dam and Reservoir; Deadwood Dam and Reservoir; and Agency Valley Dam and Beulah Reservoir), as well as Mason Dam and Phillips Reservoir, which were assessed in the 2013 Biological Assessment and 2014 Opinion. These facilities are shown in Figure 1.

² See Reclamation's Hydromet website at: <http://www.usbr.gov/pn/hydromet/select.html>

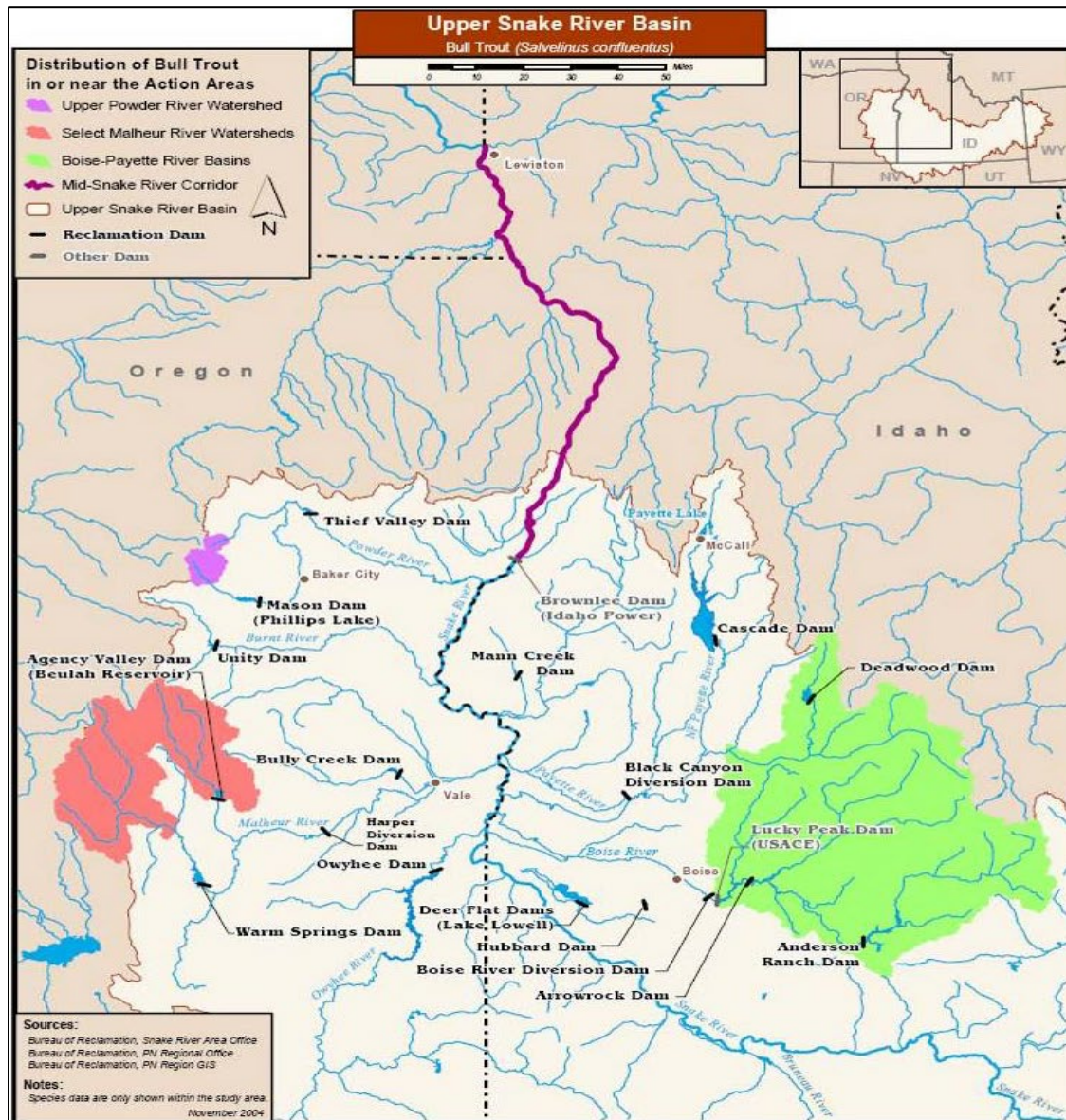


Figure 1. Known distribution of bull trout populations (shaded areas on map) associated with Reclamation facilities in the Upper Snake River basin (Reclamation 2004).

1.2 Snake River Snails

Previous annual reports to USFWS documented two species of snails in the Snake River basin: Utah valvata (*Valvata utahensis*) and Snake River physa. USFWS determined that Utah valvata did not meet the definition of an endangered or threatened species under the ESA. The Utah valvata was removed from the ESA list, thereby removing all protections and subsequent monitoring and reporting requirements provided by the ESA (75 FR 52272). Accordingly, 2010 was the last year Reclamation monitored the Utah valvata.

The physa remains an ESA-listed species; however, the 2005 Opinion did not provide an ITS, monitoring requirements, or T&Cs for physa due to the uncertainty of their presence in the

action area. Subsequent to the 2005 Opinion, physa were confirmed in the action area. A supplemental consultation with USFWS to address possible effects to physa from long-term operation of the newly constructed spillway at Minidoka Dam was completed in 2015. This supplemental consultation was initiated during construction of the spillway, which began in 2011 and was completed in the spring of 2015. The current take coverage for operations is covered under the *Biological Opinion for the Bureau of Reclamation, Operations and Maintenance above Brownlee Reservoir* (2015 Opinion) issued by USFWS in May 2015 (USFWS 2015). Information reported in this document is related to the most recent requirements set forth in this 2015 Opinion.

While Reclamation's physa monitoring requirements under the 2015 Opinion ended in 2017, Reclamation has continued to assist USFWS with ongoing survey efforts as personnel and funding allow. During the 2020 reporting period, Reclamation did not participate in ongoing USFWS-led suction dredge surveys for physa in the Snake River below Minidoka Dam, near the old Jackson Bridge site due to COVID-19 related travel restrictions. Reclamation has no immediate plans to independently perform surveys in the future.

1.3 Yellow-billed Cuckoo

Reclamation entered into informal ESA Section 7 consultation with USFWS in the fall of 2016 for the western Distinct Population Segment of the yellow-billed cuckoo (*Coccyzus americanus occidentalis*), following the USFWS determination to list this species as threatened in November 2014 (79 FR 67154). A Biological Assessment comprehensively evaluating effects to the yellow-billed cuckoo from Reclamation's operations in the Snake River basin above Brownlee Reservoir was submitted to USFWS in July 2017. In August 2017, USFWS issued a Letter of Concurrence with that BA's findings, stating that Reclamation operations are not likely to adversely affect the species.

In response to USFWS' February 27, 2020 Revised Critical Habitat Proposal for the species, Reclamation submitted formal comments regarding the proposed Critical Habitat *Unit 65: ID-1 Snake River 1*, as it relates to O&M at American Falls Dam and Reservoir. As of the submission of this report designated critical habitat has not yet been finalized.

2. Summary of 2020 Operations

The following information summarizing 2020 operations was included in Reclamation's 2020 annual progress report to the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service on Reclamation's Salmon Flow Augmentation Program:

At the beginning of the 2020 water year, reservoir carryover storage was near average to above average in the Snake River basin above Brownlee Reservoir. In the Payette, November carryover storage from 2019 was 99 percent of average. In the Boise and Upper Snake basins, November carryover storage from 2019 was 126 percent of average in both of those basins.

In the early winter through December, well below normal precipitation fell in all three of the basins. Snowpack at the beginning of January was 61 percent of normal in the Payette, 63 percent of normal in the Boise, and 84 percent of normal in the Upper Snake. The snowpack improved as the winter progressed, particularly in the Payette and Upper Snake, while the Boise continued to be dry. On April 1, the snowpack was 97 percent of normal in the Payette, 88 percent of normal in the Boise, and 114 percent of normal in the Upper Snake.

Observed unregulated runoff was reflective of the snowpack gained during the winter. The April through July unregulated runoff in the Payette and Boise basins was below average at 88 percent of average for the Payette River at Horseshoe Bend, and 66 percent of average for the Boise River near Boise. With a bigger snowpack, unregulated runoff in the Upper Snake basin was above average at 106 percent for the Snake River at Heise. Flood risk management (FRM) operations were required in the Payette and Upper Snake basins but were not required in the Boise basin leading up to and during the spring runoff of 2020.

Sufficient runoff occurred to fill the Upper Snake and Payette basin reservoirs, but due to the dry conditions, refill of the Boise reservoir system was not achievable. The Upper Snake reservoir system reached a maximum combined physical storage content of 4,104,619 acre-feet, approximately 81,076 acre-feet below full capacity of 4,185,695 acre-feet, and would have filled completely but for early irrigation storage usage and early flow augmentation releases after FRM operations were completed. The Payette reservoir system reached a maximum storage content of 793,045 acre-feet, approximately 7,407 acre-feet below full capacity of 800,452 acre-feet, and would have filled completely but for early flow augmentation releases. The Boise reservoir system was not able to refill due to lack of water supply, reaching a maximum storage content of 862,779 acre-feet. The Boise reservoir system maximum storage content peaked at approximately 86,921 acre-feet below its full capacity of 949,700 acre-feet.

2.1 Idaho

2.1.1 Boise River Basin Operational Indicators

The term incidental take is defined as death, harm, sub-lethal harassment, injury, or displacement of an individual organism (USFWS and NMFS 1998). Specific operations or conditions at Anderson Ranch and Arrowrock dams and reservoirs that are expected to result in the incidental take of bull trout were described in the USFWS 2005 Opinion. These operations or conditions are summarized as operational indicators for each dam in Table 1 and Table 2.

Anderson Ranch Dam and Reservoir

One operational indicator was exceeded during the 2020 reporting period for operations at Anderson Ranch Dam:

Anderson Ranch Reservoir stored and released water (Table 1, Figure 2, and Figure 3); however, the 2005 Opinion granted Reclamation an exemption for this action for 30 out of 30 years for which the Incidental Take Statement issued in the 2005 Opinion is valid.

Table 1. Summary of amount or extent of anticipated take of bull trout associated with Reclamation's Anderson Ranch Dam and Reservoir facility operations during the 2020 reporting period.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2020 Operations (October 2019 to September 2020)	Quick Reference: Number of times threshold has been exceeded
Up to 50 percent of the Middle and North Fork populations are affected by spillway discharges that disrupt timing of migration and spawning and that alter metabolic rates and up to 10 percent of bull trout in the reservoir are entrained into the South Fork Boise River	Water is discharged over the spillway	Spring	6 of 30 years	The spillway was not used during the reporting period	<u>4 of 6 years</u> 2006: 9 days 2014: 3 days 2017: 20 days 2018: 5 days
Up to 50 percent of the Middle and North Fork populations are affected by the altered flow and temperature regime that disrupts migration and spawning and that increases metabolic rates	Water is stored and released at Anderson Ranch Dam	Spring through fall	30 of 30 years	Anderson Ranch Reservoir elevations for WY20 are shown in Figure 2	<u>16 of 30 years</u> Exceeds annually
Up to 4 percent of bull trout in the reservoir experience degraded water quality	Reservoir storage volume falls below 62,000 af (Figure 3)	Summer	2 of 30 years	Reservoir storage volume was maintained above 62,000 af (Figure 3)	<u>0 of 2 years</u>

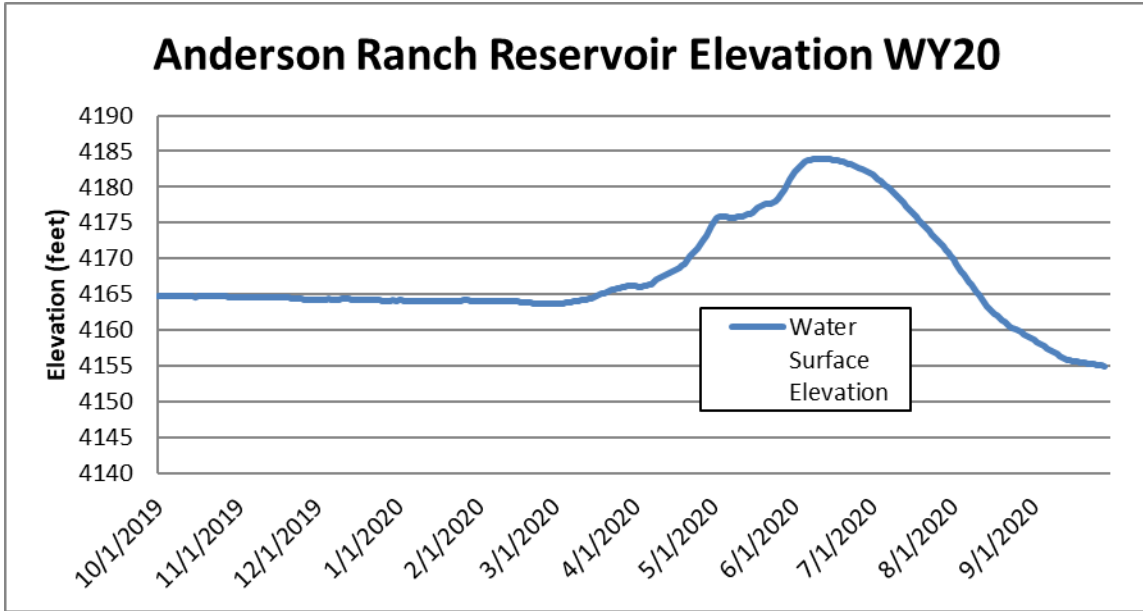


Figure 2. Anderson Ranch Reservoir elevation (feet above sea level) for WY20.

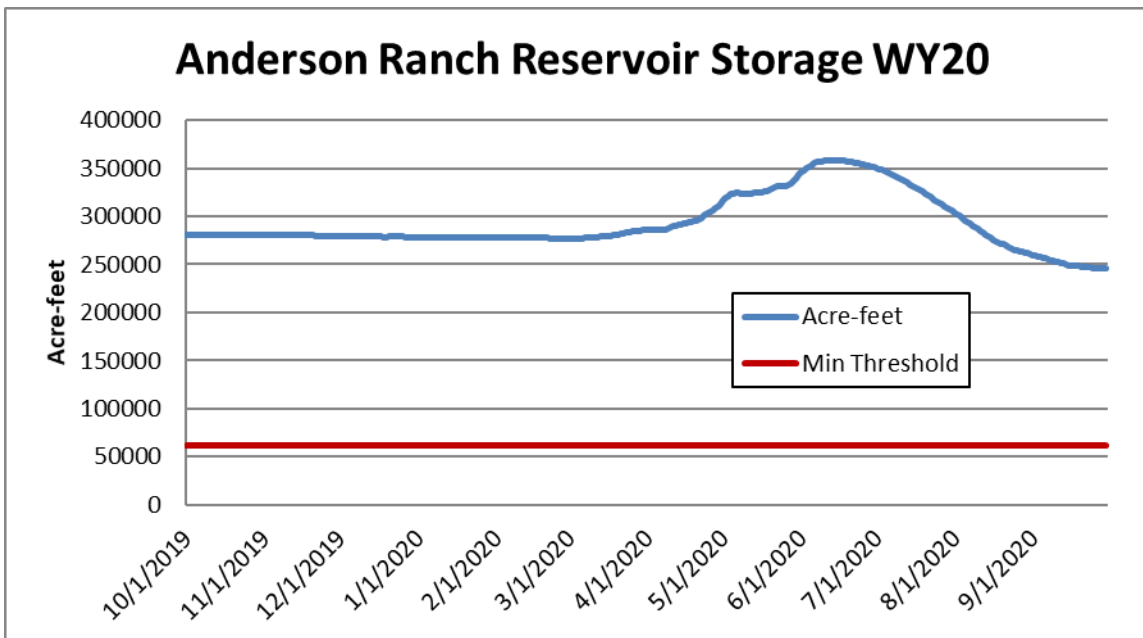


Figure 3. Anderson Ranch Reservoir storage volume (af) for WY20. The straight line represents Reclamation’s Operational Indicator minimum threshold of 62,000 af of storage.

Arrowrock Dam and Reservoir

No operational indicators were exceeded during the 2020 reporting for operations at Arrowrock Dam.

Table 2. Summary of amount or extent of incidental take of bull trout associated with Reclamation’s Arrowrock Dam and Reservoir facility operations during the 2020 reporting period.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2020 Operations (October 2019 to September 2020)	Quick Reference: Number of times threshold has been exceeded
Up to 50 percent of the Middle and North Fork populations are affected by low reservoir productivity and decreased prey.	Reservoir volume of less than 200,000 af at the end of June	June 30	3 of 30 years	Reservoir volume was 236,608 af on June 30, 2020. Refill to 200,000 af was achieved on January 13, 2020; reservoir content dipped slightly below this threshold from April 13- May 28, 2020, before rising to a peak of 243,782 af on June 24, 2020. It remained above 200,000 af until July 15, 2020 (Figure 4).	<u>3 of 3 years</u> 2007: yes (6/15) 2013: yes (4/24) 2015: yes (6/25) (Non-discretionary 2016 ³)

³ Only discretionary reservoir operations are applicable to the number of excepted years for this operational indicator. Maintaining 200,000 af in Arrowrock through the end of June involves complex management of operations including safety, environmental, and legal requirements that must start months in advance. Flood control operations were in place in 2016; therefore, Reclamation did not have the discretion in operations to meet this operational indicator. In past reports, 2016 was erroneously reported as one of the three excepted years. This has been corrected and the number adjusted in this report.

2 Summary of 2020 Operations

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2020 Operations (October 2019 to September 2020)	Quick Reference: Number of times threshold has been exceeded
Up to 8 percent of bull trout in the reservoir are entrained into Lucky Peak Reservoir, as averaged over any consecutive 5-year period.	Water is discharged over the spillway.	March through June	15 of 30 years	The spillway was not used during the reporting period	<u>2 of 15 years</u> 2006: 9 days 2017: 49 days
Up to 2 percent of bull trout in the reservoir are entrained into Lucky Peak Reservoir	Discharge exceeds 695 cfs while the reservoir water surface elevation is less than 3,111 feet	July through September	30 of 30 years	Reservoir surface elevation did not drop below 3,111 feet during the critical season in WY 2020. This operational indicator is no longer applicable due to valve reconfigurations ⁴	<u>10 of 30 years</u>
Up to 20 percent of bull trout in the reservoir, as averaged over any 5 consecutive years, experience habitat degradation and predation	Mean daily reservoir elevation falls below 3,100 feet	September 15 through October 31	18 of 30 years	Reservoir surface elevation did not drop below 3,100 feet during the critical season in WY 2020 (Figure 5).	<u>0 of 18 years</u>

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2020 Operations (October 2019 to September 2020)	Quick Reference: Number of times threshold has been exceeded
Up to 5 percent of bull trout in the reservoir are entrained into Lucky Peak Reservoir, as averaged over any consecutive 5-year period	Discharge exceeds 695 cfs while the reservoir water surface elevation is less than 3,111 feet (Figure 5) ⁴	Winter	20 of 30 years	This operational indicator is no longer applicable due to valve reconfigurations	0 of 20 years

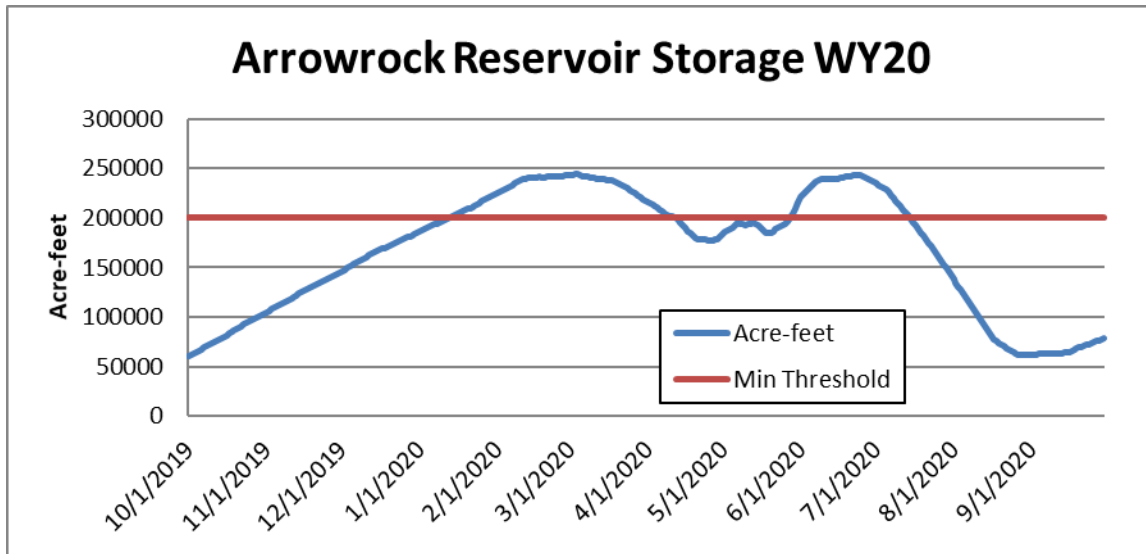


Figure 4. Arrowrock Reservoir storage volume (af) for WY20. The straight red line represents Reclamation's Operational Indicator of reservoir volume of 200,000 af. Reservoir volume should exceed this minimum at the end of June. On June 30, 2020, Arrowrock Reservoir storage volume was 236,608 af.

⁴ Since the 2005 Opinion was issued, valve reconfigurations at Arrowrock Dam have caused the upper release conduits to no longer be used, making these operational indicators obsolete. This is described in further detail in Reclamation 2018b. This indicator is still listed in annual reporting but is considered no longer applicable.

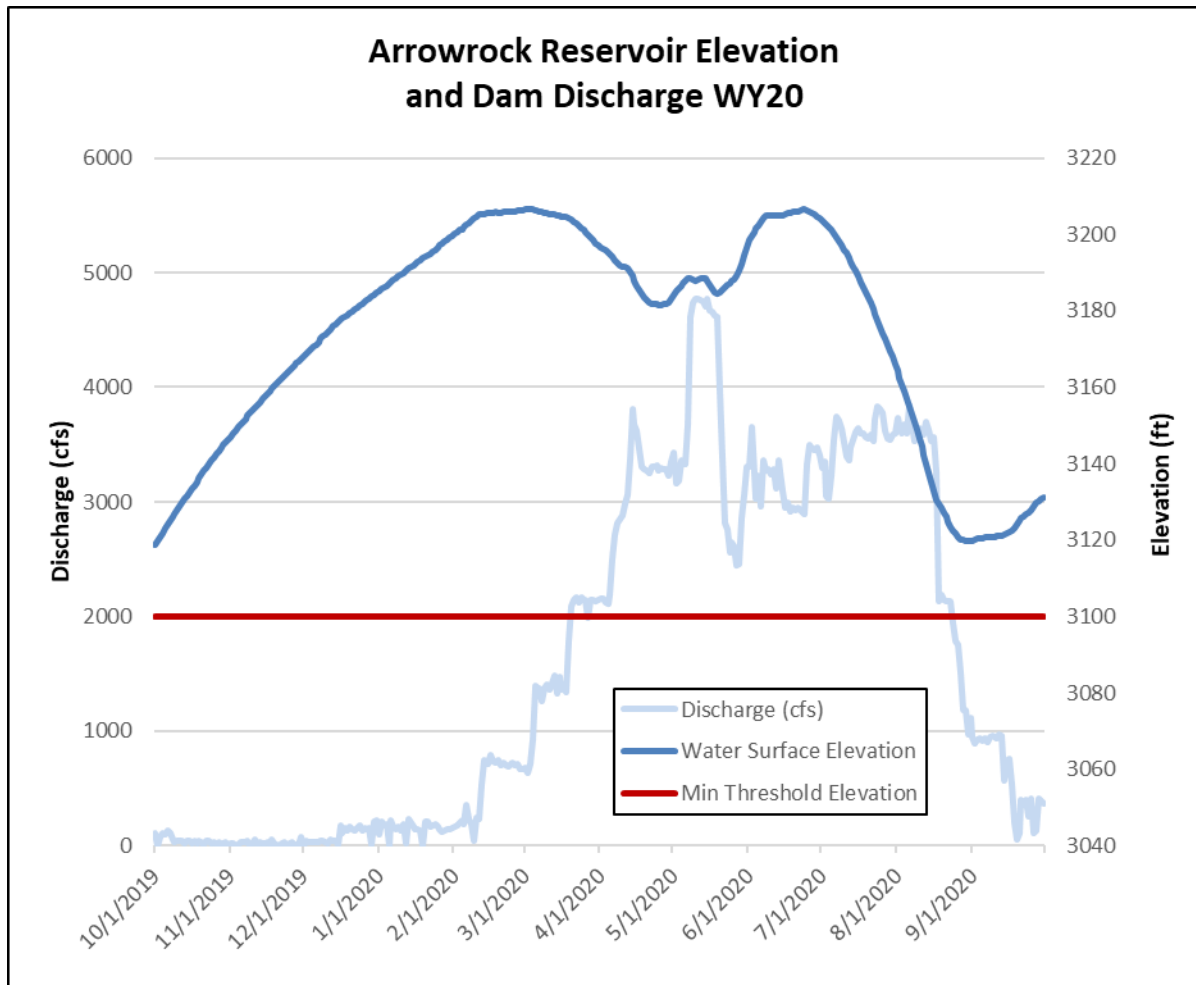


Figure 5. Arrowrock Reservoir surface elevation (feet above sea level) for WY20 and discharge (cfs). The straight red line represents Reclamation’s fall minimum elevation threshold (September 15-October 31) of 3,100 feet.

2.1.2 Payette River Basin Operational Indicators

The term *incidental take* is defined as death, harm, sub-lethal harassment, injury, or displacement of an individual organism. Specific operations or conditions at Deadwood Dam and Reservoir that are expected to result in the incidental take of bull trout were listed in the USFWS 2005 Opinion. These operations or conditions are summarized as operational indicators for Deadwood Dam and Reservoir in Table 3. Figure 6 illustrates Deadwood Reservoir storage volume in WY20.

Deadwood Dam and Reservoir

One operational indicator was exceeded during the 2020 reporting period in the Payette River basin:

Deep water releases occurred throughout the year at Deadwood Dam (Table 3); however, the 2005 Opinion granted Reclamation an exemption for this action for 30 of the 30 years for which the Opinion is valid.

Table 3. Summary of amount or extent of anticipated take of bull trout associated with Reclamation's Deadwood Dam and Reservoir facility operations during the 2020 reporting period.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2020 Operations (October 2019 to September 2020)	Quick Reference: Number of times threshold has been exceeded
Up to 2 to 4 percent of bull trout in Deadwood Reservoir are entrained into the Deadwood River below the dam	Water is discharged over the spillway (surface elevation exceeds 5,334 feet)	Spring	11 of 30 years	Water was not discharged over the spillway during the reporting period in WY20	<u>6 of 11 years</u> 2006: 32 days 2007: 33 days 2008: 33 day 2010: 15 days 2014: 69 days 2015: 50 days
Up to 2 to 4 percent of bull trout in Deadwood Reservoir are affected by degraded water conditions	Reservoir storage volume falls below 50,000 af	August through October	2 of 30 years	Reservoir storage volumes did not drop below 50,000 af during the reporting period in WY20 (Figure 6)	<u>0 of 2 years</u>
All bull trout in the Deadwood River downstream from the dam are affected by spillway discharges that disrupt timing of migration and spawning and that alter metabolic rates	Water is discharged over the spillway	May through July	11 of 30 years	Water was not discharged over the spillway during the reporting period in WY20	<u>6 of 11 years</u> 2006: 32 days 2007: 33 days 2008: 33 day 2010: 15 days 2014: 69 days 2015: 50 days

2 Summary of 2020 Operations

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2020 Operations (October 2019 to September 2020)	Quick Reference: Number of times threshold has been exceeded
All bull trout in the Deadwood River downstream from the dam are affected by low winter streamflows and temperatures that affect bull trout movement and growth, and reproduction of bull trout and the prey base	Deep water releases at Deadwood Dam and low flows below the dam	Spring – temperature increases and flow decreases; Summer – temperature decreases and flow increases; Fall – temperature increases and flow reductions; Winter – temperature increases and flow reductions	30 of 30 years	All releases are deep water releases except for water discharged over the spillway	<u>16 of 30 years</u> Exceeds annually

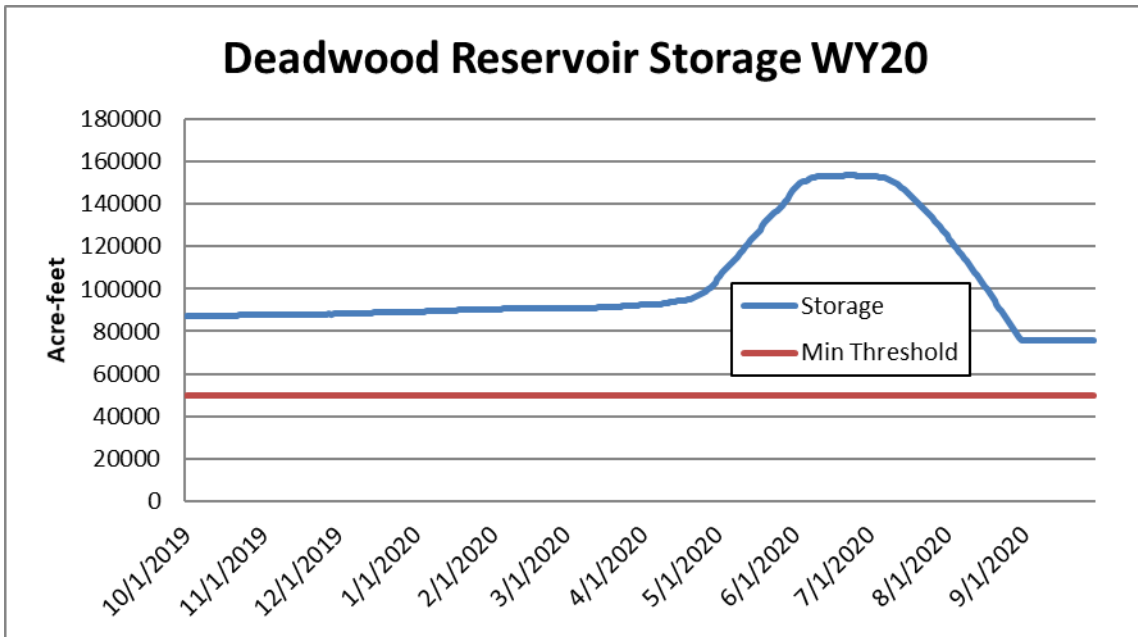


Figure 6. Deadwood Reservoir storage volume (af) for WY20. The straight red line represents Reclamation’s Operational Indicator minimum threshold of 50,000 af of storage.

2.2 Oregon

In Eastern Oregon, the snowpack conditions were near normal, but dry soil conditions following the summer of 2019 and a lack of any major spring rain events in 2020 resulted in below normal runoff conditions.

Carryover storage volume in Beulah Reservoir for WY20 was 14,120 af on October 1, 2019, approximately 24 percent of full capacity and above the conservation pool target of 2,000 af established in Reclamation (2018d). Beulah Reservoir filled to its peak WY20 capacity of 47,578 af (80 percent of full capacity) in early May 2020, and subsequently drafted to a low of 7,286 af (12 percent of full capacity) by the end of the reporting period. Beulah Reservoir did not fall below the 2,000 af conservation pool threshold at any point in WY20.

Phillips Reservoir began WY20 with a carryover storage volume of 16,180 af on October 1, 2019 (22 percent of full capacity), which dropped to a low of 15,816 af by November 1, 2019, and then refilled to a peak of 42,742 af (59 percent of full capacity) by late June 2020. Phillips Reservoir was subsequently drafted to a low of 6,706 af (9 percent of full capacity) by the end of the reporting period.

Information on flows discharged from the dams during WY20 (October 1, 2019, to September 30, 2020) can be found on Reclamation's Hydromet website². Reservoir water operations, including daily average reservoir elevations, contents in af, storage, and outflow for Reclamation facilities, are discussed in detail later in this report.

2.2.1 Malheur River Basin Operational Indicators

The term *incidental take* is defined as death, harm, sub-lethal harassment, injury, or displacement of an individual organism. Specific operations or conditions at Agency Valley Dam and Beulah Reservoir that are expected to result in the incidental take of bull trout were listed in the USFWS 2005 Opinion. Conditions described in the Terms and Conditions from the USFWS 2005 Opinion were described by Reclamation (2018) and the USFWS agreed with Reclamation's findings that ITS is still valid (USFWS 2019). These operations or conditions are summarized as operational indicators in Table 4.

Agency Valley Dam/Beulah Reservoir

No operational indicators were exceeded during the 2020 reporting period in the Malheur River basin.

Table 4. Summary of amount or extent of anticipated take of bull trout associated with Reclamation's Agency Valley Dam and Beulah Reservoir facility operations during the 2020 reporting period.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2020 Operations (October 2019 to September 2020)	Quick Reference: Number of times threshold has been exceeded
Up to 10 percent of bull trout in Beulah Reservoir are entrained into the North Fork Malheur River below Agency Valley Dam	Water is discharged over the spillway	May through June	3 of 30 years	The spillway was not used during the WY20 reporting period	<u>1 of 3 years</u> 2006: Yes Non-discretionary spill in 2011 and 2017 ⁵
All bull trout returning to Beulah Reservoir to over-winter are affected by a reduced prey base	Reservoir storage falls below 2,000 af	August through October	10 of 30 years	Reservoir storage volume did not fall below 2,000 af in the WY20 reporting period (Figure 7)	<u>8 of 10 years</u> 2007: 60 days 2008: 34 days 2009: 53 day 2010: 28 days 2013: 45 days 2014: 56 days 2015: 35 days 2016: 15 days

⁵ Only discretionary spillway use is applicable to the number of excepted years for this operational indicator. Spill in 2011 and 2017 was necessary under flood control operations and, therefore, was non-discretionary. In past reports, the spill in 2011 was erroneously reported as one of the three excepted years. This has been corrected and the number in this report has been adjusted.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2020 Operations (October 2019 to September 2020)	Quick Reference: Number of times threshold has been exceeded
Reduced prey based caused by competition from non-native fish	Run-of-river operations triggered by fish sampling	October through May	3 of 15 years (2019 – 2034)	Following conditions identified in Reclamation 2018c, run-of-river operations were not used in WY20	<u>0 of 3 years</u>

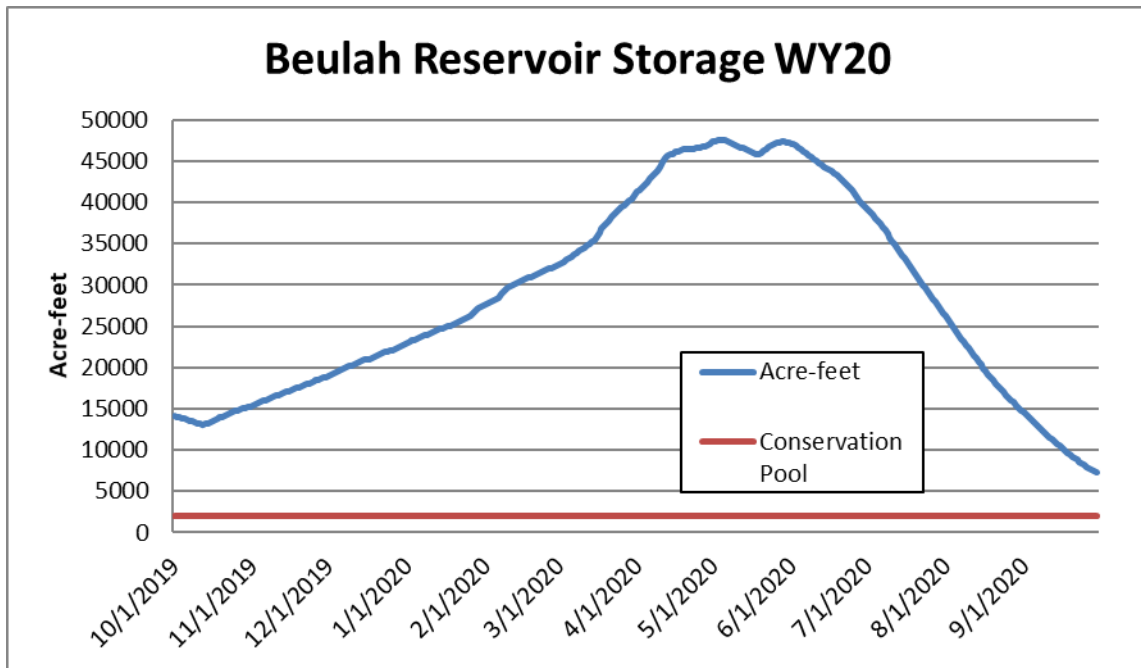


Figure 7. Beulah Reservoir storage volume (af) for WY20. The straight red line represents Reclamation’s Operational Indicator minimum threshold of 2,000 af of storage. Lowest reservoir volume during reporting period occurred September 30, 2020 (7,286 acre feet).

2.2.2 Powder River Basin Operational Indicators

An Oregon Department of Fish and Wildlife (ODFW) crew sampled two bull trout in Phillips Reservoir in 2011, which triggered a requirement that Reclamation consult with USFWS for bull trout and bull trout critical habitat in this area (Reclamation 2013). USFWS completed a non-jeopardy Biological Opinion in June 2014 for Reclamation's O&M activities in the Powder River (USFWS 2014) as a companion document to the 2005 Opinion. The 2014 Opinion contains a 21-year ITS and corresponding RPMs that outline non-discretionary actions for bull trout in Phillips Reservoir. Specific operations or conditions at Mason Dam and Phillips Reservoir that are expected to result in the take of bull trout in the form of death, harm, sub-lethal harassment, injury, or displacement were identified in Reclamation's Bull Trout Monitoring and Reporting Plan for Phillips Reservoir (Reclamation 2016), which was finalized with USFWS in WY16.

The operational indicators developed in that document are intended to minimize incidental take of bull trout resulting from operations of Phillips Reservoir. Low reservoir elevations increase the likelihood of elevated water temperatures (degraded habitat) in the reservoir and contribute to impaired migratory corridors (shallow varial zone habitat). As a result, low reservoir elevations limit the ability of fish to leave the reservoir to seek improved habitat in tributaries above Phillips Reservoir. These operational indicators are shown in Table 5. A summary of operations for WY20 are included in this report. Figures 8, 9, and 10 illustrate the water storage volume in af and reservoir elevation, respectively, and Powder River inflows into Phillips Reservoir during WY20.

Mason Dam/Phillips Reservoir

No operational indicators were exceeded during the 2020 reporting period in the Powder River basin:

Mean daily reservoir storage elevation at Phillips Reservoir was above 4,048 feet at the beginning of WY20 reporting period (Figure 9); water levels remained above the 4,048 threshold for the remainder of WY.

Table 5. Summary of amount or extent of anticipated take of bull trout associated with Mason Dam and Phillips Reservoir facility operations during the 2020 reporting period, as included in the monitoring and reporting plan finalized in 2016.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2019 Operations (October 2018 to September 2019)	Quick Reference: Number of times threshold has been exceeded
Up to 12 bull trout from resident headwater populations may be displaced during high flow events and be present in the reservoir	Powder River natural inflows exceeding 856 cfs daily mean (from 2014 Opinion)	Spring through summer	27 percent (6 of 21 years)	Powder River flows did not exceed this threshold in the WY20 reporting period (Figure 10)	<u>0 of 6 years</u>
Up to 12 bull trout from resident headwater populations may be displaced during high flow events and be present in the reservoir	Mean daily reservoir elevation falls below 4,048 feet above sea level (Reclamation 2018)	Spring through summer	100 percent (21 of 21 years; monitoring occurring 2017 – 2034)	Reservoir surface elevation remained above 4,048 feet during the entire WY20 reporting period (Figure 9)	<u>5 of 21 years</u> Exceeds annually

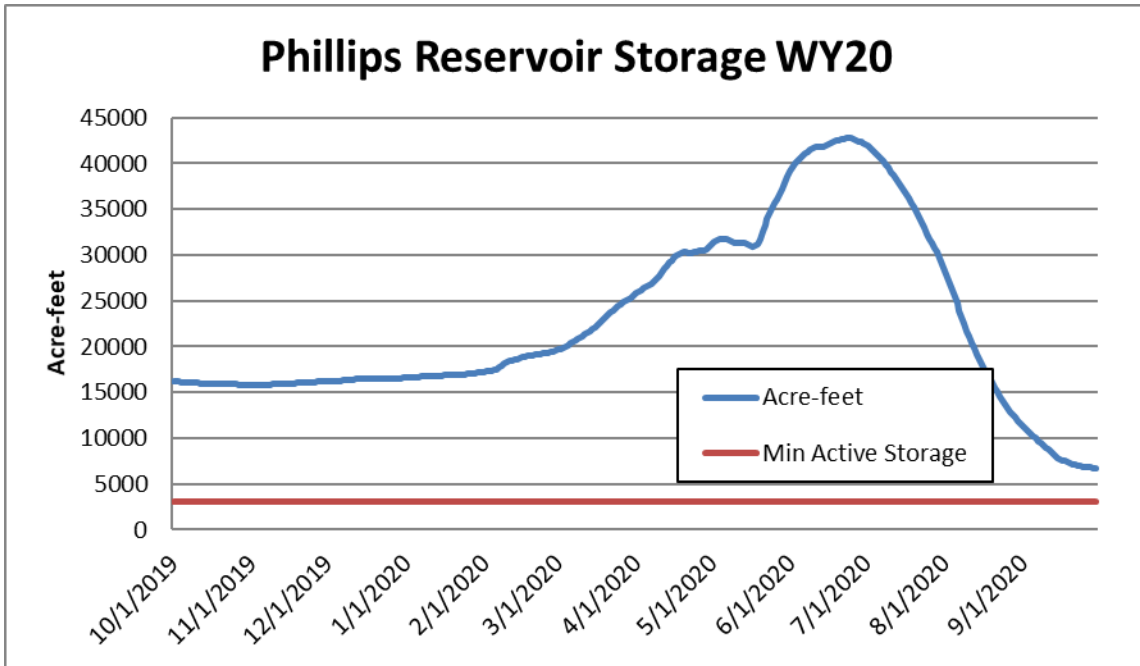


Figure 8. Phillips Reservoir storage volumes (af) for WY20. Minimum active storage occurs when pool elevation reaches 4,009 feet above sea level (3,100 af of storage), corresponding to the point of inactive storage indicated by the red line.

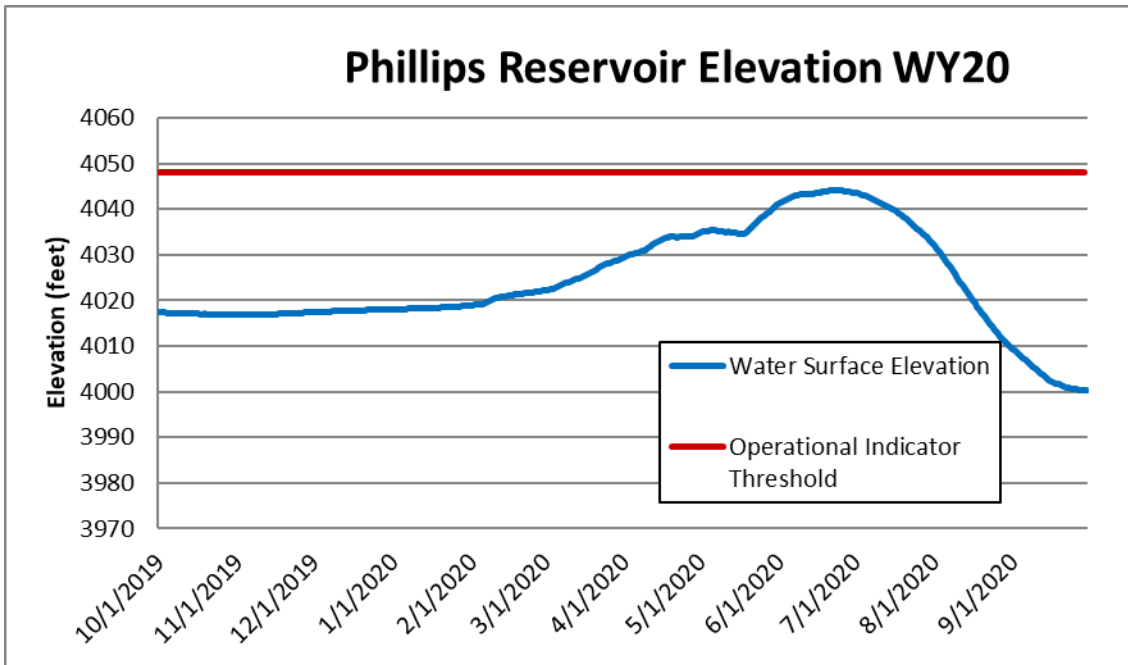


Figure 9. Phillips Reservoir surface elevation (feet above sea level) for WY20. The operational indicator spring/summer minimum for mean daily reservoir elevation of 4,048 is indicated by the red line.

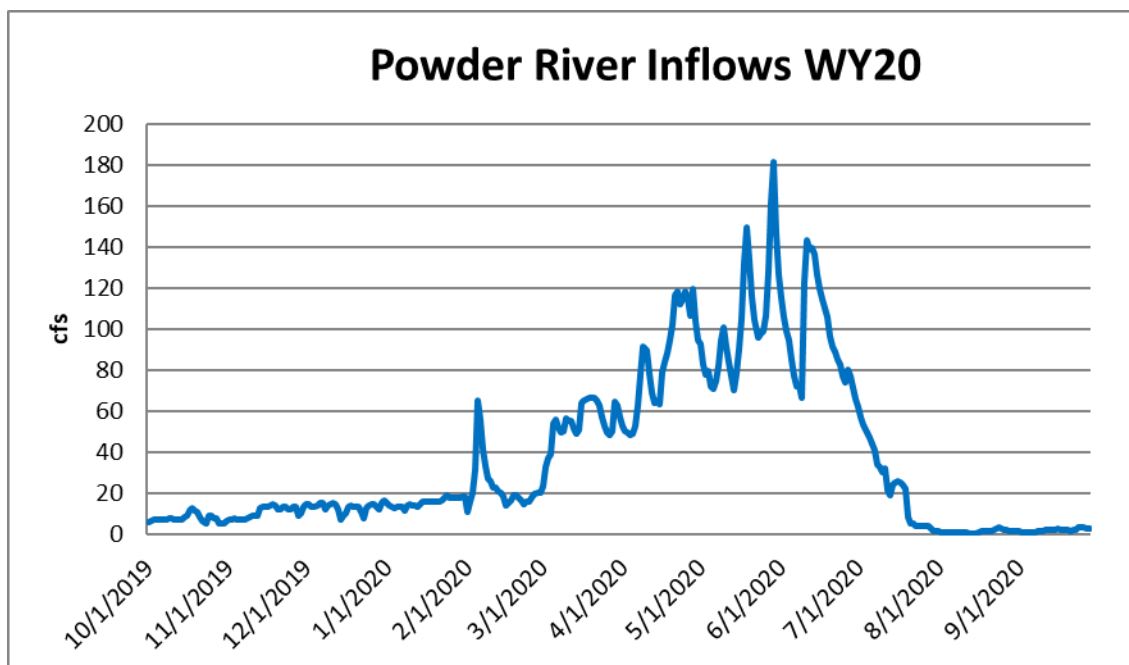


Figure 10. Powder River inflows to Phillips Reservoir in WY20 measured in cfs and recorded at USGS Gage #13275105, Powder River at Husdpeth Lane near Sumpter, Oregon.

3. Bull Trout

This chapter describes the bull trout ITS and RPMs, including monitoring efforts during WY20. The ITS includes five RPMs and their associated T&Cs to minimize incidental take of bull trout related to O&M at Reclamation’s facilities in the identified action areas where bull trout are present. Collected data may be used to satisfy the T&Cs and/or monitoring requirements. For example, data collected during a fish sampling activity may be used to monitor population trends and to identify data trends that could be used in the future to address T&Cs or revise existing operational indicators and monitoring. In 2020, Reclamation RPM activities and/or monitoring at Arrowrock, Anderson Ranch, Beulah and Phillips Reservoirs were curtailed due to COVID-19 related travel restrictions. However, previously installed temperature monitoring TidbiTs remained in place, and Reclamation intends to obtain data from WY20 in WY21.

3.1 Boise River Basin

For the purpose of this report, the Boise River basin study area includes Arrowrock Reservoir, Anderson Ranch Reservoir, the South Fork Boise River below Anderson Ranch Dam, portions of the Middle and North Fork Boise Rivers, Lucky Peak Reservoir, and the mouths of Grouse and Cottonwood Creeks, which are tributaries to Arrowrock Reservoir.

The 2005 Opinion identified five T&Cs for Arrowrock Dam and two T&Cs for Anderson Ranch Dam for minimizing the effect and/or amount of take associated with each dam’s

operation. Each of the T&Cs addresses a different aspect of the effects of operations on bull trout or bull trout critical habitat. Most data collection efforts described in the following sections will be used to address T&Cs for both Arrowrock and Anderson Ranch reservoirs because the influences of both facilities overlap.

Summary reports for the Arrowrock Hydroelectric Project (Federal License #4656) can be referenced at <https://www.ferc.gov> and fish stocking performed by the Idaho Department of Fish and Game (IDFG) can be referenced at <https://idfg.idaho.gov/fish/stocking>. An overview of both activities is also included in this report.

3.1.1 Boise River Basin Data Collection

To address T&C 2.b (minimize disruption to biological processes), streamflow and water temperatures were monitored on the South Fork Boise River. In 2020, Reclamation continued funding the U.S. Geological Survey (USGS) to maintain a flow/temperature stream gage at Neal Bridge (USGS Gage No. 13192200) on the South Fork Boise River for the purpose of monitoring tributary flow below Anderson Ranch Dam. A new Interagency Agreement (R20PG00107) was established in FY2020, providing continued funding for this effort through 2025.

Reclamation completed the development and review of the water quality model for Anderson Ranch Reservoir in November 2020. The Anderson Ranch Reservoir Water Quality model identifies spatial and temporal availability and variation in water temperatures and dissolved oxygen levels suitable for and preferred by bull trout. The data collection effort for this model occurred in 2016 through 2017.

3.1.2 Fish Sampling

Fish sampling to address T&C 1.c (entrainment) is integrated into trap-and-haul efforts to move potentially displaced (entrained) bull trout from Lucky Peak Reservoir back upstream into Arrowrock Reservoir. Trap-and-haul efforts have historically been scheduled to occur in even-numbered years, and any year (even- or odd-numbered) in which the spillway is used. The spillway at Arrowrock was not used in 2020 and COVID-19 related restrictions precluded non-essential field work in the reporting period.

3.1.3 Other Activities

Cottonwood Recruitment Modeling – South Fork Boise River

In collaboration with the University of Idaho and the U.S. Forest Service, Reclamation worked to develop and validate a cottonwood seedling recruitment model (Benjankar et al. 2017). The authors examined operational effects and assessed critical habitat in the South Fork Boise River as identified in the T&Cs (2005 Opinion). This report discussed the results of using a cottonwood recruitment model to assess recovery of riparian vegetation following wildfire. Data collection from 2018 and 2019 will seek to identify whether natural regeneration is sufficient to maintain critical habitat for bull trout in the watershed and will be used to validate model results. The project was completed in 2020 and findings summarized in the following manuscripts: Benjankar et al. 2020 and Tranmer et al 2020a.

Bioenergetics Evaluation of Migratory Bull Trout – Arrowrock Reservoir/South Fork Boise River

Reclamation is working in collaboration with the USGS to assess the energetic potential of migratory bull trout, which rely on Arrowrock Reservoir and the South Fork Boise River between Anderson Ranch and Arrowrock reservoirs for foraging, migration, and overwintering habitat. The USGS is using bioenergetics modeling to evaluate whether current reservoir operations provide conditions that are likely to support successful spawning (T&Cs in the 2005 Opinion). The project was completed in 2020 and findings summarized in a manuscript by Benjamin et al. 2020.

Arrowrock Dam Hydroelectric Project – Boise Project Board of Control

Arrowrock Dam Hydroelectric Project, Federal Energy Regulatory Commission (FERC) licensee No.4656-020, started operations in 2010. Among the requirements of the FERC license, the licensee (Boise Project Board of Control) was obligated to perform water temperature and dissolved oxygen monitoring in the Arrowrock stilling basin for 5 years, culminating in 2015. Future monitoring recommendations will be prepared by the Boise Project Board of Control and presented to FERC after review of the Arrowrock Hydro Team.

Annual meetings of the Arrowrock Hydro Team (IDFG, Reclamation, U.S. Army Corps of Engineers, and USFWS) are expected to continue. The 2020 meeting was cancelled due to COVID-19 concerns; however, the working group continues to coordinate as needed.

Recovery Planning working groups

Reclamation is working with partners to update bull trout core area assessments and develop threats assessments and monitoring priorities in order to evaluate bull trout status (RPMs and Conservation Recommendations; USFWS 2005) and identify recovery activities. Collaboration in 2020 including participation in multi-agency working groups for the Power and Malheur watersheds in Oregon and the Boise and Payette watersheds in Idaho.

Fish Stocking within Reclamation Projects – Boise River Basin IDFG

IDFG annually stocks fish in the Boise River basin for recreational angling. Stocking practices are determined solely by IDFG and stocking is not performed to meet Reclamation objectives. A summary of fish stocking⁶ for all fish types that occurred at Arrowrock and Anderson Ranch Reservoirs and in the South Fork Boise River in WY 2020 is shown in Table 6.

Table 6. Fish stocking by IDFG in WY 2020 in the Boise River basin for all fish types

Location	Date Stocked	Species Type	Size	Number Stocked
Anderson Ranch Reservoir	6/2/2020	Kokanee	Less than 6 in.	101,208
Anderson Ranch Reservoir	6/2/2020	Kokanee	Less than 6 in.	50,600
Arrowrock Reservoir	10/8/2019	Rainbow trout	Catchable (6+ in.)	810
Arrowrock Reservoir	10/9/2019	Rainbow trout	Catchable (6+ in.)	473
Arrowrock Reservoir	10/15/2019	Rainbow trout	Catchable (6+ in.)	9,361
Arrowrock Reservoir	3/16/2020	Rainbow trout	Catchable (6+ in.)	8,064
Arrowrock Reservoir	6/3/2020	Kokanee	Less than 6 in.	98,745
Arrowrock Reservoir	6/3/2020	Kokanee	Less than 6 in.	49,280
South Fork Boise River (above Anderson Ranch Reservoir)	5/19/2020	Rainbow trout	Catchable (6+ in.)	260
South Fork Boise River (above Anderson Ranch Reservoir)	5/19/2020	Rainbow trout	Catchable (6+ in.)	1,812
South Fork Boise River (above Anderson Ranch Reservoir)	6/11/2020	Rainbow trout	Catchable (6+ in.)	1,470
South Fork Boise River (above Anderson Ranch Reservoir)	6/11/2020	Rainbow trout	Catchable (6+ in.)	475
South Fork Boise River (above Anderson Ranch Reservoir)	6/23/2020	Rainbow trout	Catchable (6+ in.)	1,897
South Fork Boise River (above Anderson Ranch Reservoir)	7/6/2020	Rainbow trout	Catchable (6+ in.)	460
South Fork Boise River (above Anderson Ranch Reservoir)	7/14/2020	Rainbow trout	Catchable (6+ in.)	948
South Fork Boise River (above Anderson Ranch Reservoir)	7/14/2020	Rainbow trout	Catchable (6+ in.)	948
South Fork Boise River (above Anderson Ranch Reservoir)	7/22/2020	Rainbow trout	Catchable (6+ in.)	1,880
South Fork Boise River (above Anderson Ranch Reservoir)	8/20/2020	Rainbow trout	Catchable (6+ in.)	1,312
South Fork Boise River (above Anderson Ranch Reservoir)	8/25/2020	Rainbow trout	Catchable (6+ in.)	1,040
South Fork Boise River (above Anderson Ranch Reservoir)	9/3/2020	Rainbow trout	Catchable (6+ in.)	482

⁶ Comprehensive stocking data for the state is provided by IDFG and is available at <https://idfg.idaho.gov/ifwis/fishingPlanner/stocking/?region=4>

3.2 Payette River Basin – Deadwood River System

The 2005 Opinion identified five T&Cs for minimizing the effects to bull trout and the amount of take associated with the operation of Deadwood Dam and Reservoir. Each T&C addresses a different aspect of the effects of operations on bull trout and makes assumptions regarding the effects to bull trout from reservoir operations. Examining the system as a whole allows Reclamation to understand the systemic impacts of individual operational changes. Consequently, Reclamation engaged in the multi-year Deadwood Reservoir Operations Flexibility Evaluation (Deadwood Study) to address T&Cs 3.a through 3.d jointly, which was provided to USFWS in 2018.

Evaluating the flexibility of operations and the effects of varied operational scenarios for Deadwood Dam on water quality conditions and aquatic fauna in both Deadwood Reservoir and the Deadwood River below Deadwood Dam requires an understanding of the potential overall ecosystem response to operational changes over time. Using modeling of physical and biological parameters measured over the course of this project allows for an ecosystem analysis of the T&Cs for Deadwood Reservoir operations and their influence on bull trout populations. These efforts involved collaboration between multiple agencies and include annual activities not detailed in this report.

Conclusions from the Deadwood Study were used to develop Implementation Measures for Deadwood Dam that address T&Cs 3.a through 3.d. These operational recommendations seek to better use existing operational flexibility to maximize benefits to bull trout and minimize biological impacts system-wide, while still fulfilling Reclamation's non-discretionary flood control and water provision obligations. The final report, *Reclamation's Implementation Measures for Operating Deadwood Dam – Addressing Terms and Conditions from U.S. Fish and Wildlife Service 2005 Biological Opinion for Operations and Maintenance of the Bureau of Reclamation Projects in the Snake River Basin above Brownlee Reservoir* was completed in July 2019. Reclamation is currently involved in informal consultation to determine the appropriate amount of compliance prior to implementation of actions identified in the 2019 report prior to implementation, to ensure RPMs from the 2005 Opinion are appropriately updated.

3.2.1 Data Collection in the Deadwood River Basin

Operational indicators were monitored in WY20 and reported in section 2.1.2 of this document. Reclamation did not conduct any field data collection efforts in the Deadwood River Basin during the reporting period. Project partners for the Deadwood Study used the study techniques to describe a successful research approach to assess ecosystem effects, development of environmental flows, adaptive management and climate adaption. The project was completed in 2020 and findings summarized in Tranmer et al. 2020b.

Other Activities

In 2020, IDFG stocked Chinook, kokanee, and rainbow trout into Deadwood Reservoir as a measure to supplement a sport fishery (Table 7).

Table 7. Fish stocking by IDFG in 2020 in Deadwood Reservoir for all fish types

Date Stocked	Species Type	Size	Number Stocked
6/16/2020	Rainbow trout	Less than 6 in.	13,665
6/24/2020	Kokanee	Less than 6 in.	99,960
6/29/2020	Fall Chinook	Less than 6 in.	6,463

3.3 Malheur River Basin – Beulah Reservoir and the North Fork Malheur River

The 2005 Opinion identifies four T&Cs for minimizing the effect and amount of take associated with the operation of Agency Valley Dam and Beulah Reservoir. Each of the T&Cs addresses a different aspect of the effects of operations on bull trout and critical habitat. In cooperation with USFWS, Reclamation developed and finalized seven implementation measures in 2018 that target the maintenance of a prey base for bull trout that overwinter in the reservoir. These seven implementation measures help ensure ESA compliance at Beulah Reservoir (Reclamation 2018c). Implementation of these measures began in WY19 and will maintain incidental take coverage through the duration of the 2005 Opinion and updated monitoring requirements. Additionally, Reclamation is working with USFWS and the Bureau of Land Management to minimize effects of grazing around the reservoir (Jackson 2017-2020, pers. comm.).

Prey Base Monitoring

Reclamation analyzed the prey base in Beulah Reservoir from 2010 - 2013 (Reclamation 2015a and 2015b) to determine baseline conditions for the development of an Implementation Plan.

Reclamation did not conduct fish sampling efforts at Beulah Reservoir in WY20 due to COVID-19 related restrictions.

3.3.1 Temporary Water Lease

Reclamation worked collaboratively with the Vale Irrigation District to maintain the required conservation pool volume. As a result, Reclamation avoided using the temporary water lease during the reporting period. Storage at Beulah Reservoir did not fall below 2,000 af during WY20 (Figure 7) and carryover into WY21 was 7,129 af on October 1, 2020.

3.3.2 Trap-and-Haul Efforts

T&C 4.d requires that in years when the spillway is used at Agency Valley Dam (Beulah Reservoir), Reclamation perform trap-and-haul to capture bull trout that have been entrained through the dam and move them back up into Beulah Reservoir. No spillway use occurred in WY20; therefore, Reclamation did not perform any trap-and-haul efforts during the reporting period.

3.3.3 Other Activities

Beulah Reservoir – Range Use Evaluation

Reclamation has identified that the riparian vegetation, predominantly willow stands, present in the upper varial zone area of Beulah Reservoir provide important habitat for the prey base (fish species) that bull trout feed upon (Reclamation 2013b). Grazing permits on Reclamation lands surrounding the reservoir were curtailed in 2016, with the intent of determining whether grazing land use is compatible with the persistence of adequate habitat to support a prey base for bull trout that overwinter in the reservoir.

On October 26, 2020, Reclamation ecologists performed a site visit to the upper varial zone at Beulah Reservoir to assess the general distribution, density, and vigor of existing willow stands, and to assess the level of ongoing domestic grazing use (stray non-permitted cattle) and wildlife browsing impacts. At the time of the assessment, Beulah Reservoir storage was at approximately 9,405 acre-feet (16% total capacity). In the previous water year, Beulah Reservoir filled to a maximum of 47,578 acre-feet (80% total capacity). A summary of the survey is documented in project files (Reclamation 2020b).

3.3.4 Malheur River – Redd Counts

In 2020, the annual bull trout redd counts were canceled due to wildfire activity (Indian Creek Fire) causing unsafe conditions in the area. Reclamation participates as a partnering agency in annual survey counts of bull trout redds in the North Fork Malheur River basin to satisfy coordination and basin monitoring requirements set forth in the 2005 Opinion (Reporting Requirements and Conservation Recommendations 2 and 3). Carryover storage in Beulah Reservoir has been shown to affect the bull trout prey base (Rose and Mesa 2009); however, a direct link between carryover pool elevations and bull trout redd counts remains speculative. Figure 11 shows the number of redds observed in the North Fork Malheur River basin, and the carryover of reservoir storage in Beulah Reservoir, from previous reporting years to the present. Following several years in which surveys had been precluded by fire conditions, Reclamation assisted redd counts conducted in the Malheur River basin in 2017 and 2018. In total, 75 redds were observed in surveys throughout the North Fork Malheur River and 10 smaller tributaries⁷.

⁷ Redd count numbers from 2013 and 2016 were misrepresented in previous annual reports. Data shown in those reports erroneously included redd counts for both the Upper Malheur and the North Fork Malheur. The correct counts for the North Fork Malheur were 38 in 2013 and 50 in 2016. This figure reflects those adjustments. The alignment of this figure has also been adjusted to display carryover data by WY rather than calendar year. This was done to simplify interpretation so that the carryover numbers shown correspond to the redd counts observed the following summer.

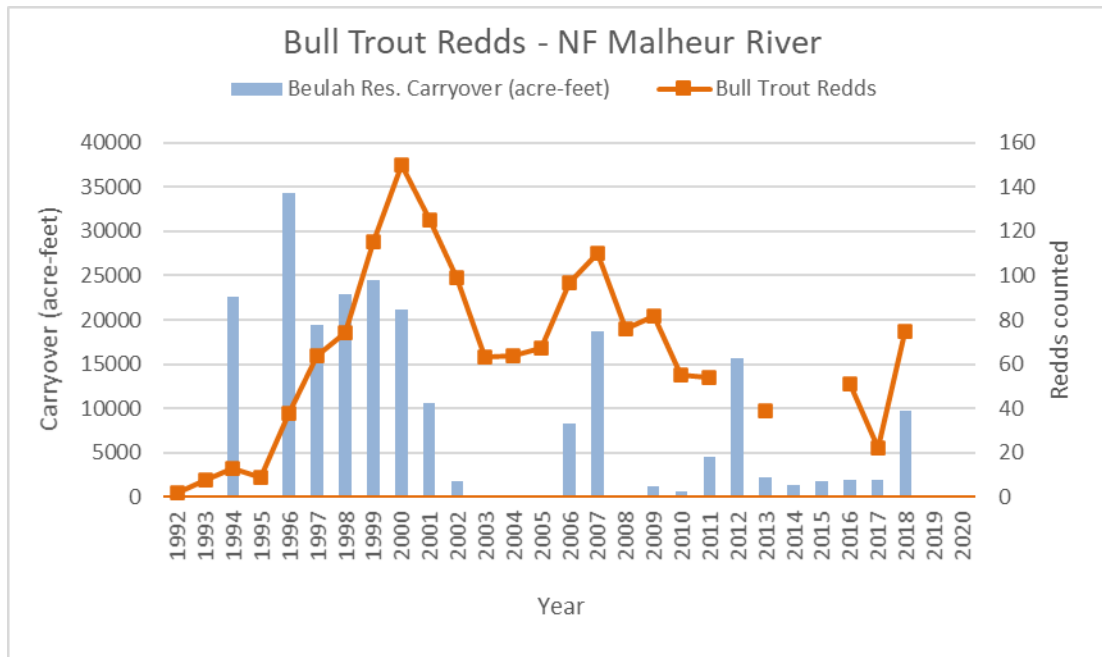


Figure 11. Data on bull trout redd trends observed in the North Fork Malheur River watershed (North Fork Malheur River) and carryover storage at the start of the Water Year in Beulah Reservoir, Water Years 1992–2018. The number of redds observed after 2007 has been adjusted by one to reflect the reduced size of the area surveyed. No redd count data exist for 2012, 2014, 2015, 2019 or 2020. See footnote 7 as this graph has been modified and corrected for previous years.

3.4 Powder River Basin – Phillips Reservoir

3.4.1 Bull Trout Monitoring

The 2014 Opinion identifies one T&C associated with minimizing incidental take of bull trout resulting from operations of Phillips Reservoir (decreased water levels and increased temperatures) and from impaired fish migration above Phillips Reservoir. Reclamation accordingly finalized a 5-year Bull Trout Monitoring and Reporting Plan for Phillips Reservoir with USFWS in 2016 (Reclamation 2016). This plan was developed in collaboration with Oregon Department of Fish and Wildlife in order to fulfill this T&C. In 2020, Reclamation continued to work to enhance knowledge of project impacts to bull trout and to better determine bull trout use of Phillips Reservoir through fulfillment of this 5-year plan. A forthcoming summary report of data from the fish sampling performed under the monitoring and reporting plan will be used to formulate operational recommendations at Phillips Reservoir.

In accordance with this monitoring and reporting plan, Reclamation continues to conduct monitoring of the Powder River gage (USGS gage 13275105 – Powder River at Hudspeth Lane near Sumpter, Oregon) to record the frequency of high-inflow events that are expected to lead to bull trout migration into/through the reservoir. Also, Reclamation has continued to

monitor pool elevation to record the frequency of drawdown that seasonally affects access through tributary varial zones. In the 2020 reporting period, inflow measured at the Powder River gage did not exceed 856 cfs daily average, the operational indicator identified in the monitoring plan.

3.4.2 Other Activities

In 2016, Reclamation implemented experimental DNA (eDNA) sampling to supplement other sampling methods used at Phillips Reservoir as part of the 5-year sampling plan to better understand bull trout use, if any, of the reservoir. Sampling took place at four locations, including the mouth of the Powder River approximately 20 meters (66 feet) above its inflow into Phillips Reservoir, the mouth of Deer Creek approximately 20 meters (66 feet) above its inflow into Phillips Reservoir, and a sampling location on each bank (north and south) of the Powder River outflow, approximately 50 meters (164 feet) below the outflow from Mason Dam. The same locations were sampled for eDNA repeatedly during multiple sampling event in the spring of 2017 and 2018. Additionally, in the fall of 2018 and 2019, several eDNA samples were taken from locations both within the drawn-down reservoir pool and upstream in the Powder River (at USGS gage 13275105). Complete results of this eDNA sample analysis will be provided in the forthcoming summary report of results of the 5-year Bull Trout Monitoring and Reporting Plan for Phillips Reservoir, expected to be completed in 2021.

4. Snake River Physa

In 2020, Reclamation did not assist USFWS with their trend monitoring of the snail population in the spillway pool and at the Jackson Bridge site due to COVID-19 travel restrictions. Long-term flow recommendations were submitted to USFWS in the spring of 2020. These recommendations will fulfill requirements identified in the 2015 Opinion (USFWS 2015).

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Parenthetical Reference	Bibliographic Citation
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