



— BUREAU OF —
RECLAMATION

2021 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 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: The sun sets behind the North Fork Boise River migratory fish weir, Boise County, Idaho. (Photograph taken by Rochelle Ochoa).

Acronyms and Abbreviations

Acronym or Abbreviation	Description
af	acre-feet
BA	Biological Assessment
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
ODFW	Oregon Department of Fish and Wildlife
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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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) 2021 (October 1, 2020, to September 30, 2021).

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 WY 21 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>

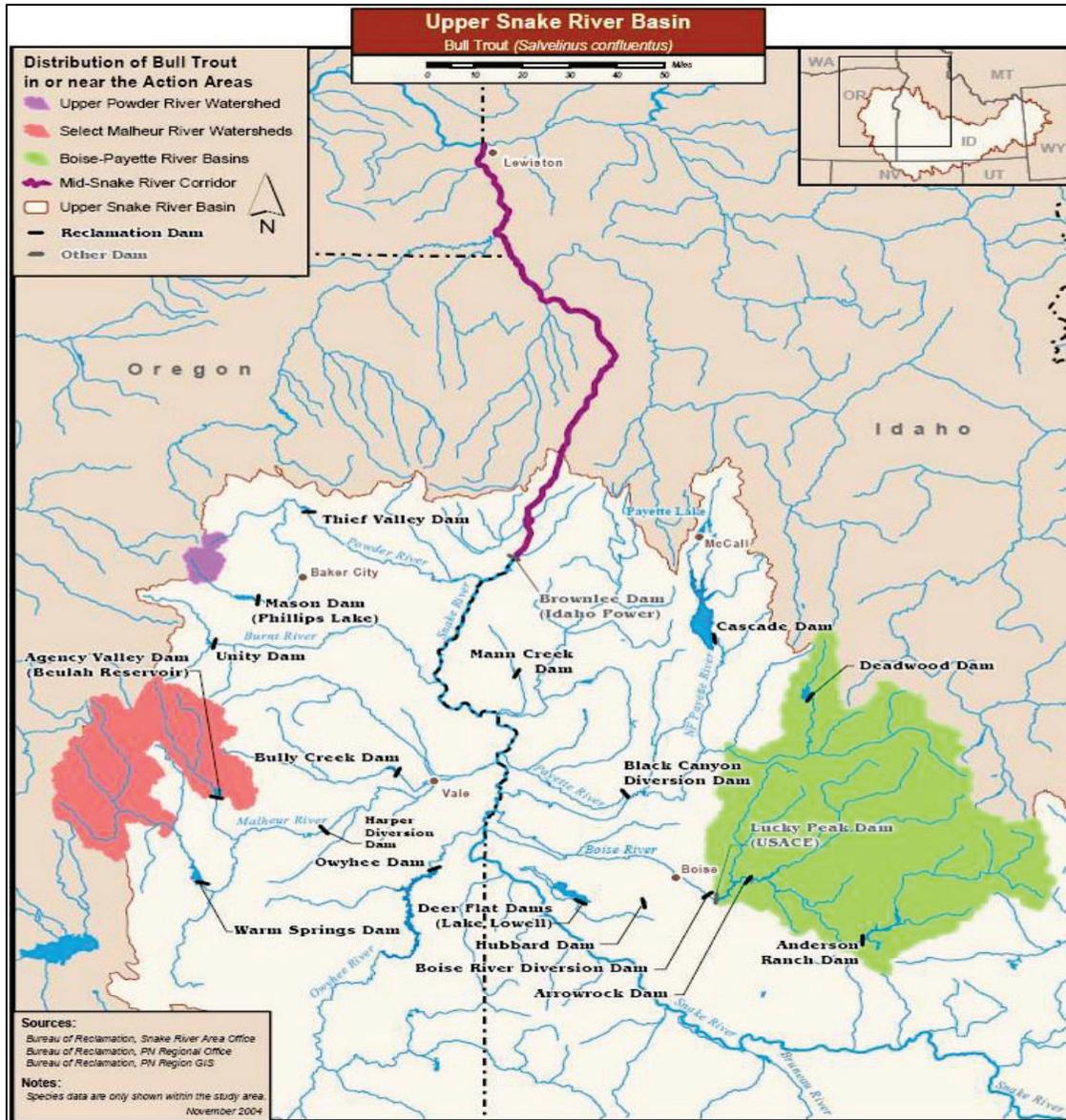


Figure 1. Known distribution of bull trout populations (shaded areas on map) associated with Reclamation facilities in the Upper Snake River basin (Reclamation 2004).

1.2 Snake River Snails

Previous annual reports to USFWS documented two species of snails in the Snake River basin: Utah valvata (*Valvata utabensis*) 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 2021 reporting period, Reclamation participated in ongoing USFWS-led suction dredge surveys for physa in the Snake River below Minidoka Dam, near the old Jackson Bridge site. 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.

Critical habitat was designated for this species in 2021. Since Reclamation received USFWS concurrence for a determination that Reclamation’s continued O&M in the Snake River Basin above Brownlee Reservoir were Not Likely to Affect for the species and proposed critical habitat at the time, which was not expanded when critical habitat was finalized, there are no plans for additional consultation on this species.

2. Summary of 2021 Operations

The following information summarizing 2021 operations was included in Reclamation’s 2021 annual progress report to the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service on Reclamation’s Salmon Flow Augmentation Program ([Upper Snake Irrigation Project Flow Augmentation, CPN Region \(usbr.gov\)](https://www.usbr.gov/cpn/irrigation/flow-augmentation/)):

At the beginning of the 2021 season, reservoir carryover storage was near average to above average in the Snake River basin above Brownlee Reservoir. Carryover storage on November 1 from 2020 was 96 percent of average in the Payette basin, 106 percent of average in the Boise

basin, and 111 percent of average in the Upper Snake basin. During the winter months, near normal precipitation fell in all three of the basins.

Snowpack at the beginning of March 2021 was 108 percent of normal in the Payette, 104 percent of normal in the Boise, and 99 percent of normal in the Upper Snake. However, from March through June, the basins experienced one of the driest spring periods on record. By April 15, the snowpack had declined to 81 percent of normal in the Payette, 75 percent of normal in the Boise, and 78 percent of normal in the Upper Snake. Observed unregulated runoff was reflective of the dry conditions experienced during the spring runoff period. The April through July unregulated runoff was only 58 percent of normal in the Payette, 53 percent of normal in the Boise basin, and 66 percent of normal in the Upper Snake basin.

As a result of the dry conditions and much below normal runoff, Reclamation 2021 Annual Progress Report 2008 Upper Snake Biological Opinion 1 flood risk management operations were not required in the Payette, Boise or Upper Snake basins leading up to or during the spring runoff of 2021. With the dry conditions the runoff was insufficient to fill the Payette, Boise, and Upper Snake basin reservoirs. The Payette reservoir system reached a maximum storage content of 746,196 af, approximately 54,256 af below full capacity of 800,452 af, which was the first time the Payette system did not refill since the early 2000s. The Boise reservoir system reached a maximum storage content of 719,432 af, approximately 230,268 af below its full capacity of 949,700 af. The Upper Snake reservoir system reached a maximum combined physical storage content of 3,703,349 af, approximately 482,346 af below full capacity of 4,185,695 af.

2.1 Idaho

2.1.1 Boise River Basin Operational Indicators

The term incidental take is defined as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” (50 FR 26832, May 11, 2015). 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 2021 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 2021 reporting period.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2021 Operations (October 2020 to September 2021)	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 WY 21 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>

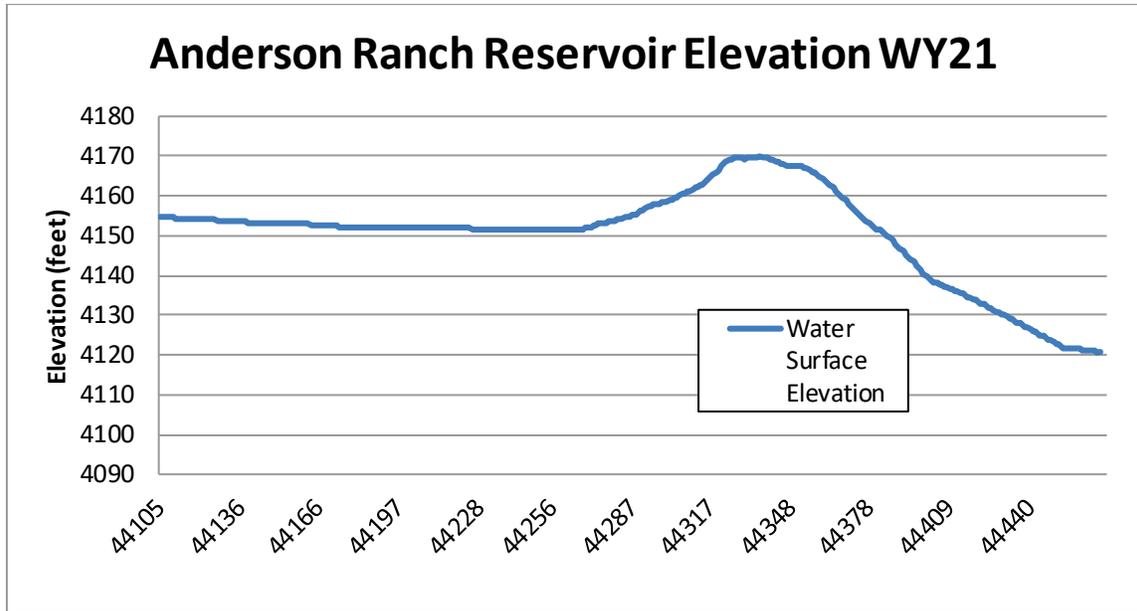


Figure 2. Anderson Ranch Reservoir elevation (feet above sea level) for WY 21.

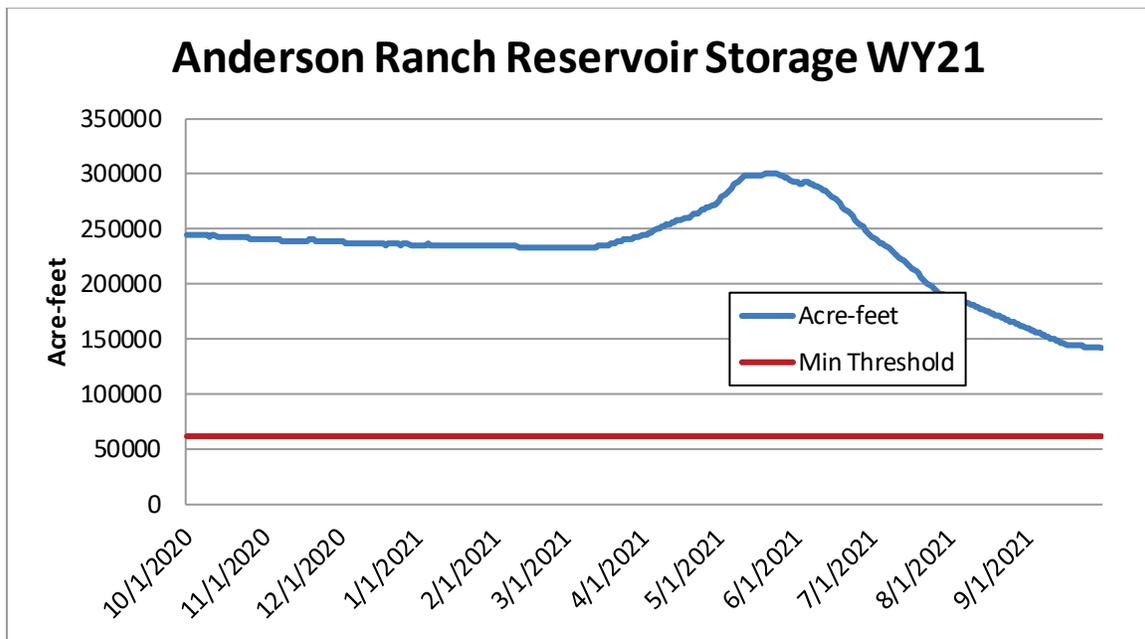


Figure 3. Anderson Ranch Reservoir storage volume (af) for WY 21. The straight line represents Reclamation’s Operational Indicator minimum threshold of 62,000 af of storage.

Arrowrock Dam and Reservoir

One operational indicator was exceeded during the 2021 reporting for operations at Arrowrock Dam.

2021 was a low water year in the Boise system. The Arrowrock Reservoir operational indicator of 200,000 af volume at the end of June was exceeded (Table 2, Figure 4). However, during operations planning in the spring, Reclamation informed the Service that this indicator was unlikely to be met (Vidergar 2021a) Reclamation and the Service reviewed the consultation record on the indicator and discovered an error in the 2004 analysis used for end of June reservoir volume corresponding to a 3 of 30-year event (Table 2). Reclamation is in discussion with the Service on an approach to correcting the value for this operational indicator (Vidergar 2021b). After re-evaluation, the revised indicator and updated exceedances will be reported in subsequent reports.

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 2021 reporting period.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2021 Operations (October 2020 to September 2021)	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. <i>Re-evaluating reservoir volume corresponding to a 3 of 30-year event.</i>	June 30	3 of 30 years	<u>Re-evaluating</u> <i>Reservoir volume was 130,981 af on June 30, 2021. Reservoir content dipped below this 200,000 af threshold on April 23, 2021, and remained below 200,000 af through the end of WY 21 on September 30, 2021 (Figure 4).</i>	<u>Re-evaluating</u> <i>4 of 3 years</i> 2007: yes (6/15) 2013: yes (4/24) 2015: yes (6/25) (Non-discretionary 2016 ³) 2021: yes

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 2021 Operations

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2021 Operations (October 2020 to September 2021)	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 2021. 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 2021 (Figure 5).	<u>0 of 18 years</u>

⁴ Meeting this operational indicator was balanced with other ecological needs in the watershed. These decisions were discussed with the USFWS prior to June operations.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2021 Operations (October 2020 to September 2021)	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) ⁵	Winter	20 of 30 years	This operational indicator is no longer applicable due to valve reconfigurations	<u>0 of 20 years</u>

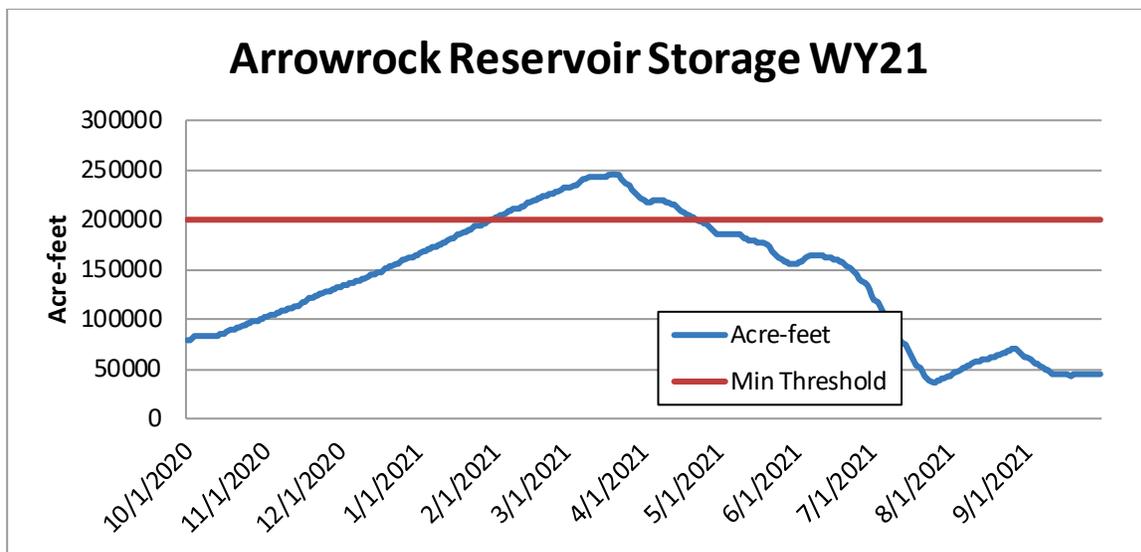


Figure 4. Arrowrock Reservoir storage volume (af) for WY 21. The straight red line represents Reclamation's Operational Indicator of reservoir volume of 200,000 af. Reservoir volume should exceed this minimum at the end of June. On June 30, 2021, Arrowrock Reservoir storage volume was 130,981 af.

⁵ 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.

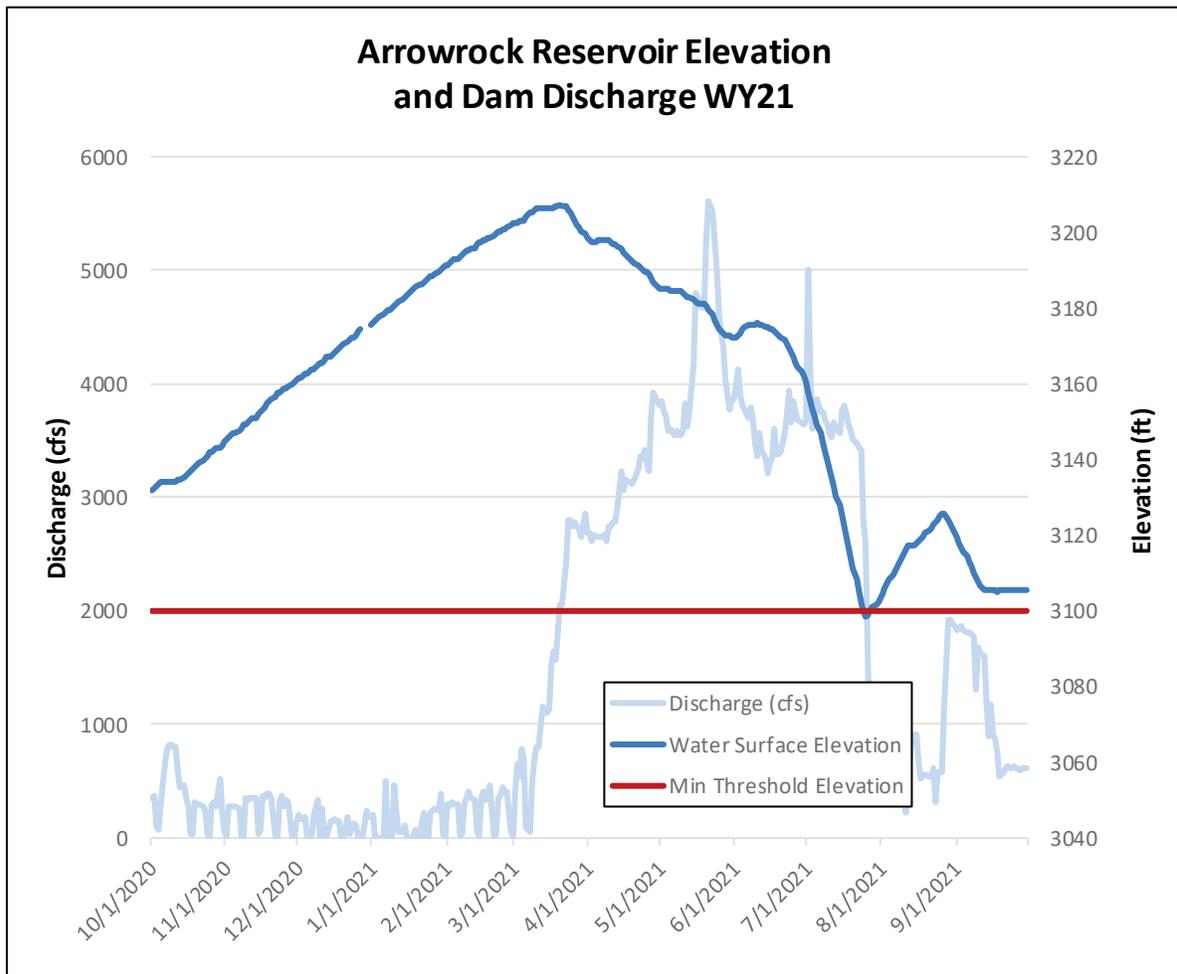


Figure 5. Arrowrock Reservoir surface elevation (feet above sea level) for WY 21 and discharge (cfs). The straight red line represents Reclamation’s fall minimum elevation threshold (September 15-October 31) of 3,100 feet.

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 WY 21.

Deadwood Dam and Reservoir

One operational indicator was exceeded during the 2021 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 2021 reporting period.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2021 Operations (October 2020 to September 2021)	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 WY 21	<u>6 of 11 years</u> 2006: 32 days 2007: 33 days 2008: 33 days 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 WY 21 (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 WY 21	<u>6 of 11 years</u> 2006: 32 days 2007: 33 days 2008: 33 days 2010: 15 days 2014: 69 days 2015: 50 days

2 Summary of 2021 Operations

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2021 Operations (October 2020 to September 2021)	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

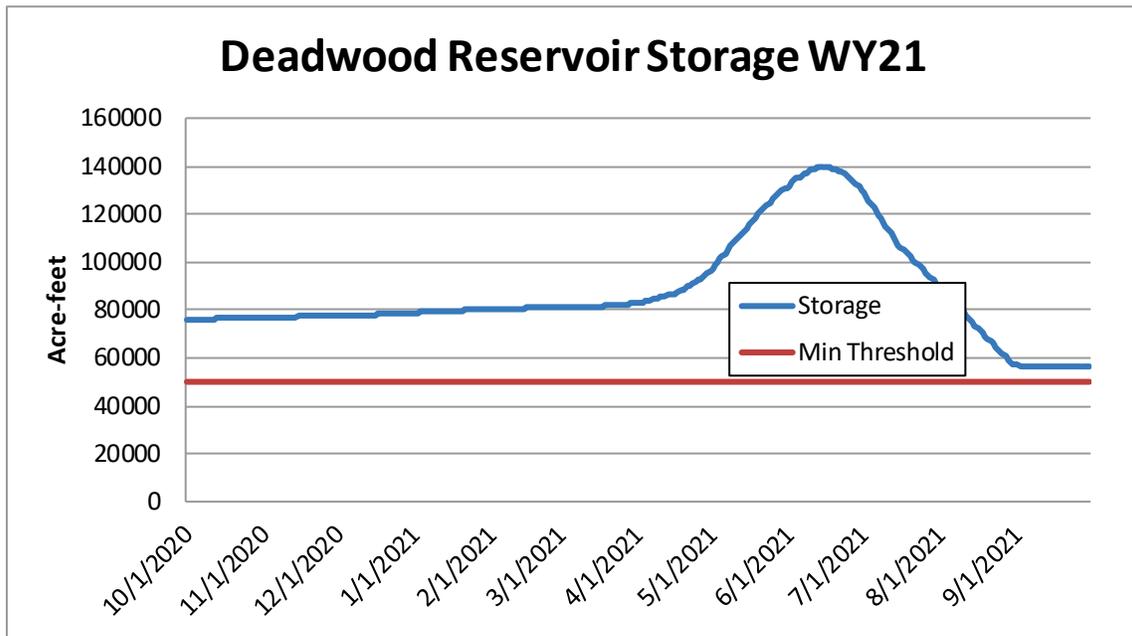


Figure 6. Deadwood Reservoir storage volume (af) for WY 21. The straight red line represents Reclamation’s Operational Indicator minimum threshold of 50,000 af of storage.

2.2 Oregon

In Eastern Oregon, the snowpack conditions were well below normal, dry soil conditions persisted, and no major spring rain events occurred. This resulted in below normal runoff conditions in those basins as well. Despite dry conditions and reservoirs that did not fill, a flow augmentation volume of 427,000 af was secured. Carryover storage volume in Beulah Reservoir for WY 21 was 7,129 af on October 1, 2020, approximately 12 percent of full capacity and above the conservation pool target of 2,000 af established in Reclamation (2018d). Beulah Reservoir filled to its peak WY 21 capacity of 38,509 af (65 percent of full capacity) in mid-April 2021, and subsequently drafted to a low of 175 af (3 percent of full capacity) by the end of the reporting period. Beulah Reservoir did fall below the 2,000 af conservation pool threshold at any point in WY 21.

Phillips Reservoir began WY 21 with a carryover storage volume of 6,664 af on October 1, 2020 (7 percent of full capacity), which dropped to a low of 5,406 af by November 12, 2020, and then refilled to a peak of 16,632 af (7 percent of full capacity) by late April 2021. Phillips Reservoir was subsequently drafted to a low of 0 af (0 percent of full capacity) by August 22, 2021, to the end of the reporting period.

Information on flows discharged from the dams during WY 21 (October 1, 2020, to September 30, 2021) 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 “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” 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

One operational indicator was exceeded during the 2021 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 2021 reporting period.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2021 Operations (October 2020 to September 2021)	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 WY 21 reporting period	<u>1 of 3 years</u> 2006: Yes Non-discretionary spill in 2011 and 2017 ⁶
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 fall below 2,000 af in the WY 21 reporting period (Figure 7)	<u>9 of 10 years</u> 2007: 60 days 2008: 34 days 2009: 53 days 2010: 28 days 2013: 45 days 2014: 56 days 2015: 35 days 2016: 15 days 2021: 45 days

⁶ 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.

2 Summary of 2021 Operations

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2021 Operations (October 2020 to September 2021)	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 used in WY 21	<u>1 of 3 years</u> 2021 ⁷

⁷ Reclamation’s 2018 document titled “Addressing Terms and Conditions for Beulah Reservoir 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” identifies that to control for the expansion of non-native fishes, run-of-river operations may be used at a frequency of not more than once every 5 years (section 6.1.2).

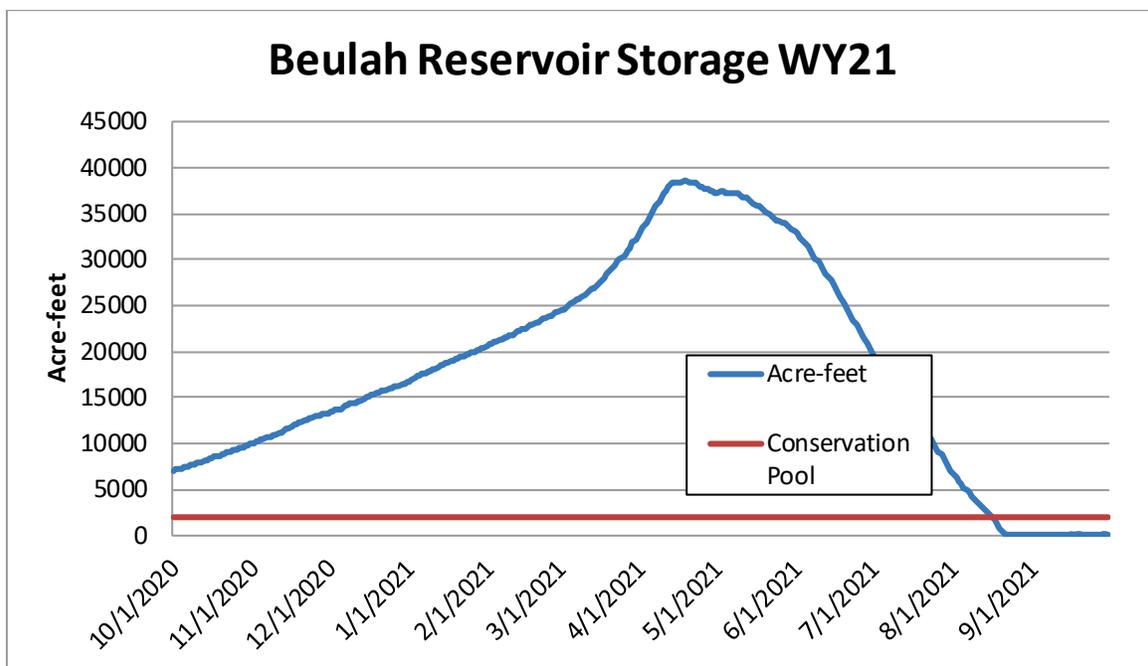


Figure 7. Beulah Reservoir storage volume (af) for WY 21. The straight red line represents Reclamation’s Operational Indicator minimum threshold of 2,000 af of storage. Lowest reservoir volume during reporting period occurred multiple times throughout September 2021 (175 af).

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 ‘harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.’ were identified in Reclamation’s Bull Trout Monitoring and Reporting Plan for Phillips Reservoir (Reclamation 2016), which was finalized with USFWS in WY 16.

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 WY 21 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 WY 21.

Mason Dam/Phillips Reservoir

No operational indicators were exceeded during the 2021 reporting period in the Powder River basin:

Mean daily reservoir storage elevation at Phillips Reservoir were below 4,048 feet at the beginning of WY 21 reporting period (Figure 9); water levels remained below the 4,048 threshold for the remainder of the 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 2021 reporting period, as included in the monitoring and reporting plan finalized in 2016.

Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2020 Operations (October 2020 to September 2021)	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 WY 21 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 WY 20 reporting period (Figure 9)	<u>5 of 21 years</u> Occurs annually

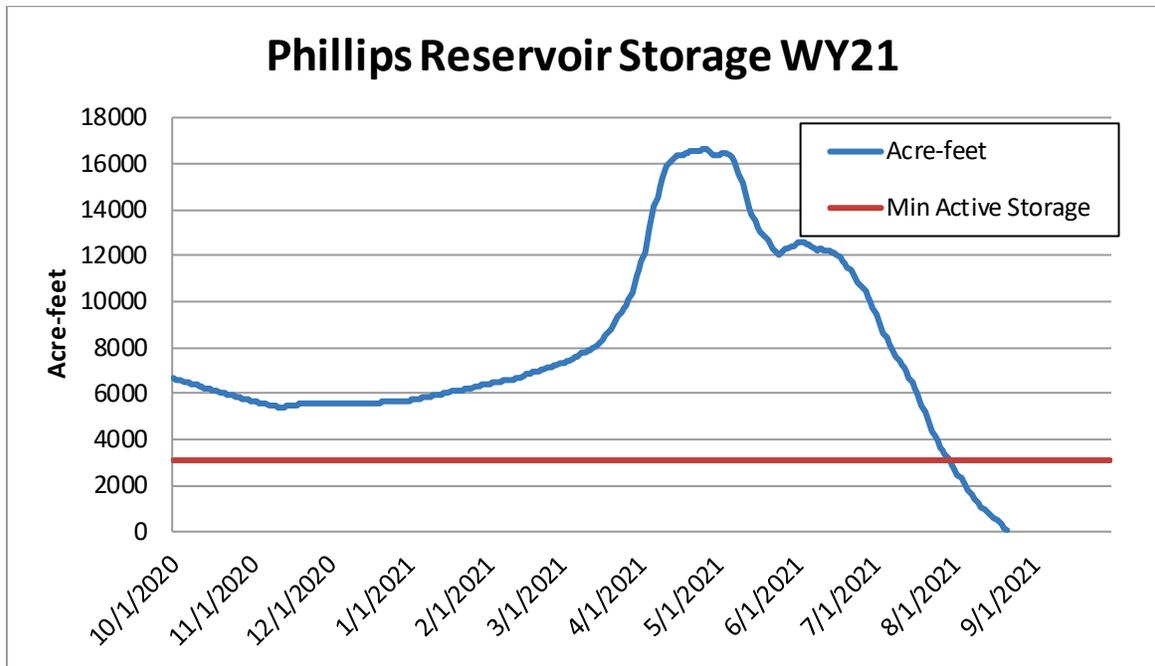


Figure 8. Phillips Reservoir storage volumes (af) for WY 21. Minimum active storage occurs when pool elevation reaches 4,009 feet above sea level (3,100 af of storage), corresponding to the point of inactive storage indicated by the red line.

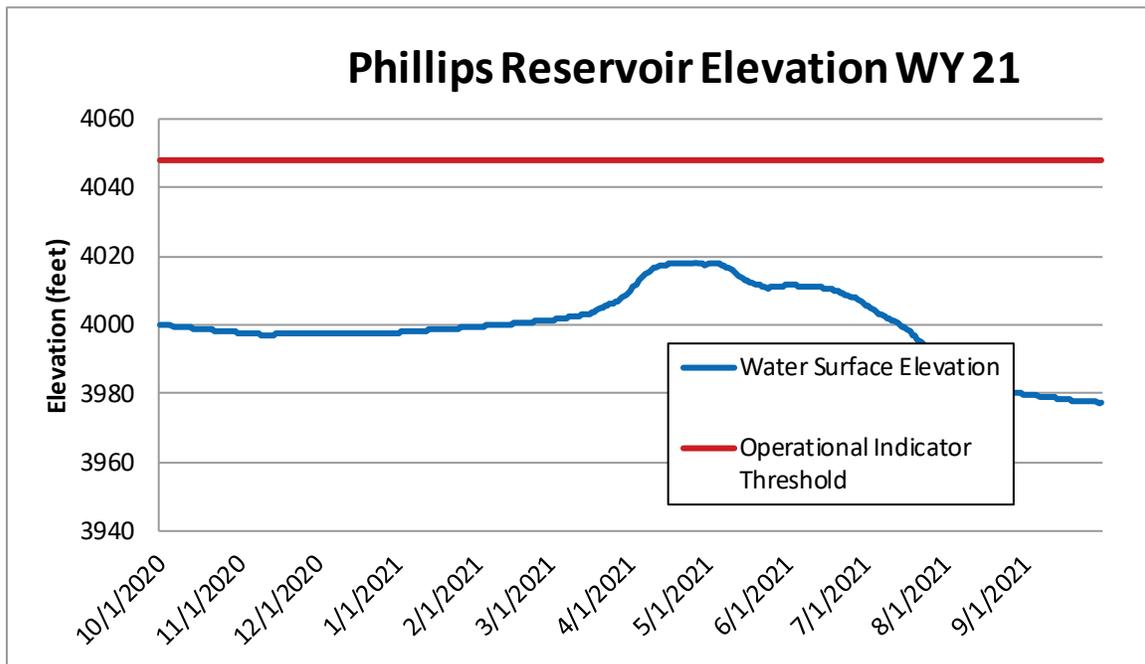


Figure 9. Phillips Reservoir surface elevation (feet above sea level) for WY 21. The operational indicator spring/summer minimum for mean daily reservoir elevation of 4,048 is indicated by the red line.

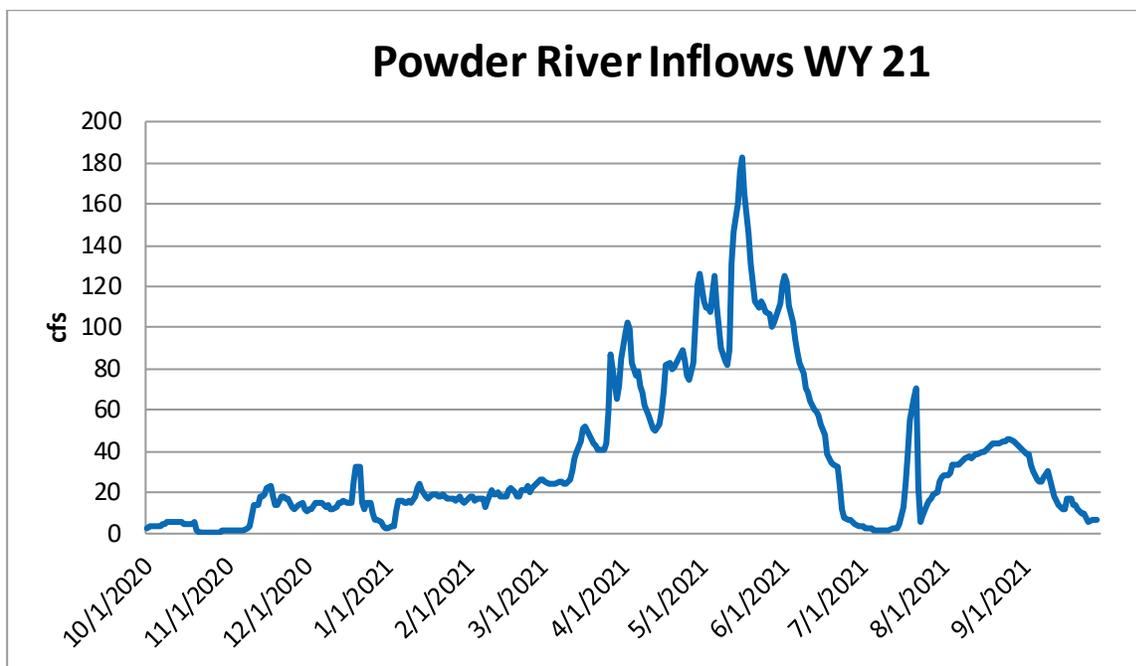


Figure 10. Powder River inflows to Phillips Reservoir in WY 21 measured in cfs and recorded at USGS Gage No. 13275105, Powder River at Husdpeth Lane near Sumpter, Oregon.

3. Bull Trout

This chapter describes the bull trout ITS and RPMs, including monitoring efforts during WY 21. 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.

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 FY 2020, providing continued funding for this effort through 2025.

Reclamation completed the water quality and habitat suitability modeling report for Anderson Ranch Reservoir (Reclamation 2020). In the report, Reclamation identifies spatial and temporal available and variation in water temperatures and dissolved oxygen levels suitable for bull trout.

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 2021 and it is an odd number year. This effort will resume in 2022. No other trap-and-haul efforts occurred in the Boise River basin during the reporting period.

North Fork Boise River Weir

A 5-foot-tall steel picket style weir was constructed across the full width of the North Fork Boise River with wings to funnel fish to the upstream and downstream trap boxes (Figure 11, Figure 12). The weir is constructed of 3.05-meter-long angle iron frames with steel conduit pickets spaced 1.25 centimeters apart. The weir is designed to act as a migration barrier for all fish > 1.25 centimeters in width (approximately > 200 millimeters in total length for bull trout), capturing fish in traps as they move upstream or downstream. To provide added strength to the frames, angle iron legs were bolted to the frames. Tripods added support to the structure of the weir (Figure 12). In the deeper and faster water, solid steel rod supports (2.5 centimeters x 182.8 centimeters) were driven 30 to 40 centimeters into the substrate behind the frame of the weir.

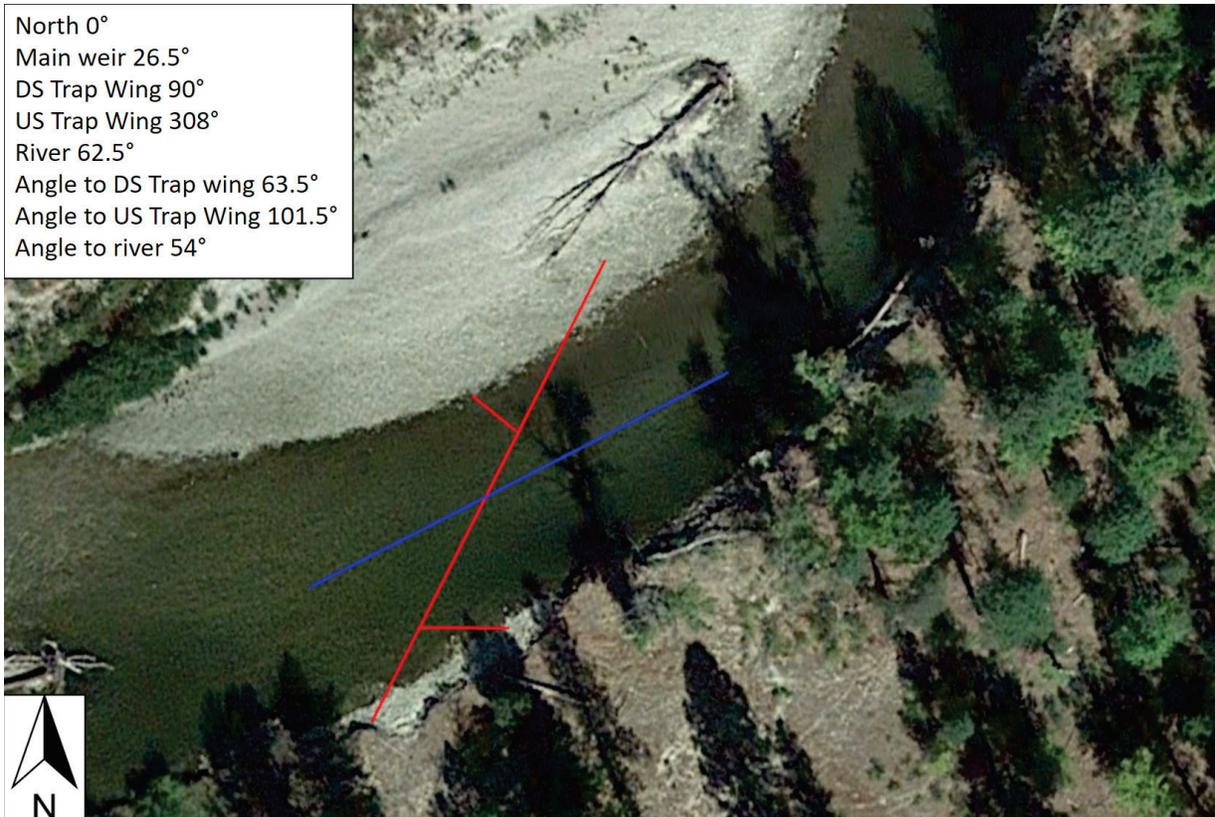


Figure 11. Aerial view of North Fork Boise River weir location in 2021. Red lines depict weir panels and blue line estimates angle of river flow.



Figure 12. Photo of the North Fork Boise River weir (2021). Flow is from right to left. Staff is standing at the open downstream trap box. Photo credit: Jaan Kolts.

The combined fish capture was 455 fish representing six species (Table 6). Bull trout represented 14.1 % of the total number of captured fish. The majority of fish captured were mountain whitefish (*Prosopium williamsoni*), 80.7% of total, mostly in middle to late October

during their spawning migration. All other species had relatively low counts, with brook trout (*Salvelinus fontinalis*) comprising 2% of the catch.

A total of 63 unique bull trout were captured while traveling downstream. One of these bull trout was later recaptured in the upstream trap, one was captured during daylight hours, the rest of the captures were during the evening trap check or overnight and found in the trap in the morning. No mortalities were recorded at the weir in 2021. Bull trout captured ranged from 220 to 770mm total length. Tissue samples were collected from 60 individuals. The samples are preserved in labeled vials containing 100% ethanol and currently stored at the Snake River Area Office along with the associated biological data. No mortality resulted from operation of the weir in 2021. For more information a detailed report on 2021 weir operation is attached as Appendix A.

Table 6. Summary of fish captured at the North Fork Boise River weir in 2021.

Species	North Fork Boise Weir Fish Capture Data	% Composition
Bull trout (<i>Salvelinus confluentus</i>) (BT)	64 (63 unique fish)	14.1
Rainbow trout (RB) (<i>Oncorhynchus mykiss</i>)	12	2.6
Mountain whitefish (WF) (<i>Prosopium williamsoni</i>)	367	80.7
Kokanee (KOK) (<i>Oncorhynchus nerka kennerlyi</i>)	1	0.2
Brook trout (BKT) (<i>Salvelinus fontinalis</i>)	9	2.0
Unknown Sucker (<i>Catostomus spp</i>)	2	0.4
Total Fish	455	

3.1.3 Other Activities

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 2021 Meeting occurred in June and the water temperature and dissolved oxygen monitoring reports for the 2020 WY were distributed.

Recovery Planning working groups

Reclamation is working with partners to update bull trout Species Status Assessments. Collaboration in 2021 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 stocking⁸ for all fish types that occurred at Arrowrock and Anderson Ranch Reservoirs and in the South Fork Boise River in WY 2021 is shown in Table 7.

Table 7. Fish stocking by IDFG in WY 2021 in the Boise River basin for all fish types

Date Stocked	Species Type	Size	Number Stocked
Anderson Ranch Reservoir			
9/23/2020	Rainbow trout	Less than 6 in.	13,800
9/23/2020	Rainbow trout	Less than 6 in.	86,523
6/2/2021	Kokanee	Less than 6 in.	149,940
6/2/2021	Kokanee	Less than 6 in.	74,993
Arrowrock Reservoir			
10/1/2020	Rainbow trout	Less than 6 in.	4653
10/2/2020	Rainbow trout	Less than 6 in.	4371
11/12/2020	Rainbow trout	Catchable (6+ in.)	7,450
11/12/2020	Rainbow trout	Catchable (6+ in.)	5,434
4/7/2021	Rainbow trout	Catchable (6+ in.)	7,616
4/8/2021	Rainbow trout	Catchable (6+ in.)	1,441
6/3/2021	Kokanee	Less than 6 in.	94,800
6/3/2021	Kokanee	Less than 6 in.	47,500
South Fork Boise River (Above Anderson Ranch Reservoir)			
5/11/2021	Rainbow trout	Catchable (6+ in.)	495
5/11/2021	Rainbow trout	Catchable (6+ in.)	495
5/18/2021	Rainbow trout	Catchable (6+ in.)	495
5/18/2021	Rainbow trout	Catchable (6+ in.)	483
6/14/2021	Rainbow trout	Catchable (6+ in.)	960
7/1/2021	Rainbow trout	Catchable (6+ in.)	980
7/12/2021	Rainbow trout	Catchable (6+ in.)	968
7/14/2021	Rainbow trout	Catchable (6+ in.)	1,925

⁸ Comprehensive stocking data for the state is provided by IDFG and is available at <https://idfg.idaho.gov/ifwis/fishingPlanner/stocking/>

Date Stocked	Species Type	Size	Number Stocked
8/23/2021	Rainbow trout	Catchable (6+ in.)	952
8/23/2021	Rainbow trout	Catchable (6+ in.)	1,008
8/26/2021	Rainbow trout	Catchable (6+ in.)	980

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 prior to implementation of actions identified in the 2019 report, 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 WY 21 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.

Other Activities

In 2021, IDFG stocked Chinook, kokanee, and rainbow trout into Deadwood Reservoir as a measure to supplement a sport fishery (Table 8).

Table 8. Fish stocking by IDFG in 2021 in Deadwood Reservoir for all fish types

Date Stocked	Species Type	Size	Number Stocked
6/16/2021	Rainbow trout	Less than 6 in.	13,520
6/23/2021	Kokanee	Less than 6 in.	103,950
7/7/2021	Fall Chinook	Less than 6 in.	5,016

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 WY 19 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 biologists sampled the fish community in Beulah Reservoir during three weeks in the spring of 2021, May 24 to 27; June 1 to 3; and June 15 to 18 for a total of 1241 hours of sampling effort. This effort satisfies requirements described in Reclamation 2018 to monitor the prey base for adfluvial bull trout that use the reservoir for Foraging, Migratory, and Overwintering habitat. Sampling methods used in 2021 included fyke traps and electrofishing following methods described in Reclamation 2018b. The most common species encountered (relative abundance) included redbside shiner (47.9%), northern pikeminnow (27.4%) and sucker spp (14.6%), other species included chiselmouth, largemouth bass, rainbow trout, sculpin, dace and crawfish (Table 9). Sampling locations were randomly chosen in each of the four quadrants (NW, NE, SW, and SE) as described in Reclamation 2018b. Thirteen net sets occurred in quadrants 1 and 2 (West shoreline) and 14 net sets occurred in quadrants 3 and 4 (East shoreline).

Data analysis included comparisons to catch statistics from 2019, the last year sampling occurred, in which similar methods were used. The most common species remained similar, however, the relative abundance changed slightly from 2019 to 2021; redbside shiner (38.5% to

47%), northern pikeminnow (21.7% to 27.4%) and sucker spp (35.7% to 14.6%) respectively. The presence of non- native species increased from 2019. The relative abundance of Largemouth bass increased by 42% and although the total catch was small (n=12) several age classes were present. The presence of rainbow trout also increased, 2.2% in 2019 to 9.2% in 2021 although genetic testing was not performed to identify native or hatchery origin most individuals had features characteristic of hatchery fish.

Total length measurements were also compared for the most common species between 2019 and 2021. A graphical comparison suggests a similar distribution of lengths (age classes) expect for rainbow trout and northern pikeminnow which show larger individuals in 2021 suggesting older age classes are present (Reclamation internal data).

Table 9. 2021 summary statistics for prey base sampling at Beulah Reservoir, Oregon. Sampling occurred in May and June of 2021. Total catch, relative abundance and Catch Per Unit Effort (CPUE) reported for Fyke nets and Electrofishing. Relative abundance values for 2019 sampling are provided for comparison, refer to Reclamation’s 2020 Annual Report for additional data.

Species	Gill Net	Fyke (trap) net	Crayfish traps	E-fish	TOTAL catch	2021 Relative abundance	2019 Relative abundance		
Largescale sucker		164		164	328	9.6%	7.3%		
Bridgelip sucker		14		4	18	0.5%	11.9%		
Sucker (juvenile, species unk.)		139		12	151	4.4%	16.5%		
Northern pikeminnow		928		9	937	27.4%	21.7%		
Chiselmouth	Gear not used in 2021	6	Gear not used in 2021	0	6	0.2%	1.5%		
Redside shiner		1633		3	1636	47.9%	38.5%		
Largemouth bass		1		11	12	0.4%	0.2%		
Rainbow trout *		296		17	313	9.2%	2.2%		
Sculpin spp		3		0	3	0.1%	0.0%		
unknown dace		3		0	3	0.1%	0.0%		
Speckled dace		0		0	0	0.0%	0.2%		
Longnose dace		0		0	0	0.0%	0.1%		
Bull trout		0		0	0	0.0%	0.0%		
Signal crawfish				7		0	7	0.2%	0.1%
TOTAL SAMPLING HRS				1239.1		1.59	1240.69		
TOTAL FISH CAUGHT				3194		220	3414		
CPUE (fish/hr)				0.39		0.04		100.0%	100.0%

*Rainbow trout were not differentiated between hatchery or native origin.

3.3.1 Temporary Water Lease

Reclamation worked collaboratively with the Vale Irrigation District to update contracting that maintains the required conservation pool volume. In 2021 the reservoir was operated to run-of-river conditions to manage for non-native fishes precluding a conservation pool.

3.3.2 Trap-and-Haul Efforts

Trap and Haul (*Spring*)

The spillway was not used at Agency Valley Dam in 2021, therefore, spring trap and haul was not needed.

Trap and Haul (*Fall*)

In 2018, Reclamation worked with the USFWS to update Bull Trout monitoring and operational requirements from the 2005 Biological Opinion (USFWS 2005) including the use of run-of-river operations as a tool to manage for increasing population(s) of non-native fishes in the reservoir. In 2021, Reclamation and the Vail Irrigation District operated Beulah Reservoir at run-of-river operations. Run-of-river operations require a trap and haul effort following cessation of irrigation releases.

Run-of-river conditions were reached when the entirety of storage volume was evacuated, this condition occurred on August 16, 2021, and continued until October 1, 2021, when reservoir refill began. During this time, the residual reservoir pool measured approximately 100 af while the outlet gates were open and all flow from the North Fork Malheur River passed through the reservoir to meet downstream water right needs.

Trap and haul sampling occurred on October 6 and 7 and resulted in a total of 3307 fish returned to Beulah Reservoir to supplement the prey base for bull trout. Native fishes returned to the reservoir included largescale sucker (*Catostomus macrocheilus*), bridgelip sucker (*Pantosteus columbianus*), chiselmouth chub (*Acrocheilus alutaeus*), and redbelly darter (*Richardsonius balteatus*). As per guidance of ODFW, largemouth bass (*Micropterus salmoides*), catfish spp (*Ameiurus*), and northern pikeminnow (*Ptychocheilus oregonensis*) were not relocated to the reservoir, catch of these species totaled 2782 fishes. Sampling methods used in 2021 included fyke traps and beach seining for fish and grab samples for crawfish following previously developed methodologies. A grab sample of 48 crawfish identified all individuals as Signal Crawfish (*Pacifastacus leniusculus*) a native species.

Fish salvage efforts have been conducted in the past for different purposes but are summarized in Table 10 for comparison, sampling in 2021 was the first effort conducted as a requirement to an ITS.

Project partners included the Vale Irrigation District, ODFW, and the Burns Paiute Tribe.

Table 10. Comparison of relative abundance (percent of total catch) for fall trap and haul efforts in tailrace of Agency Valley Dam, years 2010, 2018, and 2021. Sampling effort, gear, environmental conditions, and purpose varied between years. Values of 0 denote no fish sampled, abundance of 0% denote low numbers.

Species	Relative Abundance		
	2010	2018	2021
Largescale sucker	26.70%	12.57%	61.6%
Bridgelip sucker	0.00%	16.70%	0.16%
Northern pikeminnow	9.20%	39.44%	37.08%
Chiselmouth	27.40%	15.07%	0.47%
Redside shiner	26.90%	9.54%	0.05%
Largemouth bass	0.00%	0.41%	0.11%
Rainbow trout *	0.40%	1.86%	0.05%
Sculpin (<i>Cottus</i>) spp	1.00%	0.20%	0.00%
Dace (<i>Rhinichthys</i>) spp	6.90%	0.32%	0.00%
Mountain whitefish	0.40%	3.87%	0
Yellow perch	0.00%	0.03%	0
Catfish (<i>Ameirus</i>) spp	0.30%	0.00%	0.47%
Bull trout	0	0	0
Total catch (individual fishes)	2,657	3,437	7,387

*Rainbow trout were not differentiated between hatchery or native origin.

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 September 30, 2021, 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 176 af (0% total capacity, run of river). In the previous water year, Beulah Reservoir filled to a maximum of 38,509 af (65% total capacity). A summary of the survey is documented in project files (Reclamation 2021).

3.3.3 Malheur River – Redd Counts

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). In 2021, Reclamation did not participate due to staffing limitations with operation of the Boise North Fork Bull Trout Migration Weir. 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 13 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 tributaries⁹.

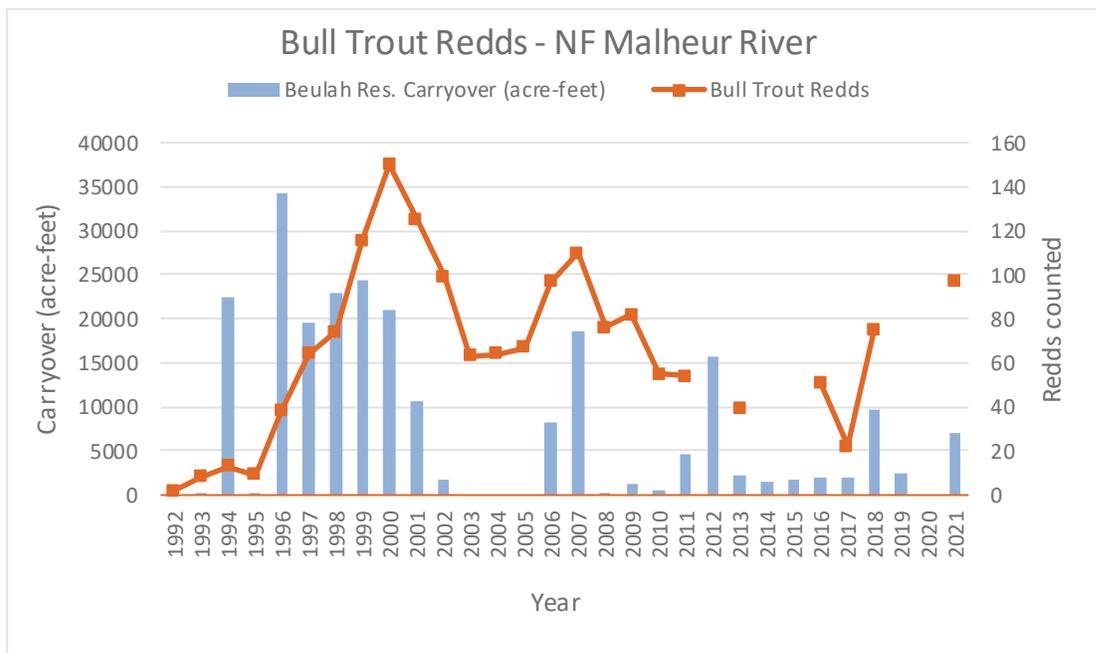


Figure 13. Data on bull trout redd trends observed in the North Fork Malheur River watershed (North Fork Malheur River) and carryover storage at the start of the WY in Beulah Reservoir, WY’s 1992–2021. The number of redds observed after 2007 has been adjusted by one to reflect the reduced size of the area surveyed. No redd count data exist for 2012, 2014, 2015.

⁹ 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.

2019, or 2020. See footnote 9 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 ODFW 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 No. 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 2021 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 No. 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, which will inform forthcoming operational recommendations for Phillips Reservoir.

4. Snake River Physa

In 2021, Reclamation assisted USFWS with their trend monitoring of the snail population in the Snake River between Minidoka Dam and Milner Reservoir on August 17-18, 2021.

Reclamation has completed the monitoring requirements outlined in the 2015 Opinion. Long-term flow recommendations were accepted by USFWS in the spring of 2020. These recommendations fulfill requirements identified in the 2015 Opinion (USFWS 2015).

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Appendix A

Bull Trout Migration Weir North Fork Boise River—2021 Section 10 Permit Report



— BUREAU OF —
RECLAMATION

Bull Trout Migration Weir North Fork Boise River —2021 Section 10 Permit Report

Permit Number PER0016984-0

Boise Project, Boise, Idaho

Columbia-Pacific Northwest Region



Mission Statements

The Department of the Interior 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.

Acknowledgements

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Cover photograph: Bull Trout at the North Fork Boise Weir, Barber Flat, Idaho

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Acronyms and Abbreviations

BO	Biological Opinion
BA	Biological Assessment
cfs	cubic feet per second
ESA	Endangered Species Act
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USFS	U.S. Forest Service
PIT	Passive Integrated Transponder
Reclamation	Bureau of Reclamation
NFBR	North Fork Boise River
MFBR	Middle Fork Boise River
BTSI	Middle Fork Boise River at Twin Springs gauge
SR	Spawning and Rearing

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1. Introduction

The Upper Snake Bull Trout Recovery Unit currently lacks trend data in many core areas and there is a need to collect more information to determine whether bull trout populations are decreasing, stable or increasing. Based on discussions with technical partners and the existing trend data, the U.S. Fish and Wildlife Service estimated that 13 of the 22 core areas in the Upper Snake Recovery Unit have either stable or increasing trends since 1995 (USFWS 2015a, p. E-20). State fisheries programs have collected trend data in only 12 of the 22 core areas in the recovery unit. For core areas that contained trend data, 8 of the 12 indicated either a stable or increasing trend but decreasing trends were observed in some core areas that were otherwise identified as likely to be stable without primary threats. While populations in many parts of the range are stable or increasing, other areas such as southwest Idaho do not have any or enough information regarding trends. In the Boise River watershed, for example, trends are increasing in the Anderson Ranch Core Area, but trends are not known in the Arrowrock Core Area (USFWS 2015a, p. E-20; Meyer et al. 2014).

The Upper Snake Recovery Unit Implementation Plan recommends several recovery actions for bull trout in the Arrowrock Core Area (USFWS 2015a, pp. E-31 – E-32). These include recovery action 4.2.1: continue ongoing population monitoring efforts, maintain current long term datasets assessing abundance and distribution of bull trout, and continue to coordinate surveys among partner agencies in the Upper Snake Recovery Unit (USFWS 2015a). The parties responsible for authorizing, funding, and carrying out these actions are the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and The Idaho Department of Fish and Game (IDFG) (USFWS 2015a, p. E-64). The Bureau of Reclamation (Reclamation) has assisted with these actions in the Boise River since bull trout were listed in 1999 and then continued efforts under the Bull Trout Monitoring and Implementation Plan and the Conservation Recommendations of the 2005 Biological Opinion on Reclamation operations and maintenance activities at facilities in the Snake River Basin above Brownlee Reservoir (USFWS 2005, hereafter 2005 Opinion).

Picket weir traps are important components of both population trend monitoring as a recovery action and Reclamation studies designed to address the specific terms and conditions of the 2005 Opinion. Weirs on the North Fork Boise River (NFBR) and the Middle Fork Boise River (MFBR) have historically been used to capture fluvial and adfluvial bull trout during their downstream migration after spawning (Salow 2004a). Weirs have provided a consistent method to assess inter-annual trends in the number of migratory bull trout. Radio telemetry using fish captured and tagged at the weirs has provided a way to monitor migration patterns and means of take for bull trout in the Arrowrock Core Area (Flatter 1999, Salow 2004a, Salow 2004b, Monnot et al. 2008, Stiefel 2007, Maret and Schultz 2013, Priscandaro 2015; Benjamin et al. 2020). The information is also used by the Boise National Forest during forest planning, fish passage improvements, management indicator species monitoring, and section 7 consultations.

Reclamation worked cooperatively with USFWS and USFS to operate weirs on the NFBR from 1999-2006, 2011 and 2013, and on the MFBR in 2002, 2003, 2005, 2006, 2011, and 2013. In 2021, Reclamation received a recovery grant from the USFWS Idaho Fish and Wildlife Office for recovery action 4.2.1 to operate the NFBR weir cooperatively with USFWS and USFS. The bull trout data will provide additional information to establish population trends and assess primary

1. Introduction

threats in the Arrowrock Core Area (USFWS 2015a). The data will also assist Reclamation and USFWS in the estimation of how many bull trout could be captured for potential radio tagging efforts or whether other monitoring techniques could be more informative in the future under the Bull Trout Monitoring and Implementation Plan.

Regulatory Background

Reclamation consulted with USFWS on the proposed actions involving the effects of future operations and routine maintenance (O&M) on species listed under the Endangered Species Act (ESA) at 12 Federal projects in the upper Snake River basin (Reclamation 2004). The USFWS issued a non-jeopardy biological opinion for Reclamation operations and maintenance activities in the Snake River basin above Brownlee Reservoir (USFWS 2005). The 2005 Opinion contains a 30-year incidental take statement and corresponding reasonable and prudent measures that outline nondiscretionary actions to minimize adverse effects to bull trout (*Salvelinus confluentus*). Reclamation developed the Bull Trout Monitoring and Implementation Plan to conduct monitoring studies needed to determine the feasibility of implementing certain terms and conditions as well as reporting requirements of the 2005 Opinion (Reclamation 2006).

The incidental take statement included in the 2005 Opinion provides Reclamation with specific exemptions for the take of bull trout at Reclamation facilities for effects described in the 2004 Biological Assessment (BA). In past years' operations, both intentional and incidental take of bull trout through weir operation was exempted under an umbrella approach that grouped federal recovery actions under section 6 cooperative agreements with individual States' wildlife management agencies (USFWS 2011 weir LOC). IDFG designated Reclamation as an Agent of the State under its scientific collection permit and reported take by Reclamation's weir operations under the IDFG's annual section 6 report to the USFWS. Reclamation also reported on bull trout handled for studies addressing specific terms and conditions in annual reports provided to the Service under the 2005 Opinion. A change in regulatory interpretation (USFWS 2015b) since the weir was last operated now requires that Reclamation either consult under section 7 or section 10 for intentional take of bull trout during monitoring studies. The weir was operated under recovery action 4.2.1 and Reclamation accordingly applied for a section 10 recovery permit.

SEC. 10. (a) PERMITS.—(1) The secretary may permit, under such terms and conditions as he shall prescribe—

(A) Any act otherwise prohibited by section 9 for scientific purposes or to enhance the propagation and survival of the affected species

Reclamation received Permit #PER0016984 (Appendix 1: USFWS Section 10 Permit #PER0016984) from USFWS for the operation of the NFBR weir in 2021. As provided for under the ESA, the permit contains terms and conditions to minimize and mitigate the impacts of intentional take and exempt incidental mortality of bull trout. The permit also contains mandatory annual reporting requirements. This report fulfills those requirements for the 2021 field season.

2. Objectives

Objective 1. Operate the North Fork weir in 2021 to implement recovery action 4.2.1 (USFWS 2015a). “Continue ongoing population monitoring efforts within the basin. Maintain current long term datasets assessing abundance and distribution of bull trout. Continue to coordinate surveys among partner agencies.”

Objective 2. Investigate effectiveness of weir design changes to improve passive capture efficiency and reduce potential predation on bull trout.

Objective 3. Determine if the bull trout population is large enough for a potential future telemetry project to have an adequate sample size to meet the objectives of Reclamation’s 2006 Implementation and Monitoring Plan for the Arrowrock Core Area.

3. Study Area

The study area is within the Arrowrock Core Area of the Upper Snake Bull Trout Recovery Unit in Idaho (Figure 1). The weirs operated on the MFBR have collected fewer years of data and were not operated as long as the NFBR weir in some years due to issues with wildfire debris and flooding. Only 9% of bull trout captured at the weirs over the years were from the MFBR weir. Over those 6 years of MFBR operation, 67% of all MFBR bull trout were from a single year (2002). With limited materials and funding for a re-design of the weir to meet Objective 2 above, operating a weir on the NFBR was prioritized for 2021.

The weir was located on the NFBR at Barber Flat at the same general location that has been used for previous studies. This location is downstream of most of the potential local populations and all known local populations in the NFBR (Figure 2). Other data collection included temperature and flow data from the weir location and other locations in the basin (Figure 2, Table 1).

3. Study Area

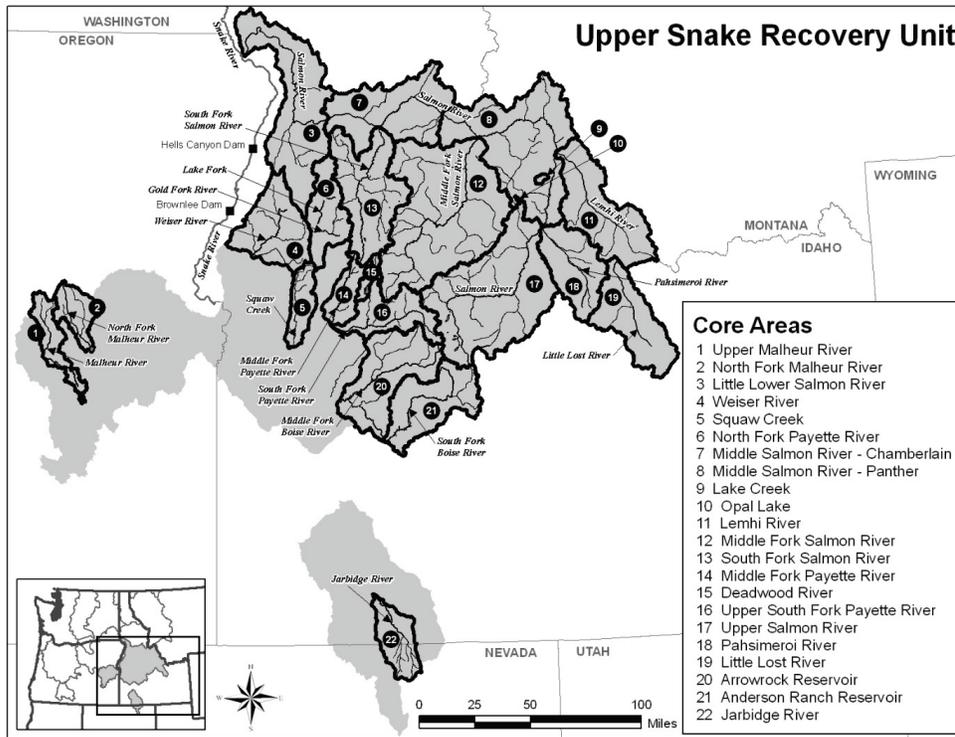


Figure 1. Upper Snake Bull Trout Recovery Unit with the Arrowrock Core Area circled in red. (From USFWS 2015a)

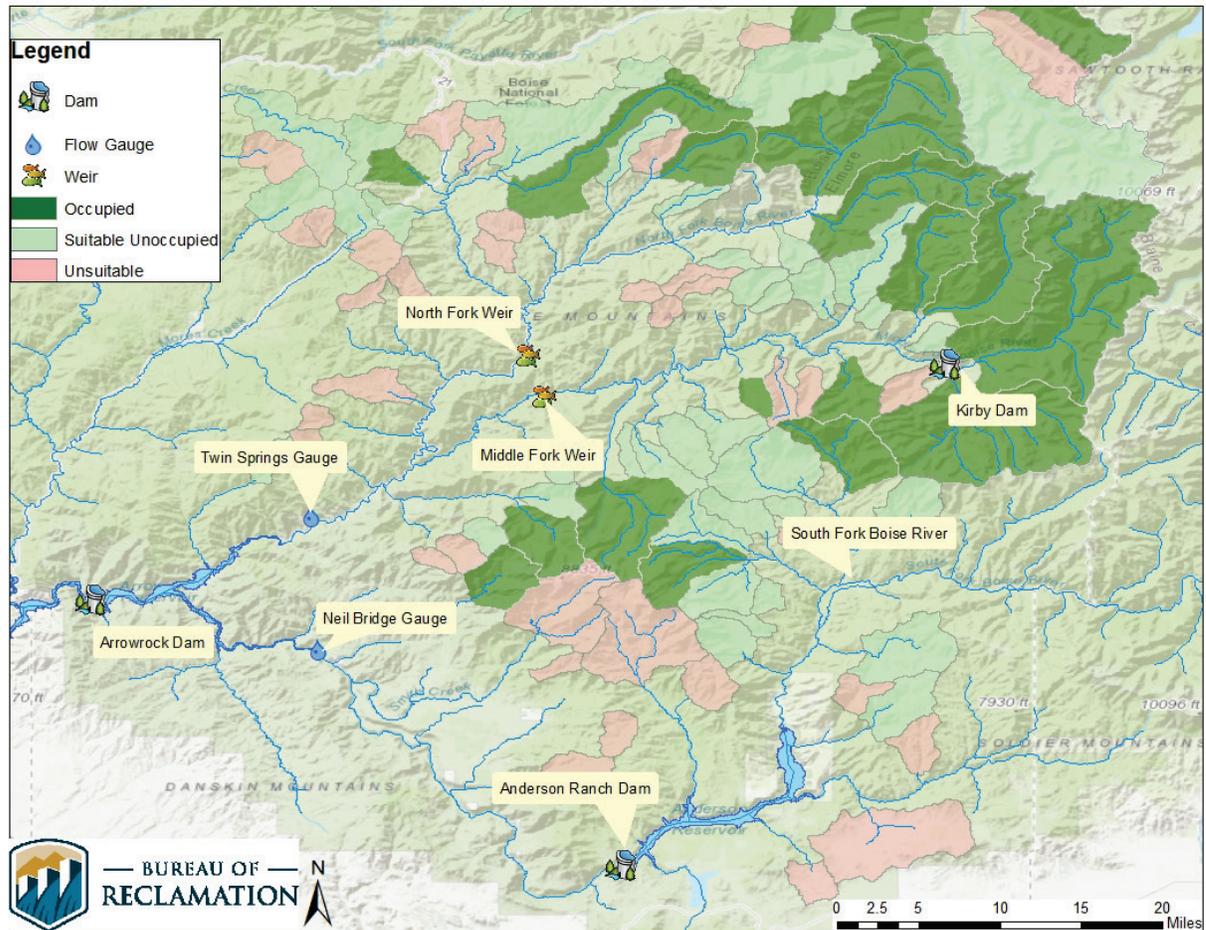


Figure 2. Map of the Upper Boise River Drainage. Modeled patches of bull trout spawning and rearing habitat are color coded based on USFS sampling data showing: occupied, suitable but unoccupied and unsuitable habitat.

Table 1. Locations and elevation of data collection sites for 2021 weir operations.

Site ID	Latitude	Longitude	Elevation (ft)
NF Boise Weir	43.81264	-115.53301	4150
NF Boise Temperature Logger	43.82602	-115.53418	4192
MF Boise Temperature Logger	43.78060	-115.49670	3887
NF Boise Tpressure Sensor	43.82602	-115.53418	4192
Twin Springs Gauge	43.66802	-115.72598	3281

4. Methods

4.1 Migration Weir

A 5-foot-tall steel picket style weir was constructed across the full width of the NFBR with wings to funnel fish to the upstream and downstream trap boxes (Figure 3, Figure 4). The weir is constructed of 3.05-meter-long angle iron frames with steel conduit pickets spaced 1.25 centimeters apart. The weir is designed to act as a migration barrier for all fish > 1.25 centimeters in width (approximately > 200 millimeters total length for bull trout), capturing fish in traps as they move upstream or downstream. To provide added strength to the frames, angle iron legs were bolted to the frames. Tripods added support to the structure of the weir (Figure 4). In the deeper and faster water, solid steel rod supports (2.5 centimeters x 182.8 centimeters) were driven 30 to 40 centimeters into the substrate behind the frame of the weir.

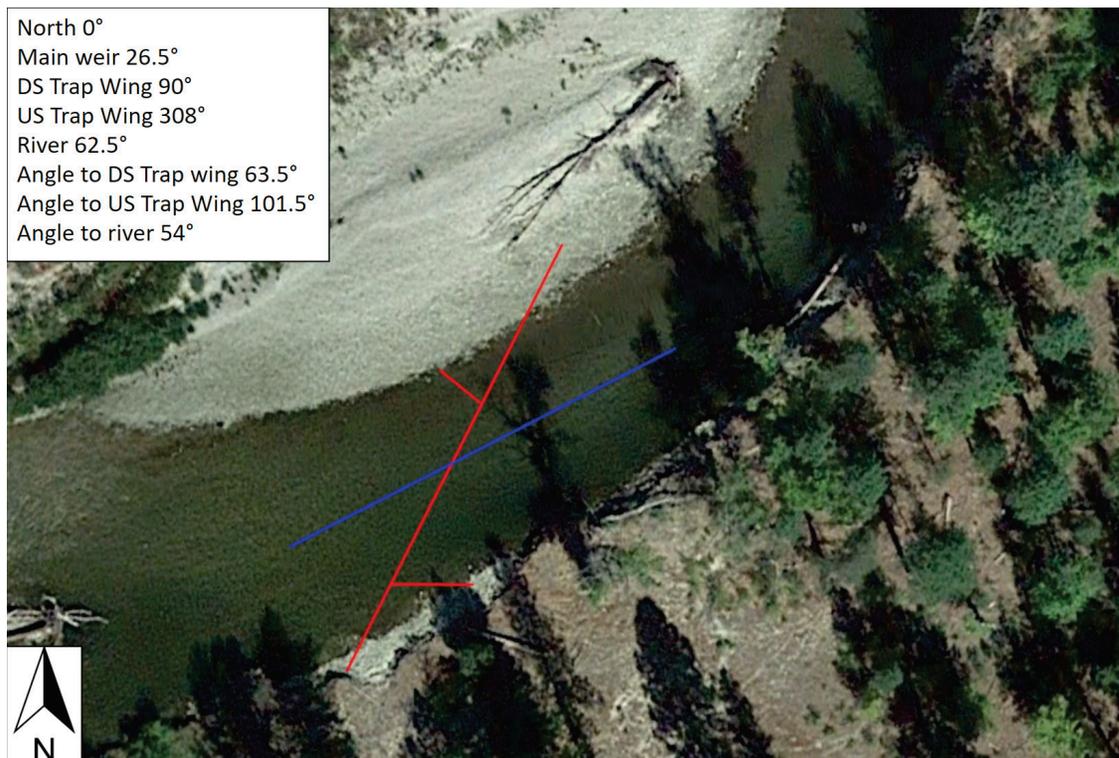


Figure 3. Aerial view of North Fork Boise Weir location in 2021. Red lines depict weir panels and blue line estimates angle of river flow.

Remote camera videos from the last season of operation in 2013 show bull trout struggling to find the downstream trap entrance, bull trout swimming back out of the trap entrance and owls attempting to catch bull trout at the weir. Weir design modifications were implemented attempt to mitigate for these issues. The main weir was installed in 2021 at a steeper angle than in previous years. In previous years the weir was 15-20° away from being perpendicular to the river channel.

In 2021 the angle was approximately 54° . This angle not only decreased the effective distance between pickets, it pushed flow (and presumably fish) toward the downstream trap box (Figure 4, Figure 5).



Figure 4. Photo of the North Fork Boise weir (2021). Flow is from right to left. Staff is standing at the open downstream trap box. Photo credit: Jaan Kolts.

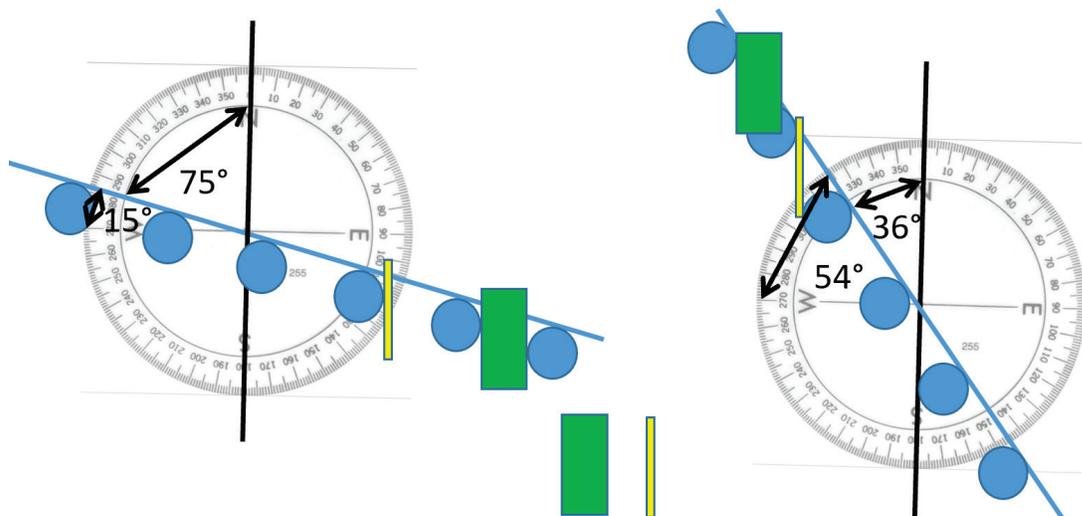


Figure 5. The steeper angle as compared to the water flow of the weir in 2021 (54° right) compared to previous years (75° left) reduces the effective space between the pickets for fish traveling parallel to the flow. Not to scale, for demonstration purposes only. Blue circles

represent pickets. Green rectangle width represents effective space between pickets at 75° and yellow rectangle width represents effective space between pickets with the new 54° design.

After the main weir and wing funnel fish toward the upstream trap box, the box itself consists of a V of pickets inside a larger rectangle (Figure 6). Fish are held inside the larger rectangle and removed at least twice a day. The goal of this weir operation is to capture bull trout migrating downstream from their spawning run, so the downstream trap is a bit more complex. The V entrance and rectangular box are similar to the upstream trap with the main weir and wing funneling fish toward this trap entrance. Off of the rectangle, an 8-inch pipe extends downstream to another rectangular trap box with a lid (Figure 7). The 8-inch tube extends 2/3 of the length of the box. A mesh bag was placed on the end of the tube to make it harder for fish to find the exit.



Figure 6. Upstream trap box. A similar configuration was used for the first stage of the downstream trap. Photo credit: Mark Nelson.



Figure 7. Downstream trap box. The V and rectangle created by pickets is similar to the upstream box with an additional tube connection for fish to move downstream into the trap box. Photo credit: Mark Nelson.

4.1.1 Fish Handling (Work Up)

All captured fish were identified to species (genera for sucker) and enumerated, including date, time and direction of travel. All game fish were measured (mm) to total length. Early in the season fish, primarily rainbow trout, were captured in poor condition with existing external fungal/bacterial infections. To limit additional stress from handling, each bull trout's condition was assessed prior to work up, and not all data collection outlined in the study plan was conducted for each bull trout. In addition to the raw counts of bull trout captured, counts per trap night were calculated to adjust for the differences in trap operation between years. No bull trout had previously been captured later than the 2021 operational time frame. The number and percent of total catch from previous years where operation began earlier than 2021 were calculated as another means to interpret differences in trap operation between years.

Most post spawn adult bull trout (>300mm) were measured for total length, fork length, width and depth before release. The process of weighing a fish requires the additional stress of removing

4. Methods

them from the water. Most weight measurements were limited to subadults (<300mm) that are first time migrants and were not likely to have injuries or stress from spawning. PIT tagging had the potential to provide additional information if any bull trout were recaptured in the future but was not related to the three primary objectives of the 2021 weir operation listed above. PIT tags were only implanted in three bull trout before USFWS decided it was not worth the additional stress given the objectives of the 2021 operations. Recent advances in genetic analysis provides the ability to identify individuals and has the potential to act as a unique identifier for any bull trout recaptured in the future. A fin clip from the caudal fin was taken from each bull trout for genetic analysis and as a mark to determine recaptures.

All genetic analyses will be sent to USFWS Conservation Genetics Lab for inclusion in an ongoing study characterizing the genetic diversity of bull trout in the Arrowrock Core Area (Adams et al. in progress). Tissue samples are preserved in 100% pure ethanol in labeled vials provided by the Genetics Lab and will follow lab protocols for archiving samples and associated data.

4.2 Spotlight Netting

Associated with the weir operations, nighttime spotlight netting upstream of the weir in previous years has captured on average 33% (range 0 to 90%) of the total annual weir catch with the rest of the fish captured in the trap boxes. To limit stress to bull trout, spotlighting was done to monitor presence of bull trout upstream from the weir. Active netting was only attempted on a few occasions.

4.3 Water Temperature and Water Level

Data from previous years has shown relationships between bull trout movement (weir catch rates) and precipitation/flow. A pressure sensor, set to collect data at 15 min intervals, was installed upstream of the potential area backwatered by the weir. Data from this site was adjusted based on barometric pressure readings at the nearest weather station (Idaho City). A temperature logger was also installed at this site. Both instruments started collecting data on July 22, 2021. The pressure sensor was removed on October 21, but the housing remains so it could be redeployed in the future. Unlike the pressure sensor, the temp logger and housing were built to withstand winter conditions and continue to collect data that can be downloaded in the future.

Flow measurements were attempted at the weir, however error codes including “check sensor” were reported and the data is not expected to be reliable for use on this project.

4.4 Game Camera Monitoring

Game cameras were deployed to monitor the presence of fish predators and monitor bull trout behavior. Five game cameras were installed to look at different sections of the weir from different angles. Cameras were initially set up to only take still photos when the motion sensors were

triggered. In late September, cameras were re-programmed to take photos at specific intervals to capture animals that may not set off the motion sensor. All photos were reviewed, and all animals were noted with the date and time of detection. Unique behavior that may be associated with predation attempts were noted. Fish were noted when identified in photos.

4.5 Personnel and Staffing

Staff from multiple agencies and offices assisted with all aspects of weir planning, permitting, fabrication, install, operations and removal. At least one individual on Reclamation's Section 10 Permit or USFWS's internal bull trout handling permit was present at all times during weir operation. Reclamation's permit including a list of staff is attached as Appendix 1. At least one additional individual was present for safety and assistance of the permitted staff. These additional individuals included both agency staff and volunteers. Installation and removal of the weir is a labor-intensive endeavor which included a larger group.

Modification to the existing weir materials was completed by Reclamation and USFS staff. Herb Roerick, Boise National Forest Fisheries Biologist, coordinated with the USFS Road Crew (Richard Young) to have road crew staff, tools and shop space available to assist with modifications to the weir structure. David Wyman from the road crew was integral in performing the welding and fabrication needed for the new weir design.

IDFG provided hatchery fish and space at the Nampa Fish Hatchery for fish work up training. A video was created during this training for reference by individuals that could not be there in person as well as a refresher while at the weir. Written protocols were developed by Reclamation and reviewed by the other agencies prior to installation of the structure. An on-site refresher was also conducted on site during installation.

Reclamation led coordination to develop a staffing schedule to ensure one permitted staff member and at least one additional individual were present at all times. While on site staff were able to stay in the Barber Flat Cabin (provided by USFS) a camper trailer (provided by Reclamation) or their own camping set up. Safety and communication protocols were developed by Reclamation for both time at the weir and travel to and from the site. Reclamation provided an off site safety contact and logistical coordinator during the two month operation.

A total of 15 agency staff from USFS, USFWS, and Reclamation assisted with the two-day installation and set up on September 7-8. Reclamation provided written installation instructions. Herb Roerick (USFS) to the lead during install. Incremental design improvements and maintenance was conducted by all staff during weir operation. A total of 14 interagency staff again assisted during weir removal October 24-25.

5. Results

5.1 Fish Capture

The combined fish capture was 455 fish representing six species (Table 2). Bull trout represented 14.1% of the total number of captured fish. The majority of fish captured were mountain whitefish (*Prosopium williamsoni*), 80.7% of total), mostly in middle to late October during their spawning migration. All other species had relatively low counts, with brook trout (*Salvelinus fontinalis*) comprising 2% of the catch.

A total of 63 unique bull trout were captured while traveling downstream. One of these bull trout was later recaptured in the upstream trap. One bull trout was captured during daylight hours, the rest of the captures were during the evening trap check or overnight and found in the trap in the morning. No bull trout mortalities were recorded at the weir in 2021. Bull trout captured ranged from 220 to 770mm total length. Tissue samples were collected from 60 bull trout. The samples are preserved in labeled vials containing 100% ethanol and currently stored at the Snake River Area Office along with the associated biological data.

Table 2. Summary of fish captured at the North Fork Boise Weir in 2021.

Species	North Fork Boise Weir Fish Capture Data	% Composition
Bull trout (<i>Salvelinus confluentus</i>) (BT)	64 (63 unique fish)	14.1
Rainbow trout (RB) (<i>Oncorhynchus mykiss</i>)	12	2.6
Mountain whitefish (WF) (<i>Prosopium williamsoni</i>)	367	80.7
Kokanee (KOK) (<i>Oncorhynchus nerka kennerlyi</i>)	1	0.2
Brook trout (BKT) (<i>Salvelinus fontinalis</i>)	9	2.0
Unknown Sucker (<i>Catostomus spp</i>)	2	0.4
Total Fish	455	

Bull trout size distribution has varied greatly among years (Table 3, Table 4). Thirty-nine (62%) of the bull trout captured were less than 300mm and considered sub-adults. The remaining 24 (38%) were in the adult size class. This is the lowest number of adults captured on record. This number of adults is 3 fish (11%) lower than the next lowest year (2006). The largest individuals (740 and 770mm) were the largest bull trout captured during weir operations in any year except 2011. However, 88.9% of bull trout captured in 2021 were under 400mm. The 7 individuals >400mm captured in 2021 is 59% lower than next lowest year, 2004 with 17.

Table 3. Relative numbers of bull trout (BT) captured overall and per trap night in different size categories among years. Lower number years for each category are darker red and higher numbers are darker blue. The 2021 Rank column represents the relative rank of the 2021 number for that row with the highest number being one and the lowest being 11. The before 9/8 rows represent information from previous years for dates before the weir was installed fully operational 2021.

	1999	2000	2001	2002	2003	2004	2005	2006	2011	2013	2021	2021 Rank
Total Count	261	434	243	131	79	100	60	47	91	104	63	9
Count <300	148	285	88	32	17	72	21	20	25	38	39	5
Count >300	113	149	155	99	62	28	39	27	66	66	24	11
Count >400	48	85	85	57	50	17	21	23	54	50	7	11
Count >500	11	20	39	25	27	14	14	11	46	38	4	11
BT/Trap Night	4.32	8.72	4.3	1.94	1.35	1.56	0.98	0.92	1.54	2.14	1.36	8
BT<300/Trap Night	2.47	5.7	1.63	0.59	0.27	1.13	0.35	0.39	0.42	0.78	0.83	5
BT>300/Trap Night	1.88	2.98	2.87	1.83	0.98	0.44	0.65	0.53	1.12	1.35	0.51	10
BT>400/Trap Night	0.8	1.7	1.57	1.06	0.79	0.27	0.35	0.45	0.92	1.02	0.15	11
BT>500/Trap Night	0.18	0.4	0.72	0.46	0.43	0.22	0.23	0.22	0.78	0.78	0.09	11
BT before 9/8	4	55	1	1	2	6	4	0	5	2	NA	NA
% before 9/8	1.53	12.7	0.41	0.76	2.53	6	6.67	0	5.49	1.92	NA	NA
Trap Nights	60	50	54	54	63	64	60	51	59	49	47	11

Table 4. Min, mean, maximum and median length of bull trout captured among years. Lower number years for each category are darker red and higher numbers are darker blue.

Year	1999	2000	2001	2002	2003	2004	2005	2006	2011	2013	2021
Min	180	160	210	219	210	208	213	195	165	185	220
Mean	312	306	369	393	428	313	385	385	468	407	320
Max	695	715	730	690	730	610	659	680	820	670	770
Median	275	264	331	378	481	272	365	395	510	371	290

Bull trout movement timing in 2021 was comparable to previous years (Figure 8, Table 5). The latest capture date in 2021, October 24 is later than bull trout have been captured in previous years. Installation in 2021 was later than all previous years. Bull trout captured in each previous year before the September 8th install date for 2021 ranged from 0-55 fish (0-12.7%) (Table 3). The highest count of bull trout before September 8th was from 2000 (55/12.7%) with the second highest count of 6 (6%) was in 2004. The relative rank of 2021 counts among all years did not

5. Results

change for 8 of the 10 categories in Table 3. Total bull trout and bull trout <300mm did drop in rank by one level when calculated per trap night.

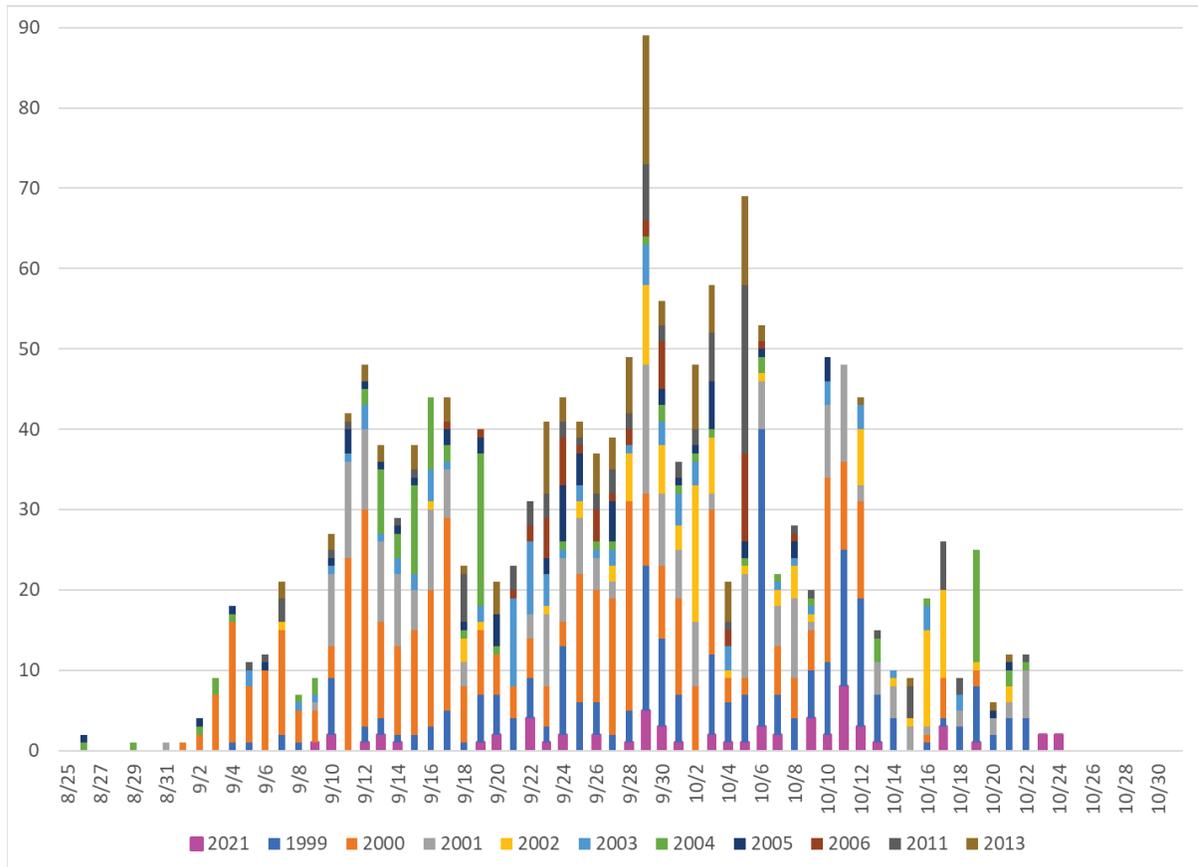


Figure 8. Bull trout weir capture timing 1999-2021.

Table 5. Bull trout captures by date 1999-2021 at the North Fork Boise weir. Lower counts within each year are darker red and higher numbers are darker blue. Pink are non-operational dates.

Date	1999	2000	2001	2002	2003	2004	2005	2006	2011	2013	2021
8/25											
8/26						1	1				
8/27											
8/28											
8/29						1					
8/30											
8/31			1								
9/1		1									
9/2		2				1	1				
9/3		7					2				
9/4	1	15				1	1				
9/5	1	7			2				1		
9/6		10					1		1		
9/7	2	13		1					3	2	
9/8	1	4			1	1					
9/9		4	1		1	2					1
9/10	7	4	9		1		1		1	2	2
9/11		24	12		1		3		1	1	
9/12	2	27	10		3	2	1			2	1
9/13	2	12	10		1	8	1			2	2
9/14	1	11	9		2	3	1		1		1
9/15	2	13	5		2	11	1		1	3	
9/16	3	17	10	1	4	9					
9/17	5	24	6		1	2	2	1		3	
9/18	1	7	3	3		1	1		6	1	
9/19	6	8		1	2	19	2	1			1
9/20	5	5				1	4			4	2
9/21	4	4			11			1	3		
9/22	5	5	3		9			2	3		4
9/23	2	5	9	1	4		2	5	3	9	1
9/24	11	3	8		1	1	7	6	2	3	2
9/25	6	16	7	2	2		4	1	1	2	
9/26	4	14	4		1	1		4	2	5	2
9/27	2	17	2	2	2	1	5	1	3	4	
9/28	4	26		6	1			2	2	7	1
9/29	18	9	16	10	5	1		2	7	16	5
9/30	11	9	9	6	3	2	2	6	2	3	3
10/1	6	12	6	3	4	1	1		2		1
10/2		8	8	17	3	1	1		2	8	
10/3	10	18	2	7		1	6		6	6	2
10/4	5	3		1	3			2	1	5	1
10/5	6	2	13	1		1	2	11	21	11	1
10/6	37		6	1		2	1	1		2	3
10/7	5	6	5	2	1	1					2
10/8	4	5	10	4	1		2	1	1		
10/9	6	5	1	1	1	1			1		4
10/10	9	23	9		3		3				2
10/11	17	11	12								8
10/12	16	12	2	7	3					1	3
10/13	6		4			3			1		1
10/14	4		4	1	1						
10/15			3	1					4	1	
10/16	1	1	1	12	3	1					
10/17	1	5	11						6		3
10/18	3		2		2				2		
10/19	7	2		1		14					1
10/20	2		2				1			1	
10/21	4		2	2		2	1			1	
10/22	4		6			1			1		
10/23											2
10/24											2
10/25											
10/26											
10/27											
10/28											
10/29											
10/30											
10/31											
Total	259	436	232	105	85	100	59	47	91	105	64

5.2 Flow and Temperature

Flows from the NFBR and MFBR combine upstream from the USGS Twin Springs gauge (BTSI). The pressure sensor just upstream from the weir shows some correlation between flow changes at BTSI and water elevation changes at the weir. However, some events in late October are not consistent between the two sites (Figure 9). Similar to previous years, peaks in bull trout captures are documented with or just after peaks in flow/pressure.

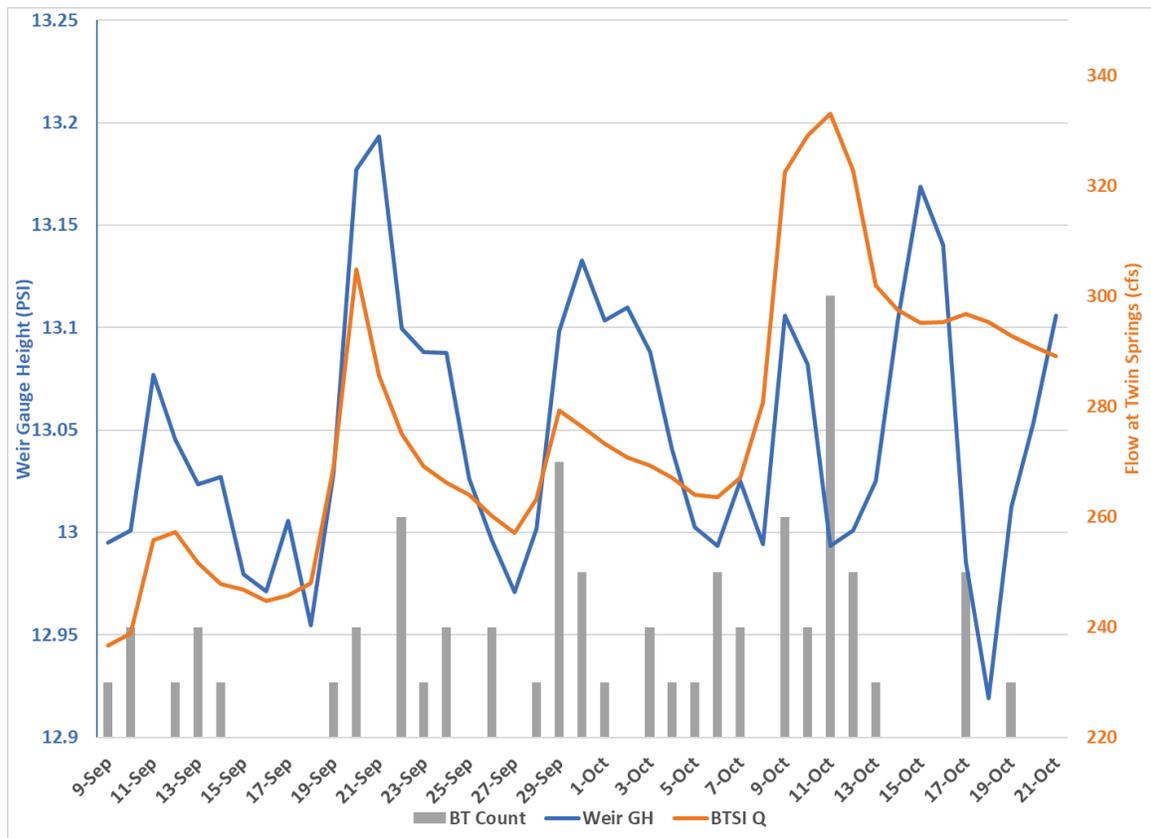


Figure 9. Daily counts of bull trout and water level fluctuation at the North Fork Boise weir compared to flows downstream at the Twin Springs gauge. Note that some additional bull trout captures occurred after the pressure sensor was removed and are not included in this figure.

Weather events bringing rain and/or snow to the area that increases flow, can also decrease water temperatures. Decreases in water temperature at the end of September and middle of October correspond to increases in bull trout captures (Figure 10). Temperature at the weir site is not available in all previous years. Temperature comparison between the NFBR weir and BTSI in 2021 shows a strong correlation between the two sites (Figure 11). BTSI is consistently warmer with a higher diurnal fluctuation in temperatures.

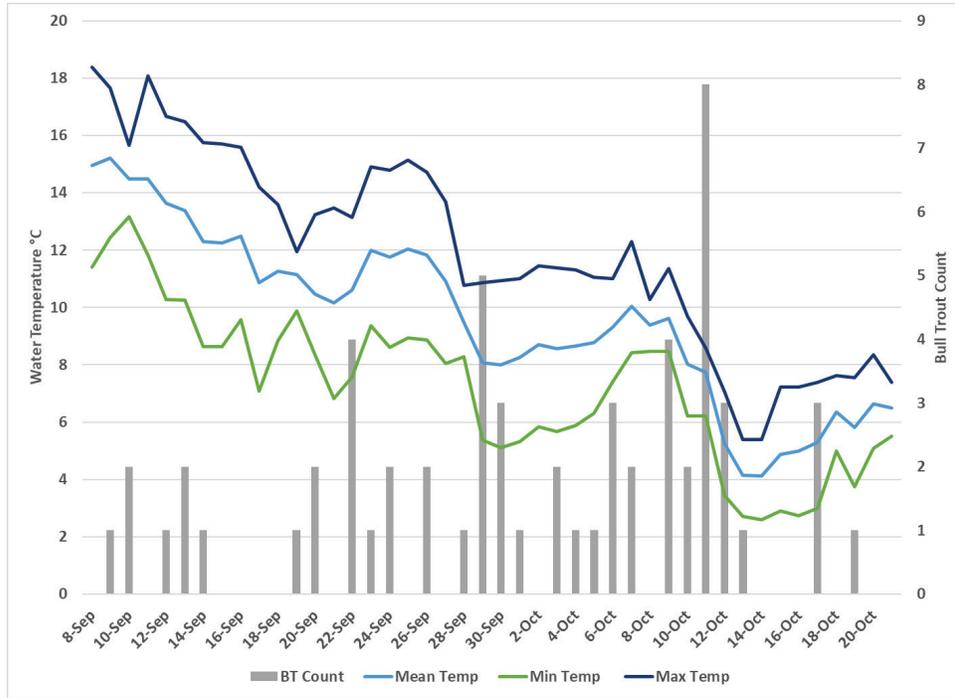


Figure 10. Mean, minimum, and maximum water temperatures at the North Fork Boise Weir with daily bull trout capture counts.

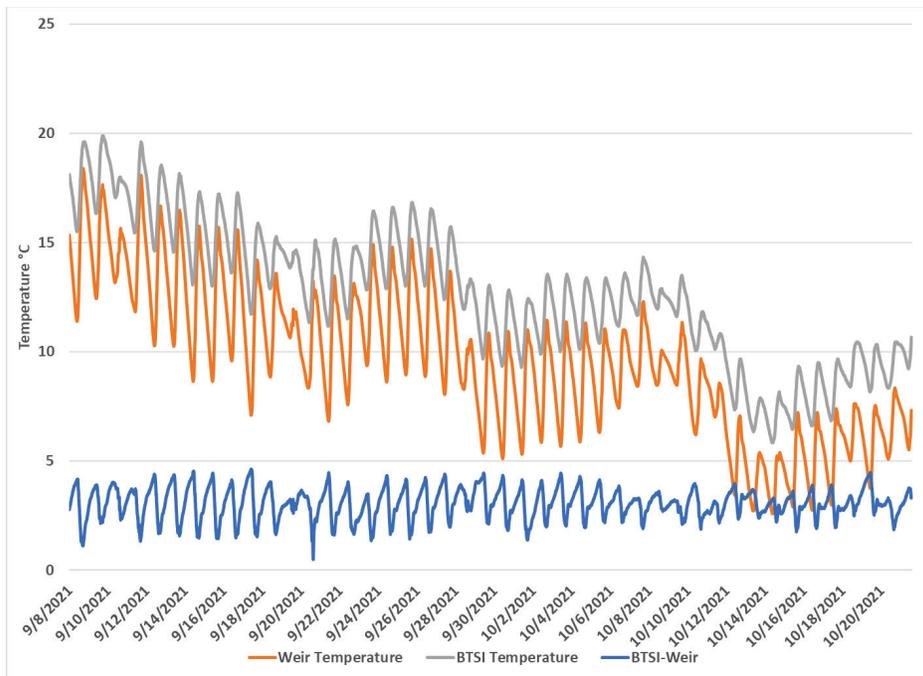


Figure 11. Fifteen-minute interval water temperatures at the North Fork Boise weir and Twin Springs (BTSI) gauge site. Blue line depicts the difference in temperature between the two locations.

5.3 Game Camera Monitoring

Game cameras captured 326 photos of animals at the NFBR weir in 2021. Owl(s) were the most frequently documented animal at the weir. In previous years and at additional locations, these great horned owls have been documented capturing bull trout. Four sets of images show what could be predation attempts by owls. Three of these were an owl standing in or with its legs in the water either downstream of the weir or in the triangle created by the wing on the downstream side of the weir. The other image shows an owl along the wing just upstream of the downstream trap box (Figure 12). Its wings are spread and legs are near the surface of the water. The remaining images of the owl(s) show them sitting on top or landing on the weir.

Otter were also documented on camera at the weir and have been documented as bull trout predators in the past. In 2021, there was only one camera on one night that detected otters.

Table 6. Animals documented on game cameras at the North Fork Boise Weir in 2021.

Animal	Photo Count	% total	Earliest Date	Latest Date
Owl	223	68.4	9/25/2021	10/14/2021
Eye Shine (likely owl)	73	22.4	10/1/2021	10/18/2021
Beaver	15	4.6	9/13/2021	10/23/2021
Whitefish	7	2.1	10/22/2021	10/23/2021
Unknown	5	1.5	9/18/2021	10/8/2021
Otter	1	0.3	10/11/2021	10/11/2021
Deer	1	0.3	10/2/2021	10/2/2021
Dipper	1	0.3	10/12/2021	10/12/2021
Trout	1	0.3	10/12/2021	10/12/2021
Total	326		9/13/2021	10/23/2021

One trout that could not be identified to species was documented on camera during the day in 2021. No fish were documented holding upstream of the weir or with their tails out of water against the weir. Schools of whitefish were documented on camera, but not until the last two days of operation. Beaver, deer, and a dipper were also documented on camera, but are not known to be fish predators.



Figure 12. Image of an owl with its wings spread out and legs at the water surface along the wing on the upstream side of the weir.

6. Discussion

When interpreting the results of weir counts it is important to understand some of the major events that could influence counts at the weir. Table 7 list some of the major events that have occurred in the Arrowrock Core Area. This list goes back to 1994 to include events within the potential lifespan of bull trout captured during weir operations that started in 1999. Telemetry studies documented mortality associated with 2003-2004 Arrowrock drawdown as well as some of the debris flows after fires in the upper basin. Climate factors such as flow and temperature also have an impact on bull trout survival that influence weir counts.

Table 7. Major events in the Arrowrock Core Area that may have influenced bull trout.

Year	Event
1994	Most of NFBR Basin burned in Rabbit Creek Fire
1994	IDFG impliments no harvest regulations for bull trout
1998	Bull Trout Listed as Threatened
2003	MFBR Debris flows
Aug 2003- March 2004	Arrowrock drawdown to dead pool for valve replacement
2001-2004	10 lower ensign valves replaced with clamshell valves
2004	Mid level Arrowrock valves taken out of service
2005	Implimenttion begins for the Biological Opinion T&Cs
2006	One of 2 years of spill since 2005 Opinion
2011	Arrowrock sluice gates permanently closed
2011	Hydro Generator installed to use 2 Arrowrock outlets
2013	Large debris flows into SFBR below Anderson Ranch
2013	MFBR Debris flows
2014	Flushing flow Release from Anderson Ranch
2016	Crooked River and some surrounding areas burned by Pioneer fire
2017	One of 2 years of spill since 2005 Opinion
2017	Highest SFBR flow since 2013 debris flows

6.1 Bull Trout Captures

Subadult bull trout <300mm moving downstream have been shown to migrate at slower rates and exhibit different behavior during migration than post spawning adults (Muhlfeld and Marotz 2005, Monnot et al. 2008). Subadult migration time frames extend well outside of the range of post spawning adults (McPhail and Baxter 1996). This is important to consider when interpreting total bull trout captured vs. total adult bull trout captured. The 63 unique bull trout captured in 2021 is similar to the range of 47 to 104 from six years of weir operation since the Arrowrock valve replacement. Total bull trout numbers are low but appear relatively stable. Compared to previous years, bull trout captured in 2021 were predominantly in the smaller size classes. The number of sub-adult bull trout (<300mm) is within the range of historic data. However, the number of adult bull trout (>300mm) is the lowest count on record.

No bull trout mortalities occurred at the weir during operations in 2021. Design changes appeared to increase trap efficiencies and only a few bull trout were observed holding upstream of the weir. During previous years, longer times spent passing the weir exposed bull trout to predators and delayed migration to foraging habitat which may have increased energy costs in post spawning adults. In 2021, the increased trap efficiency eliminated the need for dip-netting and bull trout were exposed to less stress and handling as well as decreased exposure to predators.

6.2 Brook Trout

Brook trout have only been captures in 4 of the 10 years of weir operation. This includes three in 1999, two in 2003, two in 2011, and nine in 2021. The nine brook trout captured in 2021 represents more brook trout than have been captured in the previous 10 years of operation combined. Brook trout are identified as a primary threat to bull trout due to resource competition and hybridization. Brook trout are abundant in some tributaries upstream from the weir, as indicated by studies in Beaver Creek and Pikes Fork, two tributaries in the Crooked River included in IDFG's brook trout control program (Roth et al. 2019). BNF electrofishing surveys document populations are established in the upper NFBR as well. The IDFG YY male study may provide an important tool to target brook trout control and assist in minimization measures for the threat in the core area.

6.3 Whitefish

Whitefish are important prey of bull trout and fluctuations in their populations may influence bull trout abundance from year to year. However, caution should be used when looking at whitefish data from weir operations. The whitefish spawning migration may start during weir operations, but the percent of the spawning run that moves before weir removal in any given year is likely variable. Whitefish captures increase toward the end of weir operation and a few more or less days of operation could greatly change the counts of whitefish in any given year. Large schools of whitefish were only documented on game cameras the last two days of weir operation in 2021. Interannual differences in length frequency of captured whitefish may be representative but should still be used with caution. Interannual comparison of whitefish data may represent slight shifts in migration timing or weir operational dates and not differences in whitefish abundance between years. This includes the relative abundance of whitefish and bull trout. The percent bull trout represent of total fish captured at the weir should not be used as a metric for analysis of bull trout trends.

6.4 Bull Trout Release Timing

Even though the main predator(s) documented on camera were nocturnal owls; eagle and osprey were also observed by field staff in the vicinity of the weir during daytime. Telemetry data from past years shows that bull trout are exclusively migrating downstream at night. Allowing bull trout time to enter the trap between dusk and evening trap check will be important in the future as spotlight netting is likely to be minimal in future years. This will limit bull trout getting back out of the trap box after entering as well as allowing for work up and release that night instead of holding bull trout found in the trap in the morning until the next evening. The presence of daytime predators and the lack of documented daytime movement of bull trout support holding fish from morning trap check until that evening for release.

6.5 Trap Avoidance

In previous years, on average 33% of bull trout captures at the NFBR weir have occurred by netting downstream migrating fish at the weir that did not enter the trap box. Bull trout have also been documented holding in the trap mouth or escaping from the downstream trap box. The design modifications implemented in 2021 funneled fish and flow toward the trap mouth. Fewer fish were observed upstream of the weir during spotlight netting in 2021 than previous years. Bull trout tail slapping on the weir documented in 2013 was not documented by game cameras or noted by staff on site with the new design in 2021. When staff did hear pickets rattling, fish were already in the downstream trap box. If counts in 2021 were lower than past years due to trap avoidance or the lack of spotlight netting, that should show up across species and size classes. Brook trout counts were the highest on record and whitefish the second highest. Subadult bull trout counts were the 5th highest on record and over double the lowest count on record. These counts in addition to the lack of bull trout documented holding upstream of the weir suggest bull trout capture efficiencies that are comparable to previous years.

The change in 2013 from an expanded metal trap box to pickets may be allowing the smallest fish <200mm to travel downstream without being captured. The absence of bull trout under 220 mm in 2021 (Table 4) may also be influenced by the limited amount of spotlight netting conducted. The smallest fish (<207mm) captured in 2013 were captured spotlight netting and not in the trap box made of pickets. Modifications to the trap box itself could be useful for any future weir operation. If capturing bull trout under 220 mm is required to meet future objectives, alterations may be needed to the trap box. Expanded metal with smaller holes than the current gap between pickets would retain these smaller fish. More research and potential experimentation with tube or baffle design could improve capture efficiency by reducing the number of fish getting back out of the trap box after entering.

6.6 Radio Tag Possibilities

With this population's history of alternate year spawning and interannual differences in water year impacts; a minimum 2-year battery life is optimal for obtaining information via radio telemetry. Radio tags cannot exceed 3% of the total body weight of a fish for IDFG permitting. MCFT2 tags from Lotek provide a unique ID, temperature and motion sensor readings. Both temperature and motion sensors are important for identifying mortalities and associated means of take.

A 9-gram tag would not be expected to last a single year. A 10-gram tag from Lotek (MCFT2-3EM) would have an expected battery life of over 2 years at 860 days. Only slightly heavier, an 11-gram tag (MCFT2-3FM) has an expected life of almost 4 years at 1432 days. These latter two tags would require bull trout over 333 and 366 grams respectively. Of the 63 unique bull trout captured in 2021, 16 would have been heavy enough for an 11-gram tag and one additional fish could have had a 10-gram tag.

6.7 Flow and Temperature

The differences documented between the weir site and the BTSI gauge show that additional work to document temperature and flow at the weir site could be beneficial for future operations. Rain events that influence flows at BTSI could come from storms that are concentrated in either the NFBR or MFBR drainage and only influence local fish movement. Flow measurements to create a stage discharge curve for the weir location as well as an on-site barometric pressure sensor for calibration would improve the applicability of the pressure sensor data from the weir.

Temperature data from the BTSI gauge is mainly used by USGS for detection of ice that can influence gauge readings and flow calculations. Currently the temperature data from BSTI does not have a formal quality control process. This was learned after looking into a logger drifting and not providing accurate data at another site. USGS says that there is temperature data available that is collected during flow measurements. That data could be used to check the accuracy of older data. If future work justifies the expense, funding could be provided to USGS to conduct past and/or future quality control on the temperature data from BTSI. A less expensive alternative for future data may be to install a temperature logger as a check on the data and as backup to BTSI.

6.8 Predator and Bull Trout Behavior

The owls documented on game cameras may be using the weir to target fish, but it was also noted that other prey items are available. Bats were documented by field staff flying above the water near the weir. The owls seemed to be watching the bats and may be using the weir as a good perch to hunt bats utilizing the river. Video evidence from Deadwood Reservoir and a crew scaring an owl off a freshly killed bull trout during previous weir operations indicate that owls are predated on fish even if their diet includes other prey.

Staff doing spotlight surveys as well as the game cameras failed to document bull trout spending time just upstream of the weir as they had in past years. Although owls were still documented at the weir, the design changes reduced the time frame bull trout could be susceptible to predation attempts. A quantitative analysis has not been completed, however anecdotally the percent of fish captured with talon marks or similar wounds was lower in 2021 than in previous years.

Game cameras have provided insights into the predators present at the weir as well as bull trout behavior that is hard to document with other methods. Staff installing game cameras in the future should review photos and video from 2013 and 2021 to understand what views and angles provide the best opportunity to obtain the most useful photos. Videos are time consuming to review but may be the only way to confirm certain predation events or fish behavior. For future operations, setting all of the cameras to a consistent interval of taking photos will more easily allow for additional statistical analysis such as occupancy modeling.

6.9 Recovery

The low number of larger adult bull trout captured in 2021 reaffirms the need for agencies working with bull trout in the Arrowrock Core Area to continue to address the primary threats to bull trout in the Arrowrock Core Area. The variety of life history strategies combined with large geographic scale of bull trout migrations make it hard to identify if, or what primary threats are influencing bull trout counts at the weir. The relatively high number of brook trout captured is a single data point and does not allow for recommendations to address the threat. When combined with additional data, data from the 2021 weir will be used to develop monitoring activities as Reclamation works towards long term recommendations for the Boise River system. An interagency effort to operate the weir again in the future could provide another snapshot on the status of migratory bull trout in the Arrowrock Core Area.

6.10 Future work

Interagency partners agree that operating the weir again in 2022 would likely not provide enough bull trout to radio tag for an informative telemetry study in the Arrowrock Core Area. Reclamation is coordinating with USFWS to investigate alternative efforts that could meet similar objectives to a telemetry study. Information gathered during the 2021 weir operations will help in this process.

7. Literature Cited

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8. Appendix 1: USFWS Section 10 Permit #PER0016984



United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE 11th Avenue
Portland, Oregon 97232-4181



In Reply Refer to:
FWS/IR09/IR12/AES/Recovery Permits

Dear Permittee:

Enclosed is your U.S. Fish and Wildlife Service recovery permit issued under section 10(a)(1)(A) of the Endangered Species Act (ESA), 16 U.S.C. 1531 *et seq.*, and its implementing regulations.

Please refer to the permit number in all correspondence and reports concerning permit activities. Engagement in any activity pursuant to this permit constitutes understanding and acceptance of the Special Terms and Conditions attached to your permit.

By accepting this permit and conducting activities authorized by it, you are agreeing to adhere to the attached Special Terms and Conditions. Failure to comply with the permit Special Terms and Conditions could result in ESA section 9 take violations, or suspension/revocation of this permit.

Please be aware that some species named in your recovery permit may also be listed under various State Endangered Species Acts or otherwise be of special concern to the States. As such, activities affecting those species may not be conducted without first obtaining the appropriate State permits. Possession of a Federal permit does not obviate the need for State authorization.

If you have any questions regarding this matter, please contact Colleen Henson, Regional Recovery Permit Coordinator, at 503-231-6283 or Colleen_Henson@fws.gov. Thank you.

Sincerely,

**DAVID
LEONARD** Digitally signed by
DAVID LEONARD
Date: 2021.09.01
14:04:09 -07'00'

Acting Program Manager for Restoration
and Endangered Species Classification

Enclosures

**INTERIOR REGION 9
COLUMBIA-PACIFIC NORTHWEST**

IDAHO, MONTANA*, OREGON*, WASHINGTON

*PARTIAL

**INTERIOR REGION 12
PACIFIC ISLANDS**

AMERICAN SAMOA, GUAM, HAWAII, NORTHERN
MARIANA ISLANDS



Issuing Office:

Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Ecological Services, Recovery Permits
911 NE 11th Avenue
Portland, Oregon 97232-4181
permitsR1ES@fws.gov

Digitally signed by:

**DAVID
LEONARD**

Digitally signed by DAVID
LEONARD
Date: 2021.09.01 14:04:37
-07'00'

Acting Program Manager for Restoration
and Endangered Species Classification

Permittee:

Amy Goodrich
Natural Resource Specialist
U.S. Bureau of Reclamation
Snake River Area Office
230 Collins Road
Boise, Idaho 83702

Authority, Statutes, and Regulations: 16 U.S.C. 1533d 50 CFR 17.32, 50 CFR 13

Location where authorized activity may be conducted:

On lands specified within the attached Special Terms and Conditions.

Reporting requirements:

- A. Annual reports are due by January 31 following each calendar year this recovery permit is in effect.
- B. See the attached Special Terms and Conditions for further reporting requirements.

Authorizations and Conditions:

- A. General conditions set out in Subpart B of 50 CFR 13, and specific conditions contained in Federal regulations cited above, are hereby made a part of this permit. All activities authorized herein must be carried out in accordance with and for the purposes described in the application submitted. Continued validity or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.
- B. The validity of this permit is also conditioned upon strict observance of all applicable foreign, state, local, tribal, or other federal law.
- C. Valid for use by permittee named above.
- D. Further conditions of authorization are contained in the attached Special Terms and Conditions.

SPECIAL TERMS AND CONDITIONS

1. This Endangered Species Act (ESA) recovery permit is issued under the authority of section 10(a)(1)(A) of the ESA and its implementing regulations at 50 Code of Federal Regulations (CFR) 17.
2. Take Authorization:
 - a. The permittee is authorized to purposefully take¹ the following federally-listed fish species in conjunction with the following authorized activities for scientific purposes or to enhance the recovery, survival, and propagation of the species as specified in the permittee’s June 10, 2021, new recovery permit application, in accordance with the Special Terms and Conditions stated herein.

Species [Common and		
Bull trout (<i>Salvelinus confluentus</i>)	Threatened	Harass by survey (via weir operation, spotlight netting with dip nets or seines, snorkeling, and redd surveys), collect/capture, handle, measure, biosample, Passive Integrated Transponder (PIT) tag, eDNA sampling, release, and salvage.

- b. This permit does not authorize take of federally-listed fish and wildlife species² that are not specifically authorized under this permit. However, the U.S. Fish and Wildlife Service (Service) acknowledges that incidental (unintentional) take³ of a co-occurring listed species could potentially occur while conducting certain authorized activities. When applicable, the following Special Terms and Conditions apply to all listed fish and wildlife species that the permittee is not

¹ Take, as defined by the ESA, for fish and wildlife means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Issuance of a recovery permit is a Federal action subject to the requirements of section 7 of the ESA. Under these requirements, a formal consultation is conducted to determine if the recovery permit action avoids jeopardy and adverse modification of critical habitat. The outcome of the formal consultation is the issuance of a biological opinion. If a recovery permit action is compliant with section 7 and incidental (unintentional) take is anticipated, that take can be exempted through an incidental take statement accompanying the biological opinion. The basis for the exemption is then incorporated into the Special Terms and Conditions of the recovery permit.

² The ESA defines “fish or wildlife” as any member of the animal kingdom, including without limitation any mammal, fish, bird (including any migratory, non-migratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof.

³ Incidental take is defined by the ESA as take that is “incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.” For recovery permits this type of take is referred to as unintentional take (*i.e.*, not considered the actual intent of the activities authorized under a permit).

authorized to take under this permit, but which are unintentionally harassed, captured, injured, or killed:

- i. Each individual authorized under this permit must be knowledgeable about potentially co-occurring listed species that may occur throughout the habitats in which authorized activities are conducted and must be observant and cautious to the extent that unintentional take of a co-occurring listed species is avoided to the extent practicable.
 - ii. Any listed species that the permittee is not authorized to take under this permit, but is unintentionally captured unharmed during the course of conducting authorized activities, must be released immediately at the point of capture. Activities in the project area where the species/activities are occurring must immediately cease if there is a likelihood of capturing additional individuals while continuing to conduct the activities. In the case of injury, mortality, or undue harassment of listed species for which take has not been authorized, the Recovery Permit Coordinator (RPC) at the Service's Idaho Fish and Wildlife Office (IFWO – see attached contact list) must be notified within 24 hours. The IFWO will then make a determination whether additional Special Terms and Conditions and/or restrictions must be applied in this area to address avoidance of take impacts to listed species for which take has not been authorized. The IFWO will inform the permittee in writing of the determination within 15 calendar days of the initial notification. The continuation of authorized activities in the project area where the species/activities occurred must not be reinitiated until authorized by the IFWO.
 - iii. Any unintentional take of listed species not authorized under this permit must be documented in the annual report.
- c. This permit does not authorize the removal/possession and/or damage/destruction of federally-listed plant species⁴ and/or their parts on lands under Federal jurisdiction that are not specifically authorized under this permit. If unauthorized listed plant species are affected by one or more of these actions on Federal lands, the permittee must immediately cease authorized activities in the project area where the species/activities are occurring and notify the RPC at the IFWO within 24 hours. The IFWO will then make a determination whether additional Special Terms and Conditions, restrictions, and/or other requirements must be applied. The IFWO will inform the permittee in writing of the determination within 15 calendar days of the initial notification. Actions associated with listed plant species not authorized under this permit must be documented in the annual report.

⁴ The ESA defines "plant" as any member of the plant kingdom, including seeds, roots, and other parts thereof. The removal/possession and/or damage/destruction of federally-listed plant species includes not only the whole plant, but also parts of the plant as previously defined.

3. Geographic Areas:

Authorized activities are restricted to the following locations in Idaho:

- a. Weir operation: North Fork Boise River (Boise and Elmore Counties; Boise National Forest).
- b. All authorized activities with the exception of weir operation: North Fork and Middle Fork Boise Rivers and tributaries (Boise and Elmore Counties; Boise National Forest)

If permission is required to access authorized locations, the permittee must obtain access authorization from the landowner or manager before entering these locations.

4. Authorized Individuals:

Only individuals on the attached List of Authorized Individuals (List) are authorized to independently conduct activities under this permit. The List may limit activities or identify special conditions or circumstances under which listed individuals may conduct authorized activities. Each named individual must be responsible for compliance with the Special Terms and Conditions in this permit. The List must be retained with these Special Terms and Conditions.

To request changes to the List, the permittee must submit a written or email request to the RPC at the IFWO. The request must be submitted at least 30 calendar days prior to the requested effective date. The request must include the following information:

- a. The name of each individual to be appended to the List;
- b. Current position title and employer's name for each individual;
- c. The resume/qualifications statement of each individual, detailing their education, training, and experience with authorized species and authorized activities in this permit, or similar species and activities, and type of activity for which authorization is being requested;
- d. Concurrently, ensure other permitting entities (*e.g.*, Bird Banding Laboratory, Migratory Birds, State fish and wildlife agencies, etc.) have been notified for all associated name changes on issued permits, as appropriate;
- e. The names, titles, organizations, email addresses, and phone numbers of a minimum of two references for each individual; and
- f. The names of any individuals to be deleted from the List.

The permittee must include the current updated version of the List with this recovery permit once it is received from the IFWO. This permit will be considered invalid without a current List.

Note: This procedure is for personnel changes to the List only. For requests to renew and/or amend this permit, a complete application and appropriate processing fee (if not fee exempt) must be submitted through the Service's online ePermits system available at <https://fwsepermits.servicenow.com/fws>. For questions about the ePermits system, contact the RPC at the Service's Portland Regional Office (PRO) or the IFWO (see the attached contact list).

5. General Permit Responsibilities:

- a. Acceptance of this permit serves as evidence that the permittee understands and agrees to abide by the following regulations: 50 CFR Part 13 (general permit procedures) and 50 CFR 17.32 (threatened wildlife), as applicable and available at <https://www.ecfr.gov/cgi-bin/ECFR?page=browse>. In addition, the permittee must have all other applicable permits prior to the commencement of activities authorized in this permit.
- b. Only individuals on the List are approved to conduct activities under this permit. The permittee is responsible for ensuring that all authorized individuals comply with the Special Terms and Conditions in this permit.
- c. The permittee and all authorized individuals must have in their possession a printed or digital copy of this permit, including attachments, while conducting authorized activities.
- d. The Service requires all handling of listed species be done in a manner that minimizes the risk of injury and mortality. Unless otherwise specified in this permit, captured individuals must be released at their capture site as soon as authorized activities are completed.
- e. To prevent the spread of invasive and nonnative species, all vehicles, equipment, clothing, and boots must be cleaned to remove mud, debris, and vegetative material before arriving at a project area or field site. Invasive species are organisms (includes pathogens and other microorganisms) that are nonnative to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or impact human health. Nonnative species are species that have been introduced into areas which were not historically part of their range. If any previously undocumented invasive species are observed in a project area, the Service requests that the permittee contact the IFWO to report their findings as soon as it is convenient and include the information in the respective annual report.

- f. Listed species and/or parts of listed species taken under this permit are not considered the property of the permittee but remain under the authority of the Federal Government. Additionally, they must not be sold, donated, or transferred without written authorization from the Service, unless otherwise authorized in this permit.
- g. Ground-disturbing activities must be immediately stopped when human remains or archaeological materials are discovered at a project location. Upon discovery, the permittee must immediately contact the RPC at the IFWO for further guidance before reinitiating activities. The removal or further disturbance of discovered archaeological materials and properties is not allowed at the project location until the Service provides instructions and/or guidance.
- h. The permittee is not authorized to salvage any bull trout that are encountered and appear to have been injured or killed as the result of potential criminal activity. Under these circumstances, the permittee must immediately contact and report their findings to the Resident Agent-in-Charge at the Service's Office of Law Enforcement (OLE – see attached contact list). In conjunction with the care of sick or injured bull trout or preservation of biological materials from a bull trout, the permittee has the responsibility to carry out instructions provided by the Service's OLE to ensure that evidence intrinsic to the specimen is not disturbed. The permittee must document the date, time, location (Longitude/Latitude or UTM coordinates), permittee name, permit number, and the circumstances that led to the discovery of the specimen. This information must be provided in the annual report.
- i. At the discretion of the Service, a Service employee may inspect the facilities or accompany the permittee during any activity conducted pursuant to this permit. The permittee must allow Service personnel access to any materials and information generated as a result of this permit. Any refusal, obstruction, or hindrance of Service participation in such work shall be grounds for suspension or revocation of this permit in accordance with 50 CFR 13.27 or 50 CFR 13.28, respectively.
- j. If the permittee needs to continue work with listed species after the expiration date of this permit, a request for permit renewal must be submitted through the Service's online ePermits system at least 30 calendar days prior to the permit expiration date. Meeting this requirement allows the permittee to continue currently authorized activities until the renewal application is acted upon. If this requirement is not met, this permit becomes invalid on the permit expiration date.
- k. Any new activities, changes in activities, or work in new geographic areas with the same or other listed species will require this permit to be amended. The permittee is not authorized to conduct any of these changes or additions until they have requested and have received an amended permit.

1. A permit renewal or amendment application will be processed only after all reporting requirements have been met for the current and previous calendar years. If no activities have been conducted during the term of this permit, the Service may suspend this recovery permit due to a lack of recovery benefit to the species.

6. Purposeful Take of Bull Trout:

The permittee is authorized to carry out the following activities within the geographic areas specified above, and the time limitation specified in the permit, in accordance with the Special Terms and Conditions stated below:

a. General Activities:

- i. Only qualified and experienced individuals, as determined by the IFWO, may perform the authorized activities described below (refer to the attached List).
- ii. These activities must be conducted in accordance with the study plans (as modified by the Special Terms and Conditions) accompanying the permit application and/or subsequent amendment requests.
- iii. All nets and sampling gear (including waders and boots) must be cleaned and disinfected before use, and before sampling in a different watershed. Water containing chemicals used for disinfecting equipment must be disposed of on dry land.
- iv. Disturbance of, or impacts to, bull trout habitat must be minimized during project activities. Surveyors must take precautions to avoid stepping in areas that may be potential redd locations for resident or fluvial bull trout (*e.g.*, small gravel deposits behind boulders; under overhanging vegetation; near wood debris or logs; or areas of hydraulic influence such as confluences of tributaries, springs, seeps, pool tail crests, or edges of pools), since redds of resident and small fluvial bull trout may be difficult to see due to their small size.
- v. All collection and survey activities must be minimized within spawning areas, especially near actively spawning bull trout. Any collection of bull trout that are actively spawning or are near bull trout spawning sites is prohibited. Bull trout redd data may be collected when no adults are observed in close proximity (*i.e.*, on or near the redd). The permittee must not physically disturb bull trout redd areas (both “pit” and “mound”) during these activities.
- vi. All capture, retention, and handling methods must be implemented at times that will avoid temperature stress to fish being sampled (*e.g.*, conduct activities in the morning or evening on hot summer days). At

locations that have the potential to contain bull trout, the Service recommends sampling be done at water temperatures less than 15 degrees Celsius (59 degrees Fahrenheit), where possible. Sampling must cease if the water temperature exceeds 18 degrees Celsius (64 degrees Fahrenheit). It may be necessary to conduct activities in the morning or evening on hot summer days to avoid temperature stress to captured fish.

- vii. A colored fish key with all char, trout, and salmon species as well as hybrids known to occur, or that may possibly occur, in the system must be on hand when identifying fish. If identification of the fish is difficult and it may be a bull trout or hybrid, a photograph must be taken for verification. In areas where bull trout are rare or infrequent, a photo must be taken of all suspected bull trout for verification by the Service's IFWO.
 - viii. All netting used for capturing, handling, and holding of fish, including the incidental capture of bull trout, must be composed of a fine mesh, knot-free material that will minimize injury to the fish.
 - ix. Block nets must be checked at least once a night (during peak migrant hours) to monitor and limit impingement of any juvenile bull trout that may be migrating downstream.
 - x. A gill net may be used as a modified seine and block net for herding and corralling to assist with dip netting, immediately above the weir. If used, the gill net must be light weight and composed of 1.5 inch or smaller mesh size to minimize gill entanglement as well as for ease of moving in the river current. The gill net must not be soaked or fished as a traditional gill net. When in the water, the gill net must always be attended by the crew.
- b. Weir Operation:
- i. Operation of the weir trap box and spotlight netting (with knotless nets) must only occur when water temperatures are below 18 degrees Celsius (64 degrees Fahrenheit).
 - ii. Bull trout captured during spotlight netting must be worked up and released downstream of the weir the same evening.
- c. Capture/Handling/Measuring Activities:
- i. Workers' hands must be free of sunscreen, lotion, or insect repellent prior to conducting activities that may involve handling bull trout.
 - ii. A healthy environment must be provided for bull trout held in a tank (clean, cool water with ample dissolved oxygen), and the holding time must be minimized. Water-to-water transfers, the use of shaded or dark

containers, and supplemental oxygen must all be considered in designing fish handling operations. The temperature must be maintained at, or nearly at, the temperature of the water from which the fish was taken. If ice is to be used to maintain temperature, it should be in the form of sealed ice packs.

- iii. Use non-toxic plastic, aluminum, or stainless-steel containers for holding/recovery containers. Do not use metal containers that have lead or zinc coatings.
- iv. Because bull trout are aggressive predators and are known to be cannibalistic, the permittee must partition held fish individually or by size class and should avoid holding numerous bull trout in the same live-well.
- v. If captured bull trout are anesthetized, the period of time must be minimized. The number of bull trout that are anesthetized at one time must be no more than what can be processed (biosampled and tagged) within several minutes, but must not exceed 5 minutes. The pH of any anesthetic must be monitored and/or buffered to match that of the ambient water, and the period of time an individual is anesthetized must be kept as short as possible.
 - A. It is advisable to monitor the effect of anesthesia on a few fish to determine how anesthesia will affect individual fish under local ambient conditions (water temperature, water pH, etc.). Use the lowest dose/level needed to achieve the level of anesthesia required to complete an activity.
 - B. The anesthetic MS-222 may not be used on fish that may be subject to sport harvest fisheries within 21 days of exposure.
 - C. Clove oil may not be used.
 - D. The anesthetic AQUI-S®20E may be used as an alternative to MS-222. To use AQUI-S®20E as an immediate release sedative in freshwater fish for field-based activities, the permittee must participate in the Service's Aquatic Animal Drug Approval Partnership Program (AADAP) Investigational new Animal Drug (INAD) exemption program (USFWS-AADAP INAD #11-741) and must comply with the requirements as set forth in the INAD Study Protocol for AQUI-S®20E (more information available at: <https://www.fws.gov/fisheries/aadap/inads/AQUI-S20E-INAD-11-741.html>).
 - E. Carbon dioxide may be used as a fish anesthetic as per Food and Drug Administration rules and requires no withdrawal time.

- F. Electro-anesthesia may be used as a fish anesthetic as an alternative to chemicals, and requires no withdrawal time.
 - G. All fish placed under anesthesia must have recovered sufficiently from the anesthesia to avoid predation once they are released back to the stream at the point of capture. Anesthetized fish may be allowed to recover in a holding tank.
 - H. Water containing chemicals used for anesthetizing fish must be disposed of on dry land.
- vi. The permittee may collect fish statistics (length, weight, sex, scale samples, marks, condition/health, angling injury, etc.) from captured bull trout. Handling and measurement of captured fish must follow commonly accepted techniques for salmonid field sampling. Equipment used to gather statistics and samples must be washed and sanitized in a betadine or other antiseptic solution prior to handling each fish.
 - vii. Any bull trout captured that appears healthy and able to maintain itself must be released as soon as possible, and as close as possible, to the point of capture.
 - viii. Any captured bull trout that shows signs of stress or injury must be held until it is able to maintain itself. It may be necessary to nurture the fish in a holding tank until it has recovered.
- d. Passive Integrated Transponder (PIT) Tagging Activities:
- i. To maximize the utility of the tags, the permittee must use PIT tagging technology compatible with that used in the Columbia River dams and, to the extent possible, coordinate data collected with other researchers in the river system.
 - ii. Accepted PIT-tagging procedures and standards must be followed. Contact R. D. Nelle, Supervisory Fish Biologist, at the Service's Mid-Columbia Fish and Wildlife Conservation Office (MCFWCO) (telephone: 509-548-2981; email: RD_Nelle@fws.gov) for the most up-to-date techniques for PIT tagging bull trout (*i.e.*, placement of tags, PIT Tag Information System (PTAGIS) information). Ensure all necessary data is placed into PTAGIS. More information is available at: <https://www.ptagis.org/>.
 - iii. Single-use needles must be used for each tag implantation.

- iv. The period of time that captured bull trout are anesthetized must be minimized. Bull trout may only be anesthetized if they can be processed within 5 minutes of removal from the trap or holding pen in the river.
 - v. If PIT tag injectors are used, the needles and pushrods must be disinfected between injections in isopropyl alcohol for a minimum of 10 minutes.
 - vi. All PIT tagging activities must cease when stream water temperature exceeds 18 degrees Celsius (64 degrees Fahrenheit).
 - vii. Before inserting a PIT tag into a captured bull trout, the fish must be scanned for the presence of an existing functional PIT tag. If an existing PIT tag is detected in the fish, the fish must not be tagged with an additional PIT tag.
 - viii. Any captured bull trout showing signs of injury or considerable stress prior to tagging must not be tagged with a PIT tag. The fish must be placed in a holding tank and released upon showing signs of adequate recovery.
 - ix. Individual bull trout that are PIT tagged may be held up to 12 hours in submerged holding pens or recovery boxes to ensure they are fully recovered and have retained their tag. Holding pens and recovery boxes must be partitioned to hold different size classes of bull trout as previously described to avoid cannibalism.
 - x. If an individual bull trout has lost its PIT tag before being released from a holding pen or recovery box, the permittee may re-insert another PIT tag if the additional handling and tagging process will not compromise its recovery, health, and survival.
- e. Biosampling Activities:
- i. Tissue sampling procedures must be conducted in a cool and shaded area to avoid excessive stress to bull trout. All fin clipping activities must cease when stream water temperature exceeds 18 degrees Celsius (64 degrees Fahrenheit). Any captured bull trout showing signs of injury or considerable stress prior to tagging must not be fin clipped. The fish must be placed in a holding tank and released upon showing signs of adequate recovery.
 - ii. A non-lethal tissue sample (fin clip) may be collected for genetic analysis. It must not exceed 0.75 square centimeters (approximately the size of a small hole punch). The fin clip must be taken from the tip of the caudal fin or another appropriate fin and preserved in a small vial of 95 percent

ethanol for wet clips or blotted dry and preserved appropriately as dry clips.

- iii. Appropriate bull trout biological data must be collected for each fin clip sample collected (*i.e.*, sampler, date, time, watershed, stream, river miles, size, condition, photos, etc.).
 - iv. Tissue sampling equipment must be sanitized between each collection to avoid sample contamination.
- f. Salvage Activities:
- i. The permittee may salvage injured or dead bull trout, with the exception of those that appear to have been injured or killed as the result of potential criminal activity. In the event an individual is salvaged, the permittee must follow the notification process and procedures, as applicable, as described under Special Term and Condition 5(h).
 - ii. Collected/captured malformed, abnormal, or dead individuals, as authorized by the IFWO, may be sent to an IFWO-approved repository for diagnostic examinations to determine the reason(s) for their health/physical status and/or death. Refer to the Designated Repository section for instructions on the submission of biological samples and specimens for diagnostic examinations.
 - iii. Individuals found with serious injuries that will likely compromise their survival or subject them to undue pain and suffering may be humanely euthanized. Euthanasia must follow American Veterinary Medical Association Guidelines available at <https://www.avma.org/KB/Policies/Documents/euthanasia.pdf>.
 - iv. When feasible, the permittee must contact the RPC at the IFWO (by telephone or email) for authorization prior to euthanizing the specimen. Otherwise, the IFWO must be notified within 72 hours of all salvaged specimens that are euthanized. The specimen must be submitted to an IFWO-approved repository.
 - v. Individuals that are euthanized may be used for additional research activities by the permittee if approved by the IFWO before their use.
 - vi. The Service recommends that all salvaged specimens that can be retained in the field, and in particular those that have research or educational value as determined by the on-site biologist, be preserved in accordance with standard museum practices while still providing maximum scientific information. Before expiration of this permit, all salvaged specimens must

be properly labeled and deposited at an IFWO-approved repository. The permittee must provide the repository with a copy of this permit.

- vii. The Service recommends the permittee inform the landowner or manager if salvaged specimens are recovered on their respective lands.

7. Unintentional Take Limitations:

The maximum number of adult and subadult bull trout allowed to be intentionally captured and/or unintentionally injured or killed during authorized activities per calendar year is listed in the table below (see Table 1).

Table 1. Bull trout life stages allowed to be intentionally captured/harassed and/or unintentionally injured/killed during authorized activities per calendar year under the recovery permit.

Life Stage	Number Intentionally Captured	Number Unintentionally Injured/Killed ¹
Subadults (<300 millimeters)	400	36
Adults (>300 millimeters)	250	8

¹ Based on data from past weir operations at multiple locations on the Boise River which show an average mortality rate of 5 percent (%), with mortality among sampled subadults reaching 9%, and mortality among sampled adults at 3%.

In addition to monitoring take levels by individuals, the permittee must also monitor take by the percentage of mortality among sampled subadults and adults. If the percentage of mortalities is trending higher than those listed in Table 1, the permittee must immediately contact the IFWO RPC to review the operations and minimization measures for the project. In the event that the number of individuals allowed to be unintentionally injured or killed is exceeded during performance of authorized activities, the permittee must:

- a. Immediately cease the activity resulting in injury or death. Continuation of the activity is dependent on reauthorization by the PRO. After analysis of the circumstances of the injury or mortality, the PRO may amend, suspend, or revoke this permit.
- b. Within 24 hours, notify the RPC at the PRO and the IFWO. Such notification must be followed up in writing to the PRO and the IFWO within 3 working days. The permittee must provide a written report of the circumstances that led to the injury or mortality; date, time, and precise location of the injured animal or carcass; disposition of the injured animal or suggested disposition of the dead specimen; and a description of the changes in activity protocols that will be implemented to reduce the likelihood of such injury or mortality from

reoccurring, if appropriate. The incident must also be discussed in the annual report submitted in the respective calendar year.

- c. Individuals that are euthanized may be used for additional research activities by the permittee if approved by the IFWO before their use.
- d. Unless otherwise authorized, all unintentionally killed specimens which cannot be retained in the field may be disposed of in a judicious manner at the discretion of the on-site biologist. Before expiration of this permit, all preserved specimens must be properly labeled and deposited at an IFWO-approved repository. The permittee must provide the repository with a copy of this permit.

8. Designated Repository:

Contact the listed designated repository for instructions on preparation and submittal of specimens.

- a. General repository for bull trout specimens: The Idaho Museum of Natural History, 698 East Dillon Street, Idaho State University (ISU), Pocatello, Idaho 83201. Contact Dr. Ernest Keeley, Department of Biological Sciences (telephone: 208-282-3145; fax: 208-282-4570; email: keelerne@isu.edu). The following information should also be included with the specimen submission: date, time, and place of collection; name of authorized collector(s)/permittee(s); geographic coordinates of collection location; habitat associated with collection location; and weather conditions at the time of collection.

9. All reports, publications, photographs, video footage, or other documents that include information gathered under the authority of this permit must be stored electronically in project folders that reference this recovery permit by permit number. Copies of such documents must be provided to the IFWO immediately upon request.

10. Reporting Requirements:

- a. An annual report of activities conducted under this permit must be submitted to the RPC at the PRO and the IFWO by March 31 following each calendar year this permit is in effect. To track, document, and assess all project-specific activities conducted pursuant to this permit, we are requiring the annual report to summarize all of the activities conducted pursuant to this permit during the previous calendar year. Activities that are continuous (*i.e.*, overlapping in 2 or more calendar years), must be reported each year the activity is in effect. The annual report must be in the following format:
 - i. An introduction section addressing reasons and objectives for taking the bull trout;

- ii. A methods section addressing data collection methods/techniques, data analysis process, personnel working on the project, and effectiveness of the Special Terms and Conditions in minimizing take of bull trout;
 - iii. A results section that summarizes the data collected for bull trout, including information on any other federally-listed species encountered while conducting activities authorized under this permit; and
 - iv. A conclusion section that specifically provides, at a minimum, application of the results to recommendations for the recovery of bull trout.
- b. The annual report must include, but need not be limited to, the following information. The status of ongoing projects and studies under the permit must be briefly summarized as requested below. A comprehensive report(s) on completed projects and studies must be submitted with the respective annual report or any time during the calendar year at the time of completion.
- i. Summary presentation and brief discussion of significant research results and their importance with regards to recovery of the bull trout;
 - ii. Maps and/or locations (including GPS/GIS data, as appropriate) where authorized activities occurred;
 - iii. The results of all survey or sampling efforts, including estimates of population size of any federally-listed species, if possible;
 - iv. Number of bull trout that were salvaged under the recovery permit, including capture locations and their disposition;
 - v. Results of any genetic studies from biological samples collected under this recovery permit;
 - vi. Quantified take of bull trout, by life stage, including numbers of individuals unintentionally killed (including dates, locations, and circumstances of lethal take), and an estimate of the numbers of individuals otherwise harmed or harassed;
 - vii. Quantified take for other listed species (including the removal/possession and/or damage/destruction of listed plant species and/or their parts on federally-owned or managed lands) not authorized under this permit, including numbers of individuals unintentionally killed (including dates, locations, and circumstances of lethal take), and an estimate of the numbers of individuals otherwise harmed or harassed;

- viii. Repositories where bull trout specimens were sent, including salvaged specimens, and any issued diagnostic or examination reports from a repository;
 - ix. Other pertinent observations made during authorized activities regarding the status, biology, or ecology of the bull trout;
 - x. Discovery information and documentation for any potential criminal activity that was reported to the Service's OLE.
 - xi. Reports or other documents that include information on human remains or significant archaeological materials if they were discovered at a project location;
 - xii. Reports or other documents that include information gathered under the authority of this permit, including the presence of any previously undocumented invasive or non-native species observed in a project area; and
 - xiii. Planned future activities if authorized under this permit.
- c. Copies of any issued permits required to perform authorized activities must be submitted with the annual report.
- d. Submission of annual reports:
- i. One copy of an annual report must be submitted to the RPC at the PRO and the IFWO each calendar year. Annual reports must be uploaded to the ePermits system and submitted electronically to the following sites/offices:

ePermits: <https://fwsepermits.servicenowservices.com/fwse>
PRO: permitsRIES@fws.gov
IFWO: permitsIFWO@fws.gov

Add the following subject line to the email: Annual report for recovery permit PER0016984-0.
 - ii. All email file attachments combined are limited to 25 megabytes in size. If electronic files exceed this size limitation, please: (1) send them in separate emails with appropriately sized attachments, (2) copy them onto a DVD or CD, or (3) send them as a printed document(s).
 - iii. Preferred formats for annual report documents are Microsoft Word, Excel, or Access; Adobe PDF; graphic files - GIF, JPG, BMP, or TIFF; and ArcGIS spatial files - shapefiles or geo-databases. If different file formats

are to be submitted, contact the IFWO before submission to verify if they will be readable by the Service.

- e. If no authorized activities occurred over the course of a calendar year, indication of such by email to the above addresses must be submitted as a report.
11. Failure to comply with reporting requirements may result in non-renewal, non-amendment, or suspension/revocation of this permit.

List of Service Contacts:

U.S. Fish and Wildlife Service
Portland Regional Office (PRO)
Ecological Services, Recovery Permits
Regional Recovery Permit Coordinator
911 NE 11th Avenue
Portland, Oregon 97232-4181
Email: permitsR1ES@fws.gov
Telephone: 503-231-6131
Fax: 503-231-6243

U.S. Fish and Wildlife Service
Idaho Fish and Wildlife Office (IFWO)
Recovery Permit Coordinator
1387 S Vinnell Way
Boise, Idaho 83709
Email: permitsIFWO@fws.gov
Telephone: 208-378-5243
Fax: 208-378-5262

U.S. Fish and Wildlife Service
Office of Law Enforcement (OLE)
Resident Agent-in-Charge (responsible for Idaho and Washington)
Redmond, Washington
Telephone: 425-883-8122

Mid-Columbia Fish and Wildlife Conservation Office (MCFWCO)
R. D. Nelle
Supervisory Fish Biologist
Telephone: 509-548-2981
Email: RD_Nelle@fws.gov

Annual Report Submission Information:

Annual reports, due by March 31, must be uploaded to the ePermits website and submitted electronically to the following sites/offices:

ePermits: <https://fwsepermits.servicenowservices.com/fws>

Portland Regional Office: permitsR1ES@fws.gov
Idaho Fish and Wildlife Office: permitsIFWO@fws.gov



United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE 11th Avenue
Portland, Oregon 97232-4181



In Reply, Refer to:
FWS/IR09/IR12/AES/Recovery/PER0016984-0

LIST OF AUTHORIZED INDIVIDUALS Recovery Permit PER0016984-0 U.S. Bureau of Reclamation, Snake River Area Office

1. Individuals authorized to independently conduct all authorized activities under this permit:
 - a. U.S. Bureau of Reclamation Personnel:
 - i. Camp, Susan L. (Fisheries Biologist)
 - ii. Druliner, Pam (Natural Resource Specialist)
 - iii. Fitzgerald-Teel, Gretchen K. (Natural Resource Specialist)
 - iv. Goodrich, Amy C. (Natural Resource Specialist)
 - v. Ochoa, Rochelle D. (Natural Resource Specialist)
 - vi. Prisciandaro, Anthony F. (Fisheries Biologist)
 - vii. Videgar, Dmitri T. (Fisheries Biologist)
 - b. U.S. Forest Service Personnel:
 - i. Cusack, Ciara (Fisheries Biologist)
 - ii. Roerick, Herb (Forest Fish Program Manager)
2. Supervised individuals (*i.e.*, individuals not authorized above) may conduct activities pursuant to this permit only under the direct, on-site supervision of an authorized individual listed above. "On-site supervision" is defined as having the authorized individual at a distance close enough to enable the authorized individual to immediately assist a supervised individual, as needed, while the supervised individual is conducting an authorized activity. The U.S. Fish and Wildlife Service recommends that each supervised individual receive instructions and/or training before attempting to conduct an authorized activity.

INTERIOR REGION 9
COLUMBIA-PACIFIC NORTHWEST

IDAHO, MONTANA*, OREGON*, WASHINGTON

*PARTIAL

INTERIOR REGION 12
PACIFIC ISLANDS

AMERICAN SAMOA, GUAM, HAWAII, NORTHERN
MARIANA ISLANDS

3. To request personnel changes to this List, refer to the Authorized Individuals section in the associated recovery permit.

Signature and Date:

DAVID
LEONARD

 Digitally signed by DAVID
LEONARD
Date: 2021.09.01 14:05:22
-07'00'

Acting Program Manager for Restoration
and Endangered Species Classification

This List is valid only if it is dated on or after the permit issuance date. The associated recovery permit is considered invalid without this List attached.

****Do not include this page in PDF copy of the permit****

PRO Biologist: Colleen M. Henson

Completion Date: August 26, 2021

File Name and Location: C:\Users\chenson\Desktop\Permits In Process\Applications\PER0016984-0 BOR Snake River Area Office\PER0016984_0_PRO_Draft_Permit_20210826.docx

Attachments:

1. List of Authorized Individuals

Information/Instructions for cc:

State Supervisor, Idaho FWO – Christopher Swanson, christopher_swanson@fws.gov
(email PDF) (email PDF and Word copies to Katie Powell)

Idaho Bull Trout Co-Lead – Mark Nelson, mark_c_nelson@fws.gov (email PDF)

Idaho Bull Trout Co-Lead - Dan Nolfi, daniel_nolfi@fws.gov (email PDF)

Permittee, Principal Officer – Amy Goodrich (email PDF copy ONLY to agoodrich@usbr.gov)

9. Appendix 2: IDFG Scientific Collection Permit #F-02-07-21



Idaho Dept. of Fish and Game
2021 Scientific Collecting Permit

Permit # F-02-07-21 — Rochelle Ochoa, Bureau of Reclamation

ISSUED TO:

Rochelle Ochoa
Bureau of Reclamation
230 Collins Rd.
Boise, ID 83702

Issue Date: 7/15/2021

Expiration: 12/31/2021

Doc# 749-21-000044

You are authorized to sample and/or collect fish in the below listed drainages utilizing the prescribed methods identified in this permit. **This permit must be with you or your sub-permittees while in the field or transporting biological samples.**

SUB-PERMITTEES: Anthony Prisciandaro, Amy Goodrich, Dmitri Vidergar, Ryan Hedrick, Bryan Brown, Michael Hilliard, Mark Arana, Darrin Fredrickson, Cody Sibbet, Josh Collette, Josh Ryan, Bailey Dunn, Justin Bruns, Ciara Cusack, Jaan Kolts, Robert Jaeger, Mark Nelson, Daniel Nolfi, Cara Christofferson

PURPOSE: Presence/absence surveys, genetic sampling, PIT tagging, live fish transport, fish salvage efforts

APPROVED SPECIES: Bull Trout, Rainbow Trout, Cutthroat Trout, Brown Trout, Mountain Whitefish, Sculpin spp., Bridgelip Sucker, Chiselmouth, Yellow Perch, Dace spp., Smallmouth Bass, Largescale Sucker, Kokanee, Chinook salmon, White Sturgeon, Redside Shiner, Crayfish spp., Snake River Snails

APPROVED METHODS OF SAMPLING: Migratory weirs, beach seine, dip nets, trap nets, electrofishing, cradle nets, gill nets, baited minnow traps, underwater observation, angling, suction dredge

GEOGRAPHIC AREAS OR WATERS: Snake River (below Minidoka Dam), Deadwood Reservoir, Deadwood River and tributaries downstream of dam, Middle Fork Boise River, North Fork Boise River, South Fork Boise River downstream of Anderson Ranch Dam, Arrowrock Reservoir, Lucky Peak Reservoir, Lake Lowell, Little Wood Reservoir, American Falls Reservoir, Ririe Reservoir, Lake Walcott, Palisades Reservoir, Island Park Reservoir, Henry's Lake, Hubbard Reservoir

DISPOSITION OF SAMPLES: With the exception of fish transport and salvage efforts, all live fish will be released back into the water where they were captured. All mortalities, including Bull Trout mortalities, will be returned to the body of water where collected in a manner that will not create a public nuisance. All mortalities must be noted on data sheets.

Please notify Regional Fishery Manager, Mike Peterson, at the Magic Valley Regional Office if Virile Crayfish *Orconectes virilis* are observed. This information will be used to help identify their current distribution.

PERMIT PROVISIONS:

1. This permit is not transferable, nor may its authority be delegated. It shall be produced for inspection upon request of any conservation officer or other authorized representative of the Idaho Department of Fish and Game. Any abuse or misuse of privileges granted by this permit shall be grounds for revocation.
2. **ANNUAL REPORTING.** A report must be submitted within 30 days after expiration of the permit. IDFG will provide you with a template you may use to report the requested fish data. Your report should include the following data for each sampling event: sampling date, sampling site info (HUC 4 watershed name, water body name, site name/number, sample site coordinates in decimal degrees WGS84), sampling gear type, species, total length (mm), disposition (live/dead/voucher), and counts of those not measured.



Idaho Dept. of Fish and Game
2021 Scientific Collecting Permit

Permit # F-02-07-21 — Rochelle Ochoa, Bureau of Reclamation

Your report can either be sent to: Idaho Department of Fish and Game, Bureau of Fisheries, 600 S. Walnut, PO Box 25, Boise, ID 83707, or e-mailed to: kailee.clark@idfg.idaho.gov. Your report should include all tag numbers (PIT, radio, acoustic, CWT, T-bar anchor, jaw, spaghetti etc.) and radio or acoustic frequencies used during or the location of the database accessible to IDFG where tag numbers and frequencies can be found.

- YOU ARE WORKING IN AREAS WHERE BULL TROUT ARE KNOWN TO EXIST.** This permit authorizes you as an agent of the Idaho Department of Fish and Game to “take” Bull Trout. “Take” is defined as: observe, harass, capture, handle/tag, mark, measure, release, and indirect mortality but does not include specimen vouchers. Bull Trout take in Idaho will be covered under IDFG’s Section 6 Cooperative agreement with the U.S. Fish and Wildlife Service. As such, Bull Trout mortalities need to be reported to Mr. Brett Bowersox at the Idaho Department of Fish and Game (brett.bowersox@idfg.idaho.gov). Include location, size (total length, mm), and cause of mortality. In your year-end report, please include your Bull Trout data that delineates numbers, total length, and locations of all Bull Trout collected similar to other species data.
- All stationary equipment used to collect fish and wildlife (nets, traps, etc.) will have an attached metal tag bearing, in legible English, the name and current address of the permit holder, and this permit number.
- A valid Idaho fishing license is required for hook and line collection at the time of sampling.
- Provisions in this permit authorize the holder and sub-permittees to sample or collect fish using methods and time periods that may not be allowable to the public; therefore, it is imperative that the permit holder **MAKE NO COLLECTIONS UNDER THIS PERMIT UNTIL THE LOCAL CONSERVATION OFFICER OR THE REGIONAL OFFICES ARE NOTIFIED OF WHERE AND WHEN THE COLLECTIONS ARE TO OCCUR. NOTIFICATIONS ARE TO OCCUR AT LEAST 48 HOURS PRIOR.** This notification reduces the likelihood that a Conservation Officer will be required to investigate a report from the public who may observe and perceive your activities as being illegal. **FAILURE TO COMPLY WITH THIS PROVISION MAY JEOPARDIZE YOUR ELIGIBILITY FOR FUTURE PERMITS.** A record of dates, times, and persons notified shall be kept and submitted at the end of the year as part of the collecting report.

SOUTHWEST REGION (NAMPA)

John Cassinelli
john.cassinelli@idfg.idaho.gov
(208) 854-8963

MAGIC VALLEY REGION

Mike Peterson
mike.peterson@idfg.idaho.gov
(208) 644-6326

SOUTHEAST REGION

Carson Watkins
carson.watkins@idfg.idaho.gov
(208) 236-1262

UPPER SNAKE REGION

Brett High
brett.high@idfg.idaho.gov
(208) 525-7290

Ed Schriever, Director

July 15, 2021

Date Issued