RECLAMATION

Managing Water in the West

2014 Annual Report

Bureau of Reclamation Report on Monitoring and Implementation Activities Associated with the USFWS 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
Pacific Northwest Region
Snake River Area Office
Boise, Idaho

March 2015

U.S. DEPARTMENT OF THE INTERIOR

PROTECTING AMERICA'S GREAT OUTDOORS AND POWERING OUR FUTURE

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

MISSION OF THE BUREAU OF RECLAMATION

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

Front cover photograph – North Fork Boise River, Idaho.

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Acronyms and Abbreviations

2005 Opinion	U.S. Fish and Wildlife Service. 2005. Biological Opinion for Bureau of Reclamation Operations and Maintenance in the Snake River Basin above Brownlee Reservoir.
2010 Opinion	U.S. Fish and Wildlife Service. 2010. Biological Opinion for Minidoka Dam Spillway Replacement Project.
2014 Opinion	U.S. Fish and Wildlife Service. 2014. Biological Opinion for Bureau of Reclamation Operations and Maintenance in the Snake River Basin above Brownlee Reservoir.
ARR	Arrowrock Reservoir
BA	Biological Assessment
BACI	before/after, control/impact
BiOp	Biological Opinion
cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CPUE	catch per unit effort
DPS	Distinct Population Segment
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
GIS	geographic information system
IDFG	Idaho Department of Fish and Game
ITS	incidental take statement

mm	millimeter
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
ODFW	Oregon Department of Fish and Wildlife
PIT	Passive Integrated Transponder
Reclamation	U.S. Bureau of Reclamation
RM	river mile
RPM	Reasonable and Prudent Measure
TMDL	Total Maximum Daily Load
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	Wildlife Management Area
WY	water year

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1. INTRODUCTION

The Bureau of Reclamation (Reclamation) consulted with the U.S. Fish and Wildlife Service (USFWS) on 12 proposed actions involving the effects of future operations and routine maintenance at 12 Federal projects in the upper Snake River basin (Reclamation 2004). In March 2005, USFWS completed a non-jeopardy Biological Opinion (2005 Opinion) for Reclamation 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) and corresponding reasonable and prudent measures (RPMs) that outlined nondiscretionary actions to minimize take of species listed under the Endangered Species Act (ESA) that may be impacted by Reclamation operations (USFWS 2005). The 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 Reservoir[1] in 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 Reclamation to consult with USFWS for bull trout in this area (Reclamation 2013b). The USFWS completed a non-jeopardy biological opinion in June of 2014 (2014 Opinion) for Reclamation 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 outline 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. The 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.

The ITS has two main components: 1) 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 RPMs and terms and conditions. At Reclamation's request (letter dated November 13, 2007), USFWS agreed to permanently change the submittal date from December 31 to March 31.

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

This document is submitted as Reclamation's annual report for Water Year (WY) 2014 (October 1, 2013 to September 30, 2014).

1.1 Bull Trout

Bull trout are present 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 BA and 2014 Opinion.

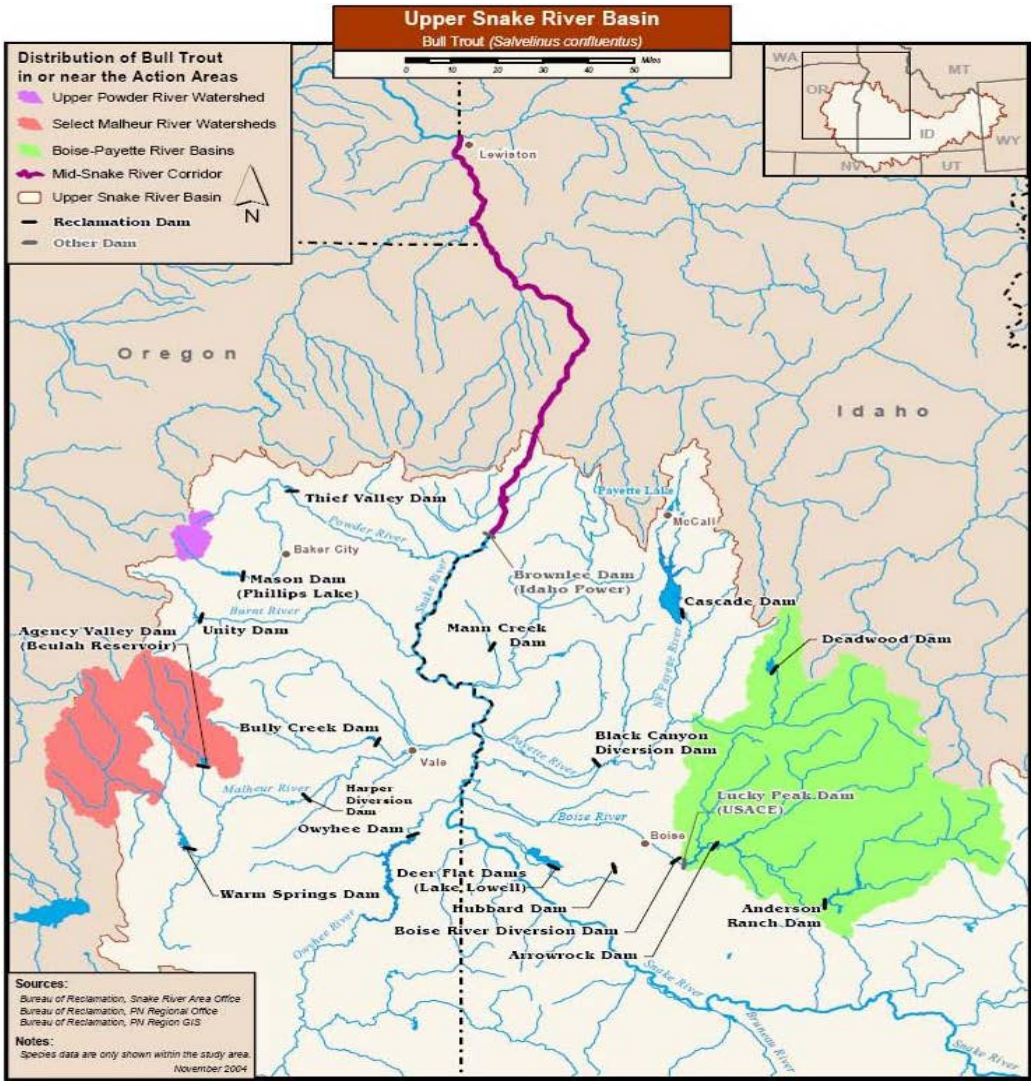

Figure 1. Known distribution of bull trout populations (shaded areas on map) associated with Reclamation facilities in the upper Snake River basin (Reclamation 2004).

This report describes operational thresholds, population monitoring, and other relevant bull trout work managed by Reclamation and work associated with projects that address specific RPMs. In addition, this report discusses 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.

The Bull Trout Monitoring and Implementation Plan (Reclamation 2006) identifies how Reclamation will monitor bull trout throughout the duration of the 2005 Opinion. Monitoring elements include evaluating operational indicators and tracking population trends. To monitor compliance with the operational thresholds defined in the ITS, operations for WY 2014 were monitored, evaluated, and summarized using Reclamation's Hydromet system (Reclamation 2014a). Operational thresholds affecting the amount or extent of anticipated take are described in later in Section 2.

1.2 Snake River Snails

Previous annual reports to the USFWS documented two species of snails in the Snake River basin: Utah valvata 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 Snake River physa (Physa [*Haitia*] *natricina*, hereafter physa) remains an ESA-listed species; however, the 2005 Opinion did not provide an ITS, monitoring requirements, or terms and conditions 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 and a supplemental consultation is currently underway to address possible effects from long-term operation. The current take coverage for operations is covered under the *Minidoka Spillway Construction Biological Opinion* (2010 Opinion; USFWS 2010). The construction of the spillway began in 2011 and is scheduled for completion in spring 2015. Information reported in this document is related to requirements of 2010 Opinion. The supplemental Section 7 consultation process for long-term operations is expected to be finished when the spillway construction is completed.

Similar to efforts reported in Reclamation's 2013 Annual Report, the 2014 physa surveys were conducted to gather baseline data that will be used to determine trends of occurrence and abundance within the Minidoka Reach (i.e., 10.5-mile reach extending from Minidoka Dam downstream to the I-84 bridge) of the Snake River; determine the effects of a range of spillway flows on physa in the Minidoka Dam spillway; further characterize physa habitats, and meet the reporting requirements of ESA Section 10 (Permit No. TE 056557-5)

2. SUMMARY OF 2014 OPERATIONS

2.1 Idaho

Throughout the first half of winter in 2014, water supply conditions were well below average in much of the Snake River basin above Brownlee Reservoir. Wetter conditions starting in February lead to significant recovery in snowpack and improved runoff forecasts. For example, snowpack increased 20 percent to 40 percent of average in February alone, with further gains of 10 percent or more in March. The prospects for providing the full target of 487,000 acre-feet for flow augmentation went from very unlikely in mid-winter to virtually assured by April 1. However, basins south and east of the Boise basin experienced severe to historic drought conditions due to the lack of reservoir carryover storage from the previous year (which also saw severe drought). Reservoirs in the Owyhee and Malheur basins were essentially empty by late July.

Reservoir carryover storage coming out of the prior 2013 water year (a drought year) was very low at many of the Snake River projects. November 2013 carryover storage was 90 percent of average in the Payette River basin and 82 percent of average in the Boise River basin, but was only 39 percent in the upper Snake River basin above Milner. Snowpack on January 1, 2014 in the Payette, Boise, and upper Snake River basins was 59, 57, and 103 percent, respectively. However, by April 1, snowpack in these three basins had improved to 100, 101, and 148 percent, respectively. Observed unregulated runoff for the April through July period turned out to be somewhat lower than April 1 snowpack percentages, with 92 percent of average for the Payette River at Horseshoe Bend, 85 percent for the Boise River near Boise, and 119 percent for the Snake River at Heise. There was minor flood control releases required in the Boise and Payette River basins in 2014. In the upper Snake River basin, no excess flows passed Milner Dam once irrigation began in late March, until flow augmentation began in early June.

Due to the very low carryover storage from the previous year, the upper Snake River system above Milner Dam reached a maximum combined physical storage content of approximately 867,000 acre-feet below the full capacity of 4,045,695 acre-feet. The Boise system nearly filled, coming up to about 31,500 acre-feet below its full capacity of 949,700 acre-feet. The Payette system was able to refill completely.

2.1.1 Boise River Basin Operational Indicators

Three operational indicators were exceeded during the 2014 reporting period in the Boise River basin. Anderson Ranch Reservoir stored and released water (Table 1; Figure 2 and Figure 3); however, Reclamation has an exemption for this action 30 out of 30 years in the 2005 Opinion. Anderson Ranch Reservoir also spilled for 3 days (June 9 through 11) for a

scheduled plant outage to conduct balance/unbalanced gate tests and inspections at Anderson Ranch Dam. This specific maintenance action needs to occur approximately every 5 years (dependent on filling the reservoir) and therefore, was not in the consultation process for the upper Snake River projects and is not covered under the ITS provided in the 2005 Opinion. Reclamation consulted with the USFWS for the proposed specific maintenance action at Anderson Ranch Dam (2014 BA; Reclamation 2014a). Reclamation has an exemption for use of the spillway in 6 of 30 years.

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 2014 reporting period.

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2014 Operations (October 2013 to September 2014)	Quick Reference: Number of times threshold was exceeded
Anderson Ranch Dam and Reservoir	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	Spillway use did occur during the reporting period as a result of required maintenance at facility (refer to USFWS 2014 Opinion)	2 of 6 years 2006: 9 days 2007: 0 2008: 0 2009: 0 2010: 0 2011: 0 2012: 0 2013: 0 2014: 3 days

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2014 Operations (October 2013 to September 2014)	Quick Reference: Number of times threshold was exceeded
Anderson Ranch Dam and Reservoir	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 WY14 are shown in Figure 2	9 of 30 years 2006: spring/fall 2007: spring/fall 2008: spring/fall 2009: spring/fall 2010: spring/fall 2011: spring/fall 2012: spring/fall 2013: spring/fall 2014: spring/fall
	Up to 4 percent of bull trout in the reservoir experience degraded water quality	Reservoir storage volume falls below 62,000 acre-feet (Figure 3)	Summer	2 of 30 years	Reservoir storage volume was maintained above 62,000 acre-feet (Figure 3)	0 of 2 years 2007: 0 2008: 0 2009: 0 2010: 0 2011: 0 2012: 0 2013: 0 2014: 0

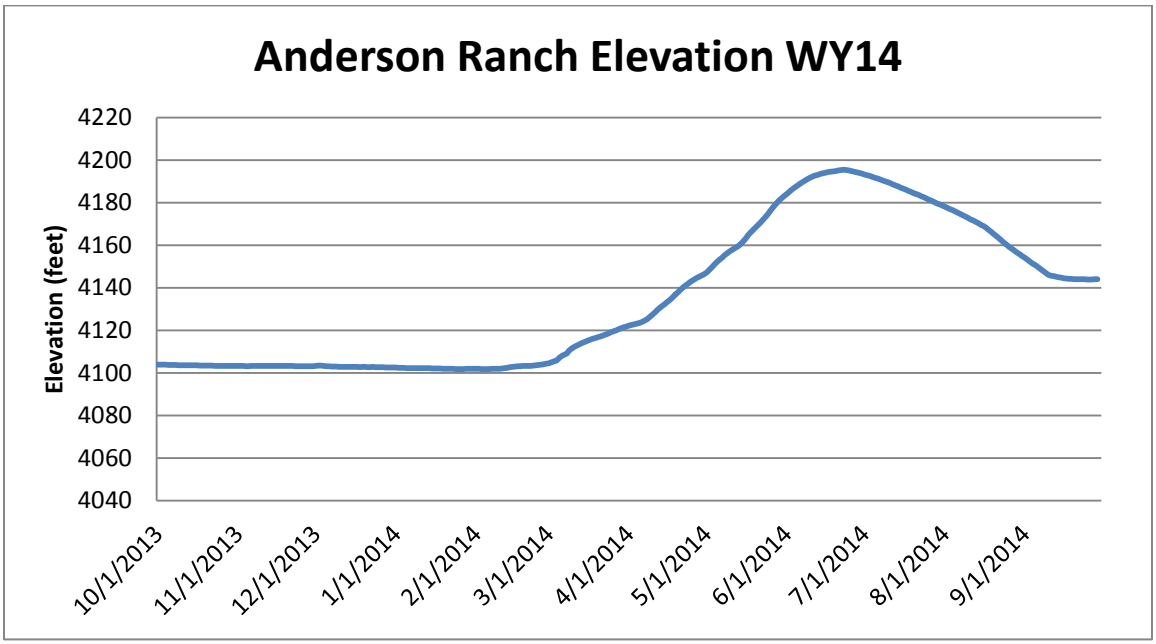

Figure 2. Anderson Ranch Reservoir elevations (feet above sea level) for WY14.

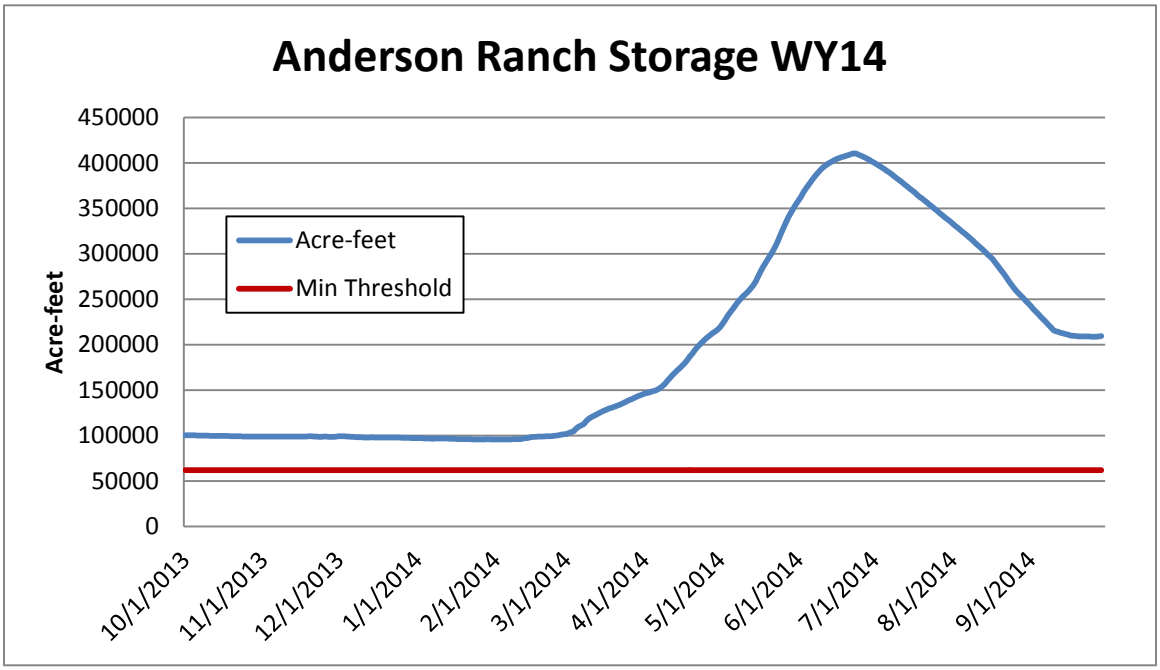

Figure 3. Anderson Ranch Reservoir storage volumes (acre-feet) for WY14. The straight line represents Reclamation's Operational Indicator minimum threshold of 62,000 acre-feet of storage.

Arrowrock Reservoir elevation fell below 3,111 feet for 2 days during the critical season (July through September) while the discharge from Arrowrock Dam exceeded 695 cfs (Table 2 and Figure 4). Reclamation has an exemption for this action in 30 of 30 years.

Table 2. Summary of amount or extent of anticipated take of bull trout associated with Reclamation's Arrowrock Dam and Reservoir facility operations during the 2014 reporting period.

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2014 Operations (October 2013 to September 2014)	Quick Reference: Number of times threshold was exceeded
Arrowrock Dam and Reservoir	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 acre-feet at the end of June	June 30	3 of 30 years	Reservoir volume was maintained above 200,000 acre-feet at the end of June in WY14	2 of 3 years 2006: 0 2007: yes 2008: 0 2009: 0 2010: 0 2011: 0 2012: 0 2013: yes 2014: 0
	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	Spillway use did not occur during the reporting period.	1 of 15 years 2006: 9 days 2007: 0 2008: 0 2009: 0 2010: 0 2011: 0 2012: 0 2013: 0 2014: 0
Arrowrock Dam and Reservoir	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 3111 feet	July through September	30 of 30 years	Reservoir Surface elevation dropped below 3,111 feet for two days (August 20 and 21) during WY14 while discharge exceeded 695 cfs.	5 of 30 years 2006: 6 days 2007: 48 days 2008: 1 day 2009: 3 days 2010: 0 days 2011: 0 days 2012: 4 days 2013: 0 days 2014: 2 days
	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 3100 feet	September 15 through October 31	18 of 30 years	Reservoir surface elevation did not drop below 3100 feet during the WY 2014 (Figure 4)	0 of 18 years 2008: 0 2007: 0 2008: 0 2009: 0 2010: 0 2011: 0 2012: 0 2013: 0 2014: 0
Arrowrock Dam and Reservoir	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 3111 feet (Figure 5)	Winter	20 of 30 years	Reservoir elevations did not drop below 3,111 feet in the winter months of 2014 (Figure 6)	0 of 20 years 2006: 0 2007: 0 2008: 0 2009: 0 2010: 0 2011: 0 2012: 0 2013: 0 2014: 0

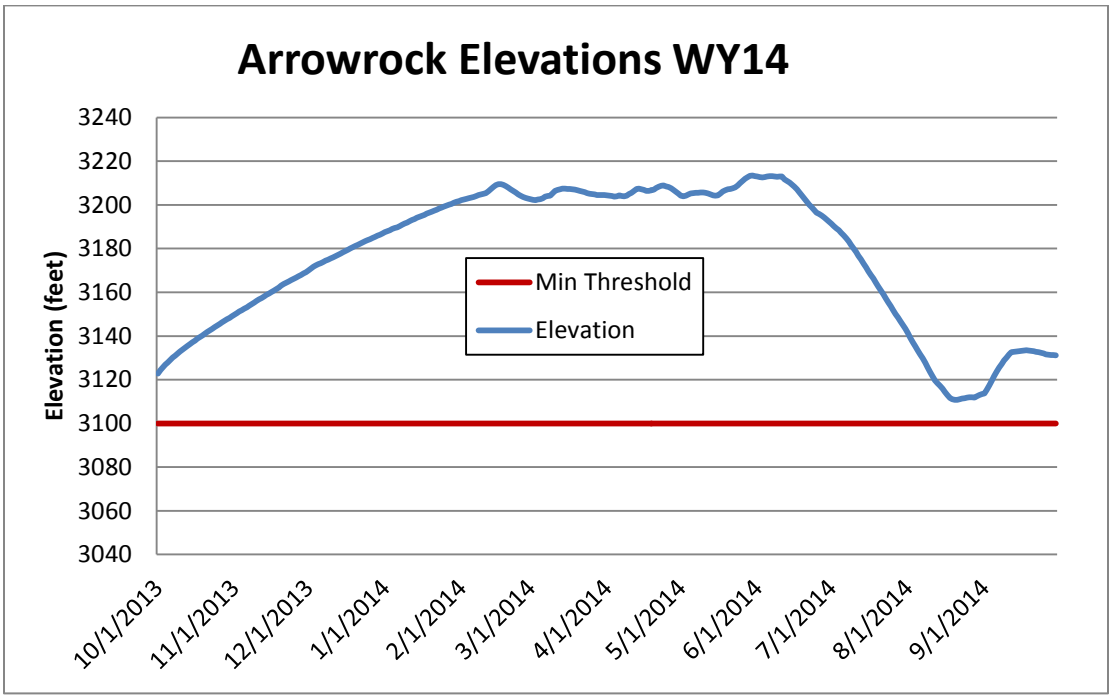

Figure 4. Arrowrock Reservoir elevation (feet above sea level) for WY14. The straight line represents Reclamation's Operational Indicator fall minimum threshold at elevation 3100 feet.

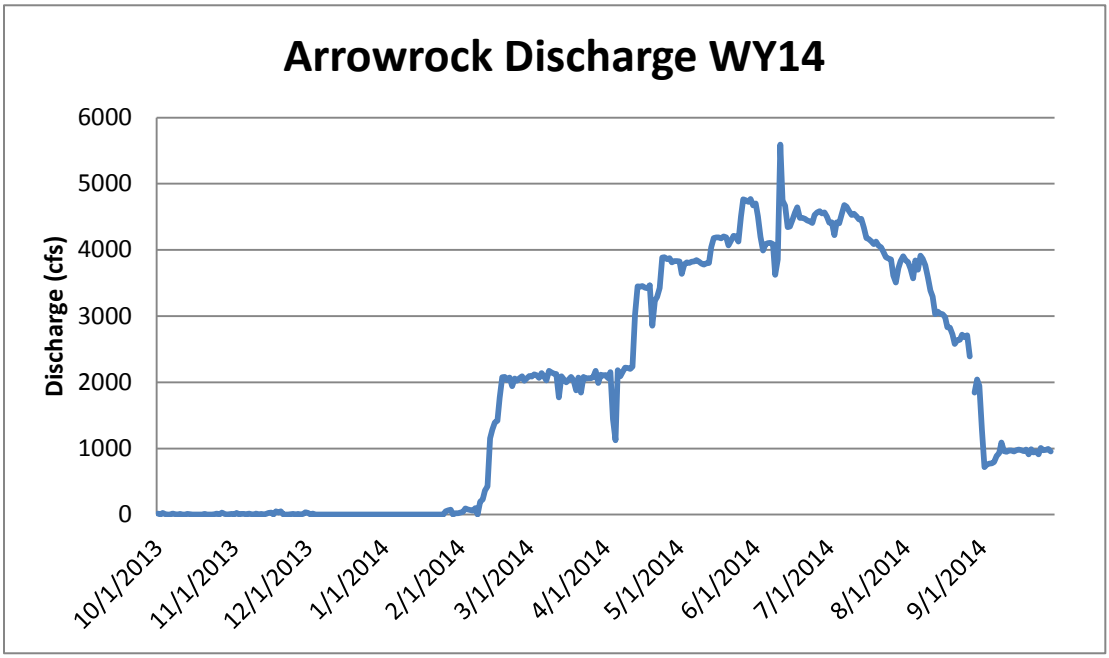

Figure 5. Arrowrock Reservoir discharge in cubic feet per second (cfs) for WY14.

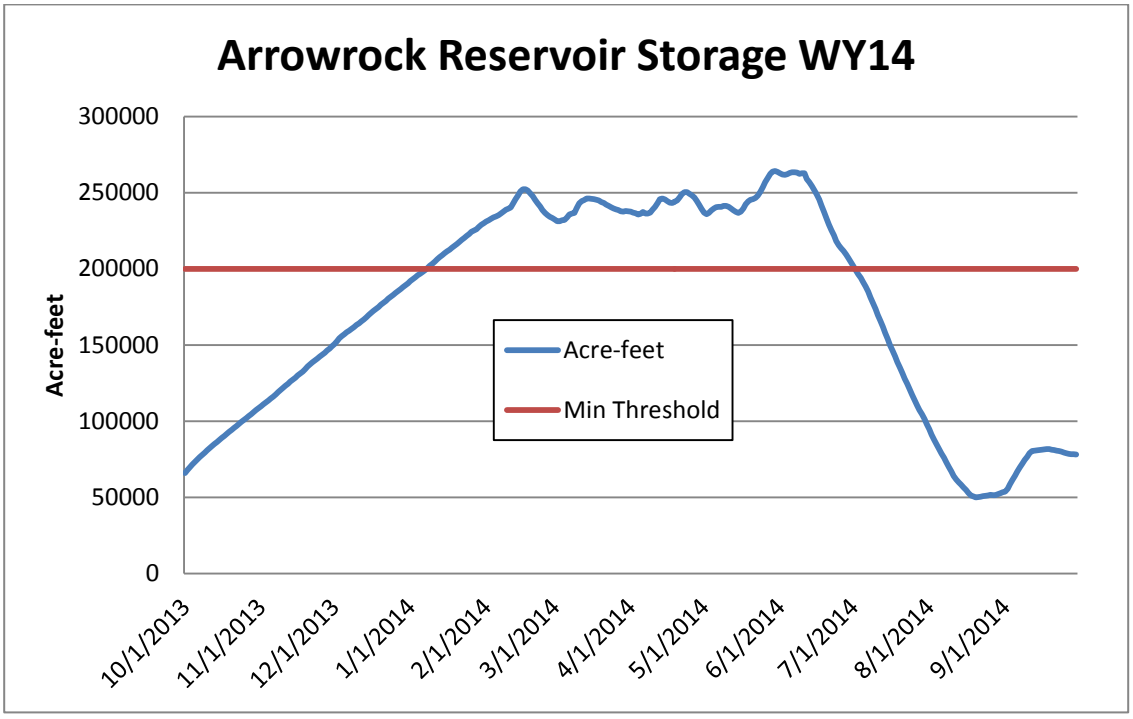

Figure 6. Arrowrock Reservoir storage volume (acre-feet) for WY14. Straight line represents Reclamation's Operational Indicator of reservoir volume of less than 200,000 acre-feet at the end of June.

2.1.2 Payette River Basin Operational Indicators

Three operational indicators were exceeded during the 2014 reporting period in the Payette River basin. Deep water releases occurred throughout the year at Deadwood Dam. Reclamation has an exemption for this action 30 of the 30 years. Also, Deadwood Reservoir discharged water over the spillway for 69 days during the spring (May 24 through July 1) exceeding two operational indicators (Table 3). Reclamation has an exemption for these actions 11 of the 30 years. Figure 7 illustrates Deadwood Reservoir storage volume in WY14.

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 2014 reporting period.

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2014 Operations (October 2013 to September 2014)	Quick Reference: Number of times threshold was exceeded
Deadwood Dam and Reservoir	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	Spring	11 of 30 years	Water was discharged over the spillway during WY 2014 between May 24 through July 1.	5 of 11 years 2006: 32 days 2007: 33 days 2008: 33 day 2009: 0 days 2010: 15 days 2011: 0 days 2012: 0 days 2013: 0 days 2014: 69 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 acre-feet	August through October	2 of 30 years	Reservoir storage volumes did not drop below 50,000 acre-feet (Figure 7).	0 of 2 years 2006: 0 2007: 0 2008: 0 2009: 0 2010: 0 2011: 0 2012: 0 2013: 0 2014: 0
Deadwood Dam and Reservoir	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 discharged over the spillway for 69 days during WY14	5 of 11 years 2006: 32 days 2007: 33 days 2008: 33 day 2009: 0 days 2010: 15 days 2011: 0 days 2012: 0 days 2013: 0 days 2014: 69 days

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2014 Operations (October 2013 to September 2014)	Quick Reference: Number of times threshold was exceeded
	All bull trout in the Deadwood River downstream from the dam are affected by low winter stream flows 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	8 of 30 years 2006: all year 2007: all year 2008: all year 2009: all year 2010: all year 2011: all year 2012: all year 2013: all year 2014: all year

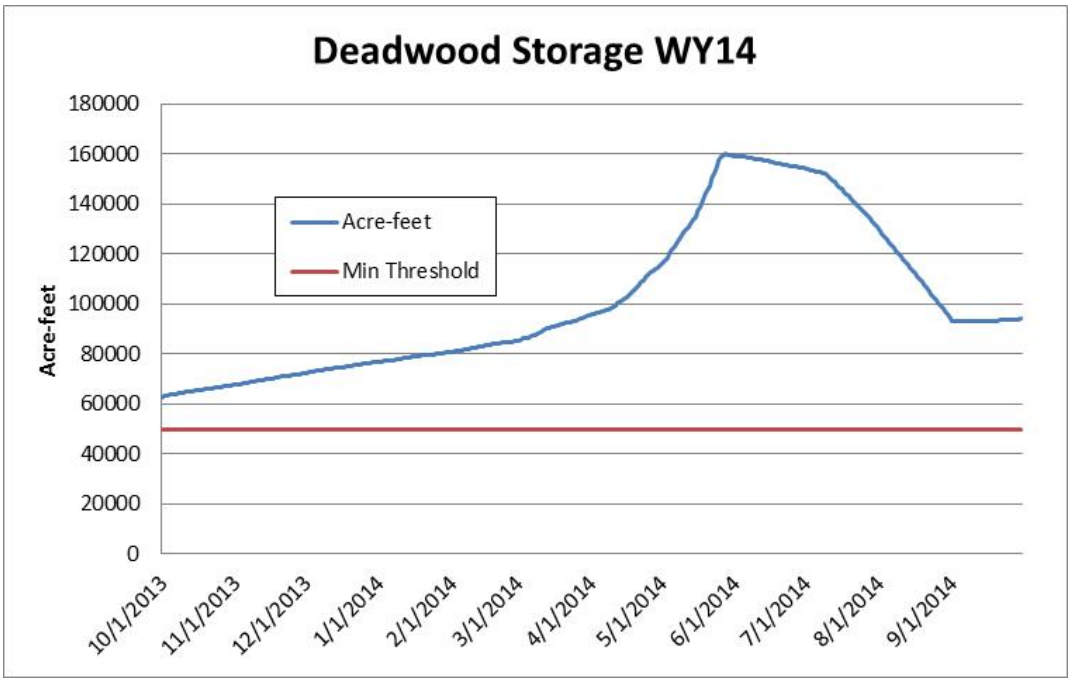

Figure 7. Deadwood Reservoir storage volumes (acre-feet) for WY14. The straight line represents Reclamation's Operational Indicator minimum threshold of 50,000 acre-feet of storage.

2.2 Oregon

Carryover storage in Beulah Reservoir for WY14 was very low, at 2,540 acre-feet on October 1, 2013. In the Malheur River basin, WY14 was a below-average water year; this low runoff filled Beulah Reservoir to only 39,970 acre-feet, or about 68 percent of its capacity (59,212 acre-feet) in 2014. The reservoir was drafted to 2.9 percent of reservoir capacity (1,739 acre-feet) on August 25, 2014. Reservoir content dropped below the 2,000 acre-foot threshold on August 2, 2014.

Flow information for WY14 (October 1, 2013 to September 30, 2014) can be found at Reclamation's Hydromet website. Reservoir water operations, including daily average reservoir elevations, contents in acre-feet, storage, and outflow, for Reclamation facilities are discussed in detail later in this report.

2.2.1 Malheur River Basin Operational Indicators

Beulah Reservoir fell below 2,000 acre-feet for 56 days during WY14 (Table 4). Figure 8 illustrates the water storage volume in Beulah Reservoir during WY14.

Table 4. Summary of amount or extent of anticipated take of bull trout associated with Reclamation's Beulah Dam and Reservoir facility operations during the 2014 reporting period.

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency of Exemptions	2013 Operations (October 2012 to September 2013)	Quick Reference: Number of times threshold was exceeded
Beulah Dam	Up to 10 percent of bull trout in Beulah Reservoir are entrained into the North Fork Malheur River below the dam	Water is discharged over the spillway	May through June	3 of 30 years	Spillway was not used in WY14	2 of 3 years 2006: yes 2007: 0 2008: 0 2009: 0 2010: 0 2011: yes 2012: 0 2013: 0 2014: 0
	All bull trout returning to Beulah Reservoir to over-winter are affected by a reduced prey base	Reservoir storage falls below 2,000 acre-feet	August through October	10 of 30 years	Reservoir storage volume fell below 2,000 acre-feet for 56 days in this reporting period (Figure 8).	5 of 10 years 2006: 0 days 2007: 60 days 2008: 34 day 2009: 53 days 2010: 28 days 2011: 0 days 2012: 0 days 2013: 45 days 2014: 56 days

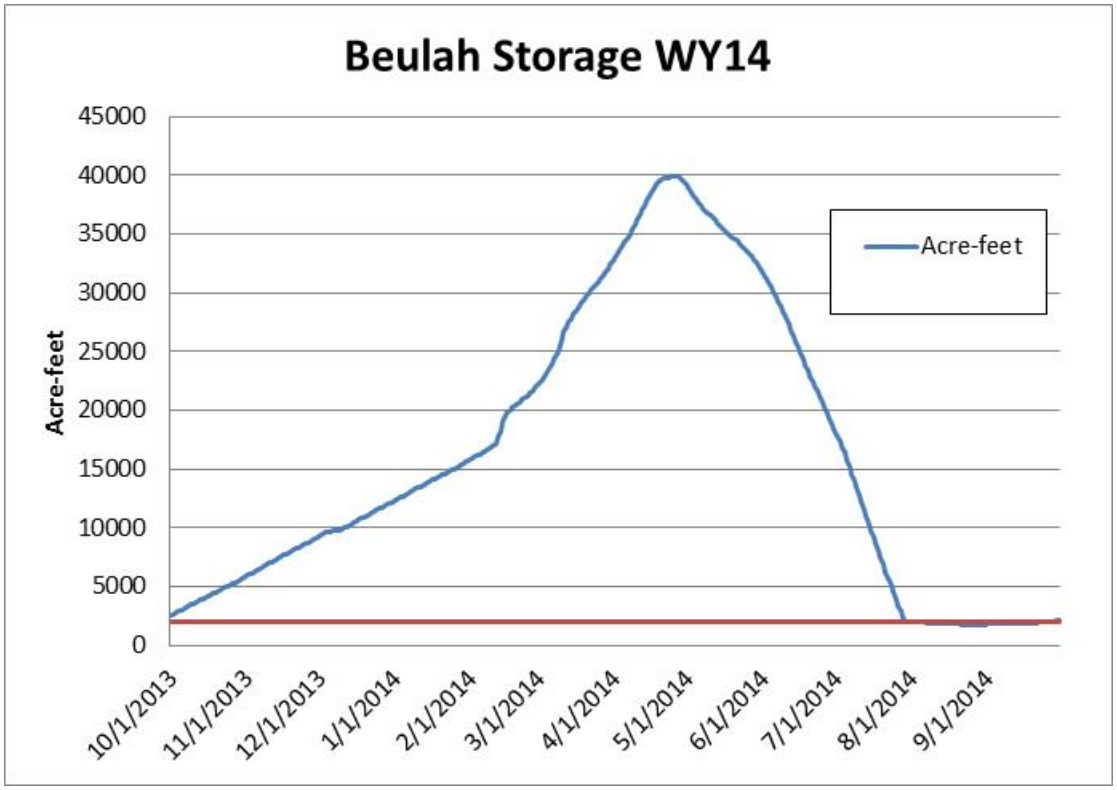

Figure 8. Beulah Reservoir storage volumes (acre-feet) for WY14. The straight line represents Reclamation's Operational Indicator minimum threshold of 2,000 acre-feet of storage.

2.2.2 Powder River Basin Water Year Summary

Bull trout were discovered in Phillips Reservoir in 2011 necessitating Reclamation to consult with USFWS for bull trout in this area (Reclamation 2013b). The USFWS completed a non-jeopardy biological opinion in June of 2014 (2014 Opinion) for Reclamation O&M activities in the Powder River (USFWS 2014) as a companion document to the 2005 Opinion. The 2014 Opinion contains a 21-year incidental take statement and corresponding RPMs that outline nondiscretionary actions for bull trout in the Phillips Reservoir. Reclamation will complete a monitoring plan for Phillips Reservoir during WY15. Although there are no operational indicators established at this time, a summary of operations for WY14 are included in this report. Figures 9 and 10 illustrate the water storage volume and reservoir elevation in Phillips Reservoir during WY14.

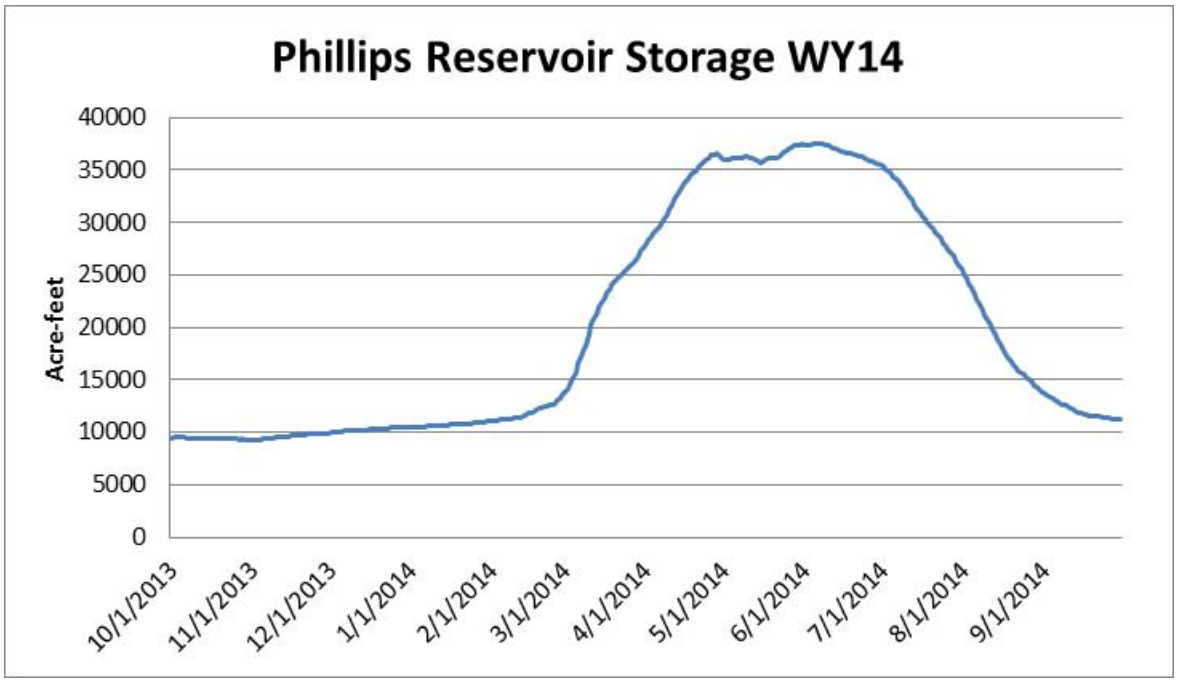

Figure 9. Phillips Reservoir storage volumes (acre-feet) for WY14.

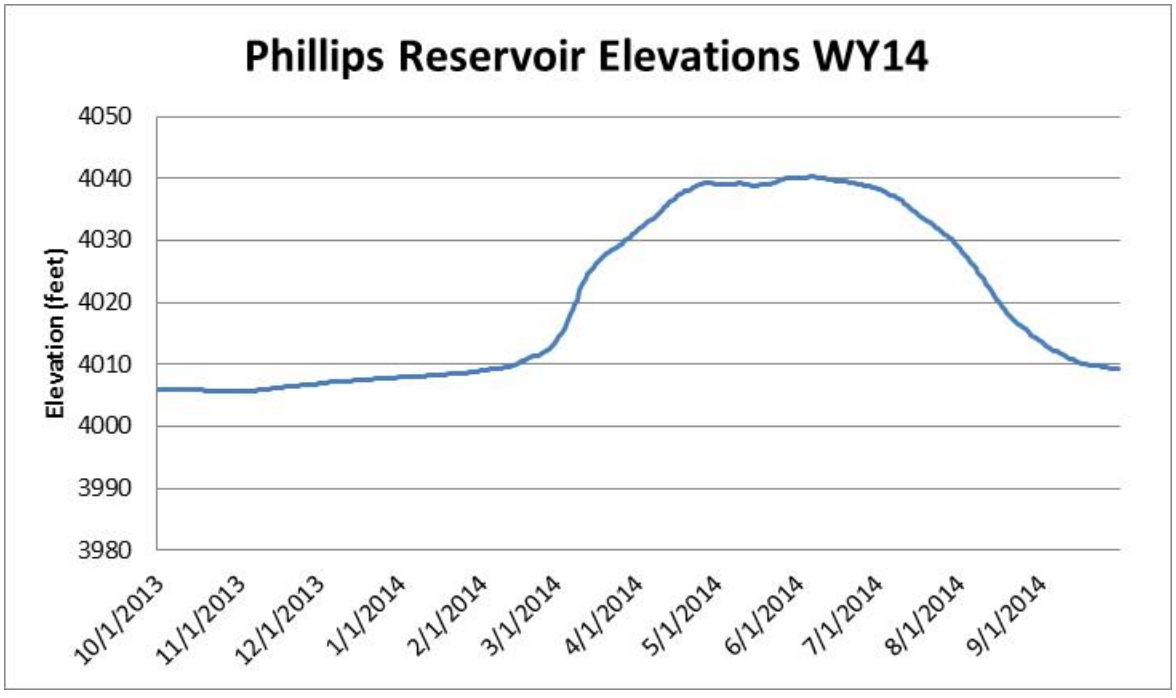

Figure 10. Phillips Reservoir elevation (feet above sea level) for WY14.

3. BULL TROUT

This chapter describes the bull trout ITS and RPMs, including monitoring efforts during WY14. The ITS includes four RPMs and their associated terms and conditions 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. Data collected to address these efforts may be used to satisfy the terms and conditions and/or monitoring requirements. For example, data collected during a fish sampling activity may be used to help monitor population trends. In 2014, Reclamation was involved with RPM activities and/or monitoring at Deadwood, Arrowrock, Anderson Ranch, and Beulah reservoirs.

3.1 Boise River Basin

For the purpose of this report, the Boise River basin study area includes the Arrowrock Reservoir; the South Fork Boise River below Anderson Ranch Dam; the Middle and North Fork Boise rivers; Lucky Peak Reservoir; and Grouse and Cottonwood creeks (Figure 11).

The 2005 Opinion identified five terms and conditions for minimizing the effect and/or amount of take associated with the operation of Arrowrock Dam and two terms and conditions for Anderson Ranch Dam. Each of the terms and conditions 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 assess terms and conditions for both Arrowrock and Anderson Ranch reservoirs because the influences of both facilities overlap.

Data collection efforts discussed for the Boise River basin during this reporting period include fish sampling; tracking radio-tagged bull trout, and hydrologic and water chemistry sampling. Sampling locations in the Middle Fork and North Fork Boise Rivers are depicted in Figure 11, sampling locations in Arrowrock Reservoir are depicted in Figure 12 and sampling locations in the South Fork Boise River are depicted in Figure 13.

A review of 2014 Arrowrock Hydroelectric Project operations and fisheries management activities performed by the Idaho Department of Fish and Game (IDFG) is also included in this report.

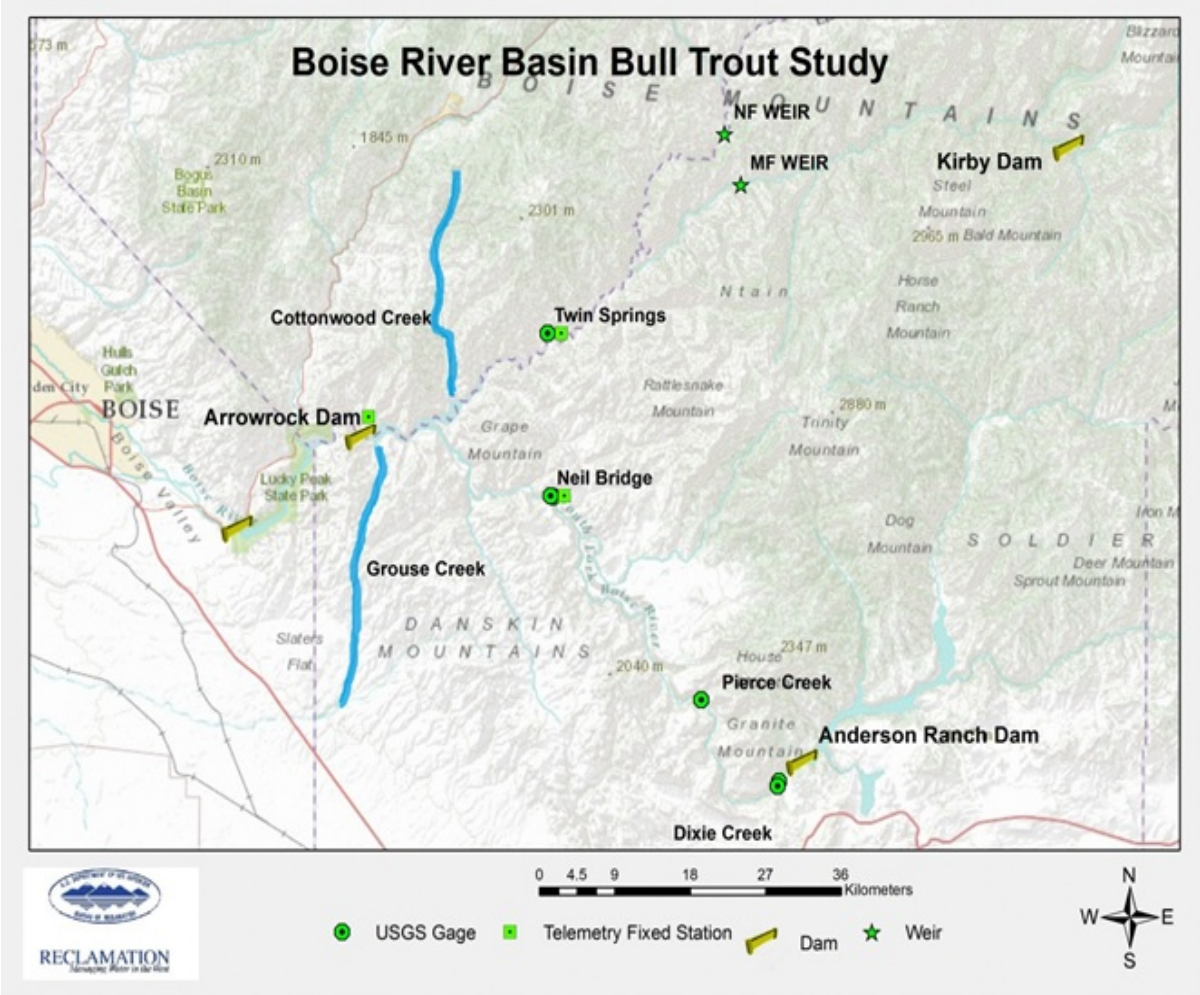

Figure 11. Monitoring locations in the Middle Fork and North Fork Boise rivers using telemetry receivers housed in U.S. Geological Survey (USGS) gages, telemetry fixed stations, and weirs.

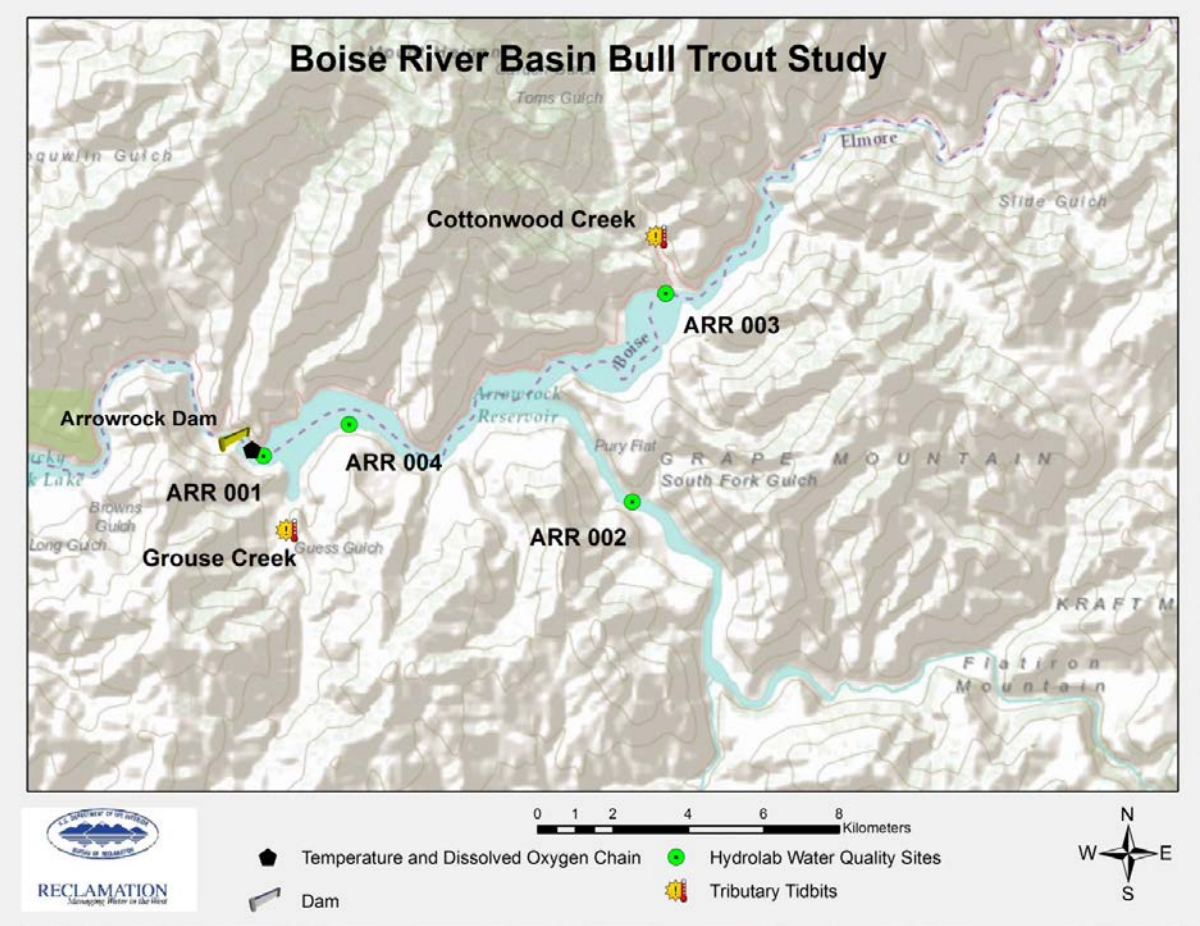

Figure 12. Limnologic and hydrologic sampling locations in Arrowrock Reservoir (ARR), Idaho 2014. Locations for Onset® TidbiT temperature loggers, a temperature and dissolved oxygen chain, and water profile stations are shown.

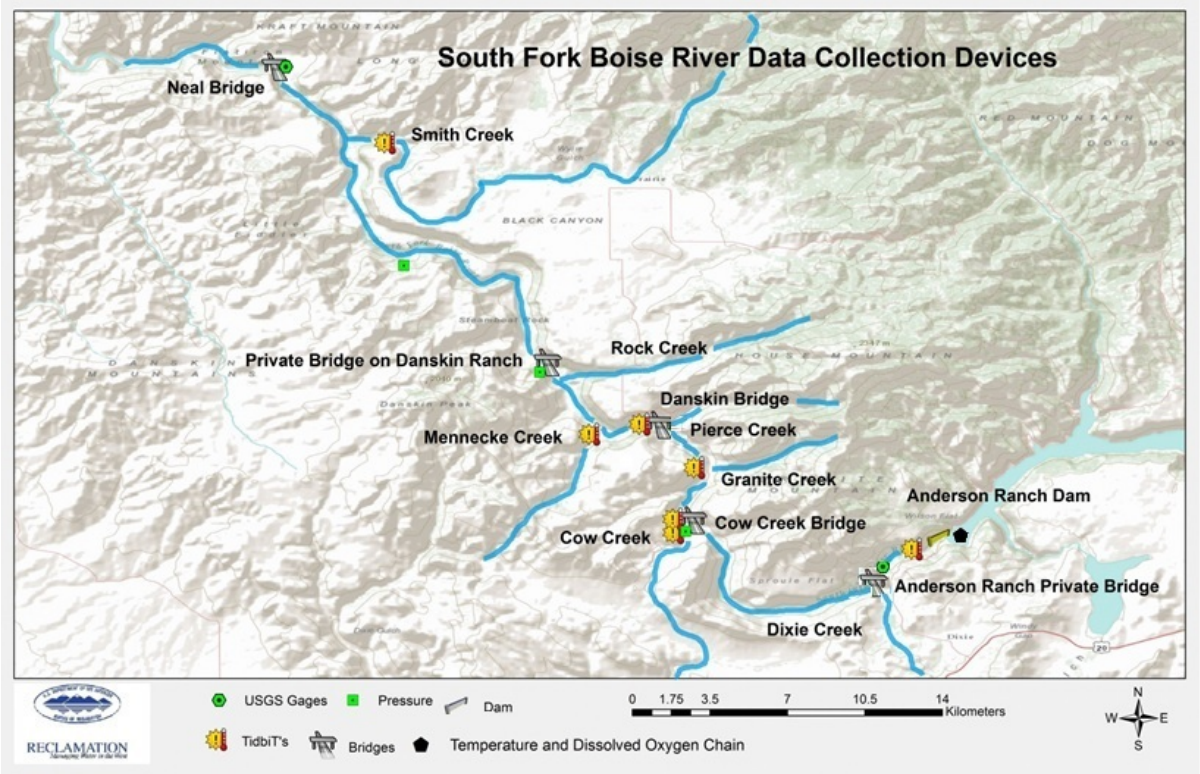

Figure 13. South Fork Boise River basin study area, 2014. Locations of Onset® TidbiTs temperature loggers, a temperature and dissolved oxygen chain, pressure transducers and USGS gages, one of which also house a telemetry receiver (Neal Bridge) are shown.

3.1.1 South Fork Boise River Data Collection and Arrowrock Reservoir Data Collection

The Middle Fork and North Fork Boise River data collection included both hydrology and fisheries efforts necessary to address Terms and Condition 1.c which directs Reclamation to minimize conditions that increase the risk of bull trout entrainment past Arrowrock Dam. Bull trout migration, reservoir water quality, and pool elevation were evaluated to assess how operations at Arrowrock Dam can minimize harassment and take of bull trout. Bull trout from the Arrowrock Reservoir migratory population were tracked in the Middle Fork and North Fork Boise Rivers in 2014 (see Section 3.1.2).

The South Fork Boise River data collection included both hydrology and fisheries efforts necessary to address Term and Conditions 2.a and 2.b, which direct Reclamation to determine ramping rates that reduce harassment to bull trout and to examine system flexibility to minimize impacts associated with disruption of migratory cues, respectively.

Bull trout migration behavior and river hydrology conditions will be coupled to assess how operations at Anderson Ranch Dam influence bull trout in the South Fork Boise River below the dam. Radio-tagged bull trout from the Arrowrock Reservoir migratory population were tracked in the South Fork Boise River (see Section 3.1.2).

Streamflow and water temperatures were monitored on the South Fork Boise River and selected tributaries (Figure 13). In 2014, Reclamation continued funding the USGS to maintain flow/temperature stream gages at Neal Bridge (USGS gage No. 13192200) on the South Fork Boise River for the purpose of monitoring flow below Anderson Ranch Dam. Of note, landslide and debris flow events in 2013 and 2014 related to previous wildfires created significant changes in river morphology and continued instability in two tributary watersheds to the South Fork Boise River. Consequently USGS discontinued the respective stream gages (Pierce Creek [USGS gage No.13190565] and Dixie Creek [USGS gage No. 13190505]). Pre-fire data from these gages will be used in conjunction with bull trout tracking information and water quality monitoring for Arrowrock Reservoir. In addition to the stream gages that were discontinued, three tributary temperature loggers (Cow, Mennecke, and Smith creeks) were also lost due to instabilities and debris flows in the watersheds during the 2014 field season. Overall in 2013 and 2014, fires, landslides and debris flows resulted in the decommissioning of two USGS gaging stations, four temperature loggers, and one pressure transducer.

Data collection in Arrowrock Reservoir focuses on water quality monitoring and fish tracking necessary to address Terms and Conditions 1.a through 1.e., which directs Reclamation to minimize impacts to bull trout resulting from habitat loss, reduction in reservoir productivity, and impacts to food base, and entrainment. Water quality parameters and prey base conditions will be used in conjunction with bull trout movement behavior to assess how operations at Arrowrock Dam influence bull trout in Arrowrock Reservoir.

Fish tracking and migratory data collection efforts overlap all three forks of the Boise River and Arrowrock Reservoir, as it is an open system allowing fish to move freely between the water bodies.

3.1.2 Fish Sampling

In 2014, Reclamation performed fish sampling as part of the trap-and-haul effort to move bull trout from Lucky Peak Reservoir back upstream into Arrowrock Reservoir to address Terms and Condition 1.c (entrainment). Sampling events performed by Reclamation are described in Section 3.1.5 later in this report. Fish sampling events conducted by IDFG in 2014 provided applicable information and are described in Section 3.1.6 (IDFG 2014).

3.1.3 Radio Telemetry

The use of radio transmitters and archival temperature tag technology is used to address the terms and conditions outlined in the 2005 Opinion. Bull trout spatial and temporal use of Arrowrock Reservoir and the South Fork, North Fork, and Middle Fork Boise rivers can be documented with these technologies. Information collected on bull trout movement patterns coupled with continuous measurements of water temperature and discharge will be used to describe migratory cues for bull trout migration and will inform decisions related to ramping rates at Anderson Ranch Dam that will minimize harassment or harm of bull trout in the South Fork Boise River and in Arrowrock Reservoir.

As part of this ongoing investigation, 176 bull trout have been surgically implanted with radio transmitters or archival temperature and pressure tags since fall 2011. Of those 176 tagged fishes, 144 were tagged with radio transmitters, and 96 of the 144 were also tagged with an internal or external archival temperature and pressure tag. Twenty-three bull trout were surgically implanted with archival temperature and pressure tags only. The battery lives of the radio transmitters vary, and none exceed a warranty date of 675 days (80 percent of expected life). Only 5 radio tags (3.5 percent) are likely to be active in the basin by the end of this reporting period (December 31, 2014). These 5 tags have not been recently located by ground or remote site tracking. Data from the radio transmitters and archival tags will be summarized upon completion of the telemetry project.

Movement of radio-tagged fish was monitored using fixed telemetry sites, mobile tracking, and boat tracking. Fixed telemetry sites are located with the USGS flow monitoring equipment at Neal Bridge (South Fork Boise River) and Twin Springs (Middle Fork Boise River), and in stand-alone fixed telemetry stations (Arrowrock Dam) (Figure 13). Mobile tracking occurred one to two times per week during spring 2014, but was reduced to once per month as a result of wildfires, landslides, and limited staff availability. Mobile telemetry was also limited in the North Fork, Middle Fork, and South Fork Boise rivers during the later summer and fall due road closures from wildfires and landslides. Additionally, supplemental tracking occurred on the South Fork Boise below Anderson Ranch Dam during a scheduled plant outage for maintenance and inspection. The inspection required Reclamation to redirect the discharge from Anderson Ranch Dam from the jet valves to the spillway for 3 days in June (9 through 11). Extra tracking and visual monitoring were implemented prior to, during, and after the spill occurred to monitor any adverse effects to the system. All telemetry efforts will continue monthly into April 2015 on all forks of the Boise River and Arrowrock Reservoir.

3.1.4 Hydrology and Water Chemistry

Hydrology and water chemistry data were collected in Arrowrock Reservoir and select tributaries during the reporting period. These data are being used to assess Term and Condition 1.b and coupled with bull trout migration behavior to assess Term and Condition 2.b. Reservoir vertical profiles were collected biweekly from May through October and every 6 weeks from November to April. Seven water quality parameters were measured at four locations on the reservoir (Figure 12). Water quality parameters included water temperature, dissolved oxygen concentration, pH, conductivity, turbidity, florescence (chlorophyll), and barometric pressure. Hydrology and water quality samples will continue to be sampled through the 2015 field season.

Onset® TidbiTs temperature thermographs were deployed in Grouse Creek and Cottonwood Creek on May 12, 2011, and set to record water temperature hourly (Figure 12). Data are manually downloaded a minimum of two times a year. Water temperatures will continue to be collected in Grouse and Cottonwood creeks through the 2015 field season.

Two semi-permanent water quality monitoring stations were installed on Arrowrock and Anderson Ranch reservoirs in 2014. The Arrowrock station has been in operation since 2012; however, this was the first year for the Anderson Ranch station. On March 24, 2014, the Arrowrock station was deployed approximately 200 yards upstream of the dam in the deepest portion of the reservoir. On September 3, 2014, the Anderson Ranch station was deployed approximately 500 yards upstream of the dam in the deepest portion of the reservoir (Figure 12). Onset® TidbiTs temperature thermographs were attached to a rope at 1-meter intervals from 1- to 25-meter depths for both stations. Three Minidot temperature/dissolved oxygen sensors were attached at 4 meters, 8 meters, and 20 meters to measure dissolved oxygen above, within, and below the anticipated annual thermocline for both stations. Data were downloaded and the Arrowrock and Anderson Ranch stations were removed on November 24 and 25, 2014, respectively, for winter storage. Both sites will be redeployed in the spring of 2015 when conditions allow.

3.1.5 Trap-and-Haul Efforts

Trap-and-haul efforts were conducted during March, April, and May 2014 to relocate potentially displaced (entrained) bull trout from Lucky Peak Reservoir back to Arrowrock Reservoir. Trap-and-haul effort sites in Lucky Peak Reservoir were selected based on known geographic and bathymetric conditions similar to those where bull trout were previously captured at by Reclamation (2000 through 2012). Primary locations of bull trout capture are at the Arrowrock Dam tailrace and nearby waters, shallow gradient slopes, and in the vicinity of tributary confluences. Physical water chemistry data were also monitored

and used to determine site suitability, in particular, temperature (<15°C) and dissolved oxygen (>7mg/L) (Figure 14). There were two types of gill nets used: an experimental net, which is constructed of six 12.5-foot sections of various mesh sizes from 0.5 to 4 inches measuring 75 by 6 feet; and standard gill nets, constructed using only one size of 1.5 to 3-inch stretch mesh, measuring 300 by 6 feet. The gill nets were constructed to remain perpendicular to the water surface and near or on the bottom of the reservoir. A 300-foot gill net fished for ½-hour constituted 1-hour of effort. Two gill nets were fished simultaneously by tying them end-to-end. This manner of effort allowed staff to reduce bull trout mortality by limiting set duration to 30 minutes or less (e.g., two nets fished for 30 minutes equal 2-hours of effort). Gill nets were retrieved from the opposite end they were deployed in order to minimize soak time, and increase bull trout survival.

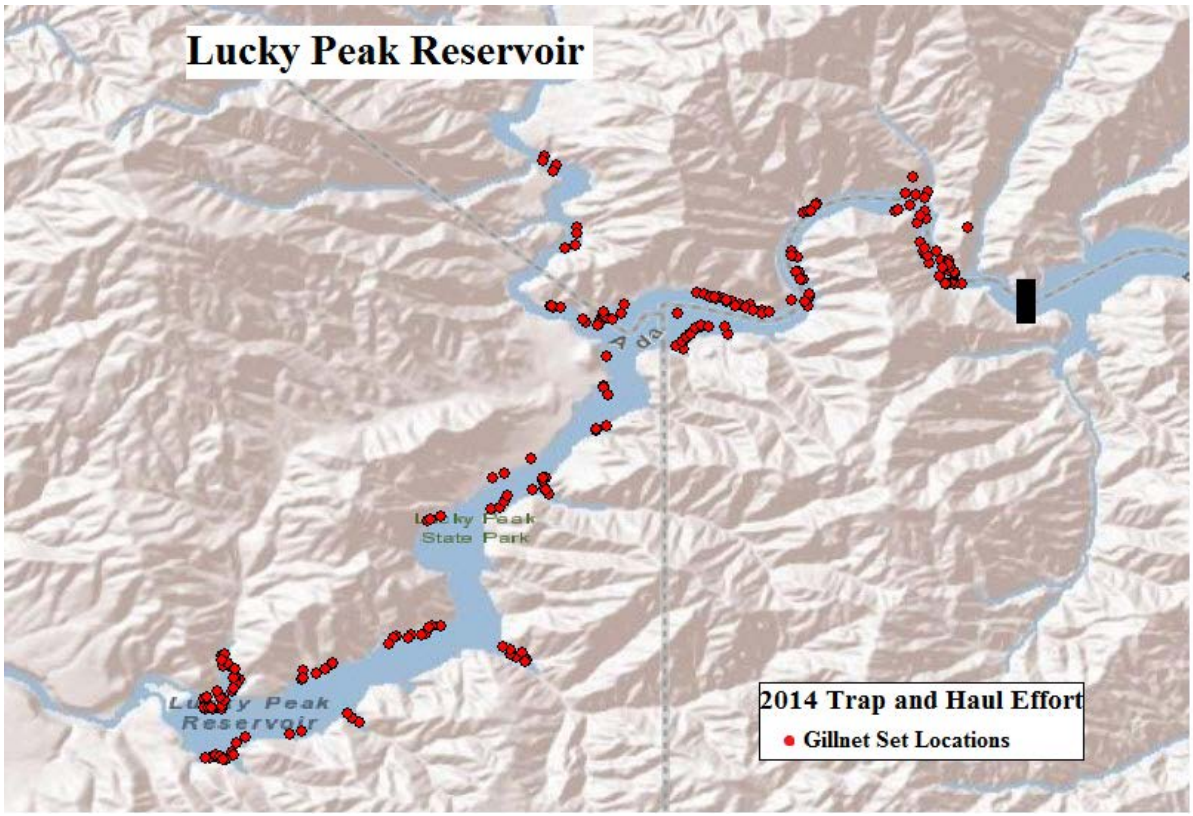

Figure 14. Locations of 2014 bull trout trap and haul efforts on Lucky Peak Reservoir. No bull trout were captured in Lucky Peak Reservoir.

Lucky Peak trap-and-haul efforts were conducted from March 24 to May 22, 2014 (Table 5). A total of 1,474 fish representing 11 species were captured using gill nets during a total of 236 effort hours with a total catch per unit effort of 6.25. Chiselmouth, largescale sucker and northern pikeminnow, and yellow perch comprised 89.48 percent of the total catch. No bull trout were caught.

Table 5. Catch data for trap-and-haul effort on Lucky Peak Reservoir in 2014. Sampling periods included March, April, and May.

Species	Soak Time (hours): 201		
	Total Count	**CPUE**	**Percent**
Bull trout (*Salvelinus confluentus*)	0	0.00	0.0
Bridgelip sucker *(Catostomus columbianus)*	12	0.05	0.81
Chiselmouth (*Acrocheilus alutaceus*)	109	0.46	7.39
Rainbow trout (*Oncorhynchus mykiss*)	17	0.07	1.15
Cutthroat trout (*Oncorhynchus clarki lewisi*)	1	0.00	0.06
Kokanee salmon *(Oncorhynchus nerka)*	7	0.03	0.47
Large scale sucker *(Catostomus macrocheilus)*	909	3.85	61.67
Northern pikeminnow *(Ptychocheilus oregonensis)*	79	0.33	5.36
Small mouth bass *(Micropterus dolomieui)*	29	0.12	1.97
Mountain whitefish (*Prosopium williamsoni*)	35	0.15	2.37
Yellow perch *(Perca flavescens)*	222	0.94	15.06
Redside shiner (*Richardsonius baltreatus*)	54	0.23	3.66
Total	**1,474**	**6.25**	**100**

3.1.5.1 Observed Trends in Lucky Peak Trap-and-Haul Efforts

Results of the 2014 Lucky Peak Reservoir bull trout trap-and-haul effort are consistent with a declining bull trout catch-per-unit-effort observed since operational changes were implemented at Arrowrock Dam to meet the 2005 Opinion terms and conditions. Trap-and-haul efforts have been conducted during select years from 2000 through 2014 (Figure 15).

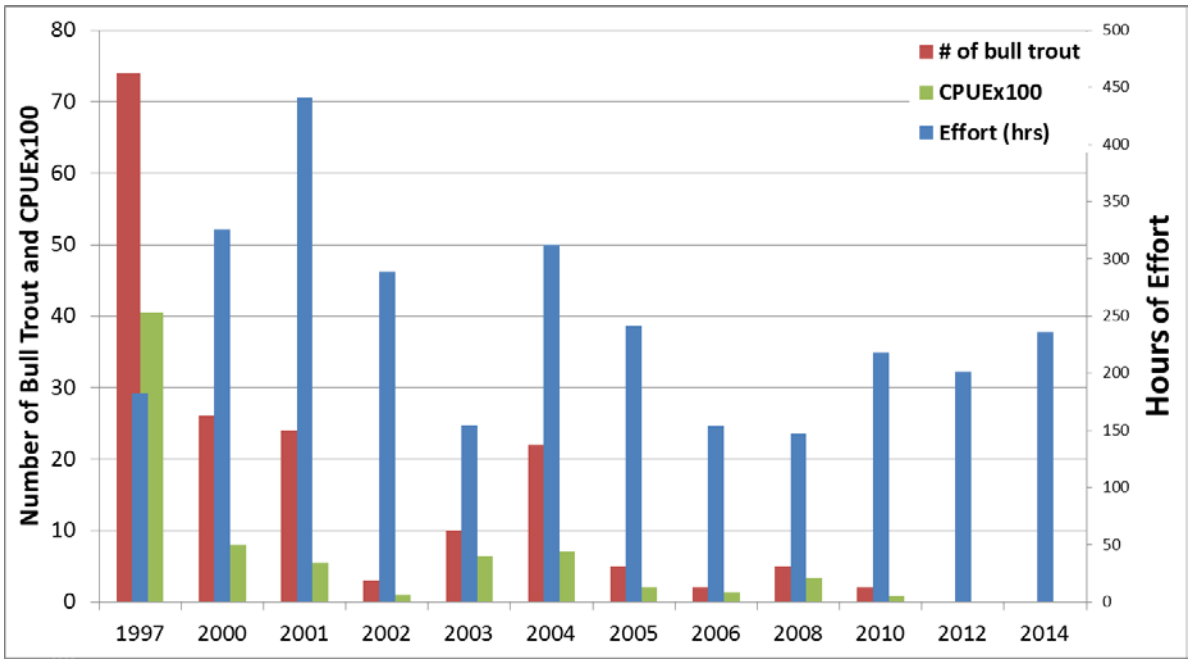

Figure 15. Catch per unit effort (CPUE) for bull trout trap-and-haul efforts in Lucky Peak Reservoir since 1997.

3.1.6 Other Activities

3.1.6.1 Arrowrock Dam Hydroelectric Project – Boise Project Board of Control

Arrowrock Dam Hydroelectric Project (Project), Federal Energy Regulatory Commission (FERC) licensee No.4656-020, started operations in 2010. Among the requirements of the FERC license, the licensee is obligated to:

1. *Monitor water temperature and dissolved oxygen of the water that exits the project.*

   In 2014, the Arrowrock hydroelectric plant was off line for several periods due to inadequate elevation differentials between Lucky Peak Reservoir and Arrowrock Reservoir but was only dewatered during the time period of January 1 to January 26. For the exception of the period that the tailrace was dewatered the water temperature and dissolved oxygen was monitored. There were no reportable incidents where dissolved oxygen levels fell below the accepted thresholds while the turbines were operation (Boise Project Board of Control 2015a)

2. *Conduct a fish salvage effort in the project tailrace if a shutdown occurs for more than 24 hours when the Lucky Peak Reservoir pool elevation is below 3022 feet.*

   Conditions did not occur during 2014 that required a fish salvage effort to occur; because the plant was not operating prior to the shutdown in January a fish salvage was not necessary (Boise Project Board of Control 2015b).

3. *Meet with the Arrowrock Hydro Team (IDFG, Reclamation, U.S. Army Corps of Engineers (Corps), and USFWS) annually to report operations of the project.*

   The annual Arrowrock Hydro Team met on March 18, 2014 to discuss the operations from the previous year (Boise Project Board of Control 2014).

3.1.6.2 Fish Management in Arrowrock Reservoir – IDFG

IDFG annually stocks fish into Arrowrock Reservoir. Table 6 is a summary of fish stocking for all fish types that occurred at Arrowrock Reservoir in 2014.

Table 6. Historical fish stocking data for all fish types at Arrowrock Reservoir in 2014.

Date Stocked	Species Type	Size	Number Stocked
10/30/2014	Triploid Troutlodge Kamloop	Catchable (6 inches +)	400
10/23/2014	Triploid Troutlodge Kamloop	Catchable (6 inches +)	15,845
10/08/2014	Hayspur Rainbow Triploid	Catchable (6 inches +)	19,530
09/10/2014	Hayspur Rainbow Triploid	Catchable (6 inches +)	6,464
05/15/2014	Early Spawner Kokanee	Fry (0-3 inches)	49,955

IDFG stocked a total of 42,239 triploid trout 6 inches and longer and 49,955 kokanee were stocked in Arrowrock Reservoir in 2014.

3.1.6.3 Stranding Pool Pilot Study in South Fork Boise River – Reclamation, IDFG, and Trout Unlimited

Reclamation, IDFG, and Trout Unlimited have planned to postpone the stranding pool study until conditions in the river stabilize. Results from this pilot effort are being used to design a more comprehensive study looking at the effect and occurrence of stranding pools in the South Fork Boise River.

3.1.6.4 Winter Survival Survey in the Spring and Fall Rainbow Trout Young of Year Survey in South Fork Boise River below Anderson Ranch Dam – IDFG

In the spring of 2014, IDFG conducted winter survival surveys in the South Fork Boise River below Anderson Ranch Dam to evaluate survival of age-0 salmonids (fry). IDFG also conducted surveys in the fall of 2013 and 2014 to assess the density of fry present following the fire and landslide events prevalent in the area. IDFG is reporting the results of these efforts (Butts 2015). Density estimates in the spring of 2015 will be important to understand the total effect the fire and landslides may have had on the year class of salmonids in the South Fork Boise River.

3.2 Payette River Basin – Deadwood River System

The 2005 Opinion identified five terms and conditions for minimizing the effects to bull trout and the amount of take associated with the operation of Deadwood Dam and Reservoir. Each term and condition addresses a different aspect of the effects of operations on bull trout and makes assumptions regarding the reservoir operation effects on bull trout. Examining the system as a whole allows Reclamation to understand the systemic impacts of individual operational changes. Consequently, Reclamation has been engaged in the multi-year *Deadwood Reservoir Operations Flexibility Evaluation Study* (Study or Deadwood Flexibility Study) to address the terms and conditions jointly and evaluate operational flexibility to minimize biological impacts system-wide.

WY13 was the final year of the Study's intensive data collection effort to establish a comprehensive understanding of the physical and biological factors associated with water management operations that may be limiting bull trout productivity and movement in the reservoir and in the Deadwood River below the dam. As a result of preliminary findings from the Study, Reclamation requested permission to implement interim operational changes at Deadwood Dam to validate assumptions, models, and study results in a continuing effort to comply with the terms and conditions outlined in the 2005 Opinion.

In conjunction with the interim operations, in particular when winter flows were maintained at 2.4 cfs, Reclamation collected water quality data within the stilling basin and in the Deadwood River downstream of the dam; conducted a trap-and-haul effort; radio-tagged rainbow and bull trout in the stilling basin, and conducted connectivity surveys in the Deadwood River downstream of the dam. The interim operational changes are in place through the end of the 2015 irrigation releases. Ongoing work to download and replace water thermographs continued in 2014.

A conclusive comparison between all the previous years' data will be summarized in the final Study report. A detailed description of the methods can be found in the Study proposal (Reclamation 2008) and detailed fish sampling results can be found in Reclamation's 2014 fish sampling report to IDFG (Reclamation 2014b). The Study involved data collection methods for fish population dynamics, productivity, hydrology, and water chemistry monitoring (Reclamation 2008). These data are being used in physical and hydrodynamic modeling. Instruments in Deadwood Reservoir and the Deadwood River above and below the dam are recording temperature as well as inflow and outflow quantities (Figure 16). The information collected from the reservoir is critical to understanding how releases from the dam affect the habitat conditions below the dam under varying operational conditions.

Evaluating the flexibility of the operations and the effects of Deadwood Dam on aquatic fauna requires an understanding of the potential overall ecosystem response to an operational change over time. Using modeling of physical and biological parameters measured over the course of this project allows for an ecosystem analysis of the terms and conditions for Deadwood Reservoir operations and its influence on bull trout populations. These efforts involved collaboration between multiple agencies and include annual activities not detailed in this report. The final results of the Study will be provided in the *Deadwood Reservoir Operations Flexibility Evaluation* report scheduled for completion in 2015.

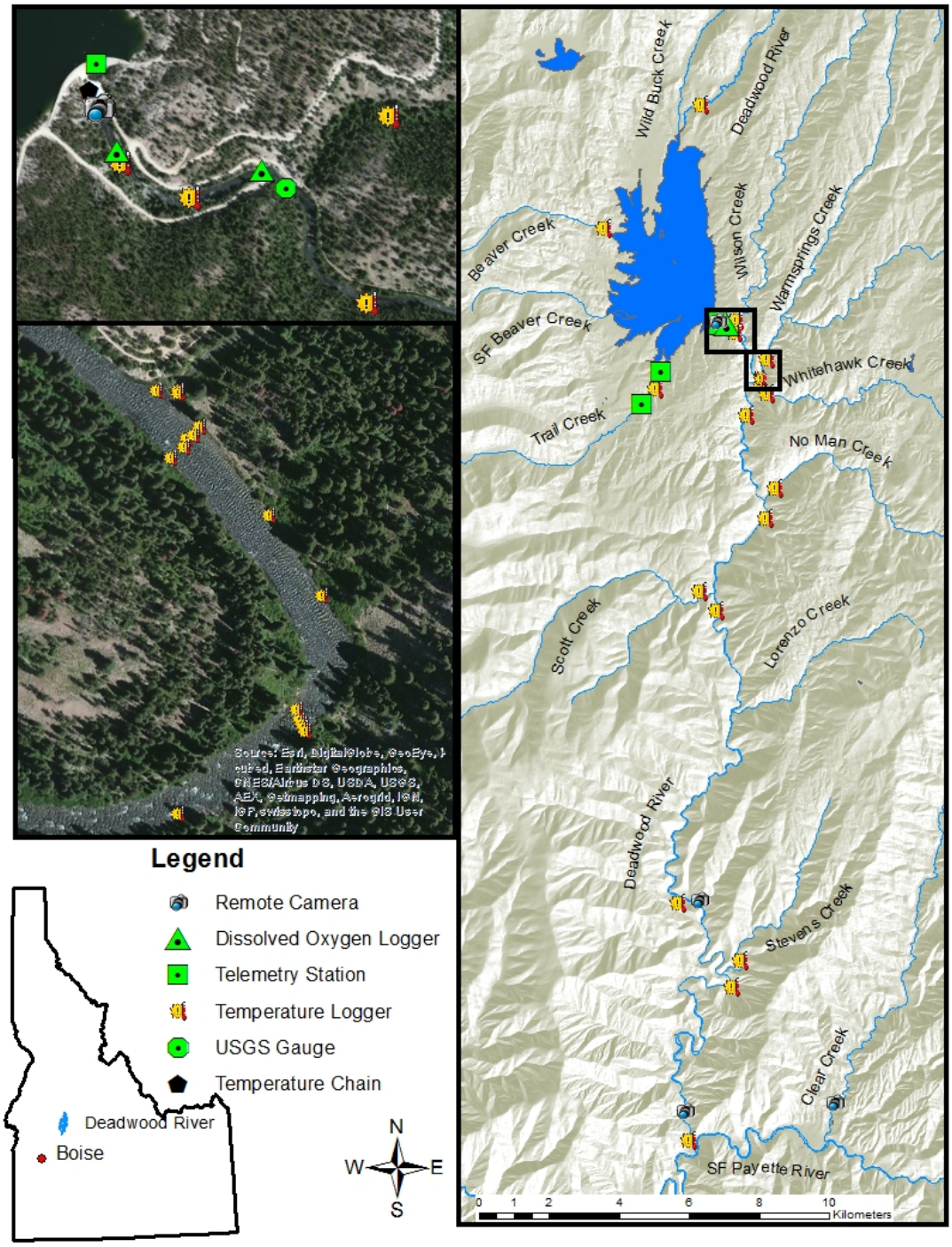

Figure 16. Limnologic and hydrologic sampling locations in the Deadwood study area, Idaho 2014. Equipment used to record data varied between locations and included Onset® TidbiT temperature loggers (individual loggers and a chain set up to collect data at different depths within the stilling basin), miniDO2T dissolved oxygen loggers, Bushnell® game cameras, and a USGS gage.

3.2.1 Data Collection in the Reservoir and Tributaries above the Dam

Physical, hydrologic, and water quality data were collected in the Deadwood River, Deadwood Reservoir, and selected tributaries as outlined in the Deadwood Flexibility Study Proposal (Reclamation 2008).

3.2.1.1 Hydrology and Water Chemistry

Collection of water temperature data using thermographs continued in 2013 in four tributaries to the reservoir: Deadwood River, Trail Creek, Beaver Creek, and Wildbuck Creek (Figure 16). Onset® TidbiTs recorded hourly water temperature data that were manually downloaded a minimum of one time per year. Temperature data is stored at Reclamation's Snake River Area Office and is being used for biological and hydrologic modeling (Reclamation 2013a).

3.2.1.2 Other Activities

IDFG operated kokanee weirs on Trail Creek and the mainstem Deadwood River during the fall spawning period to limit escapement and collect eggs for brood stock. In 2014, the Trail Creek and mainstem weirs were operated from August 6 to September 15. IDFG handled 13 bull trout at the mainstem weir and 11 at Trail Creek.

IDFG also stocked 5,000 fingerling fall Chinook salmon (3 to 6 inches) and 10,840 fingerling triploid Hayspur rainbow trout into Deadwood Reservoir as a measure to control kokanee salmon and provide a sport fishery.

3.2.2 Data Collection in the Deadwood River Downstream of Deadwood Dam

Since 2007, 63 bull trout have been captured in the stilling basin below the dam and 197 bull trout have been captured in tributaries to the river below the dam. During the 2014 reporting period, four bull trout were captured in the stilling basin below Deadwood Dam. Only one of these bull trout was large enough to implant a radio tag. This fish was tagged and released back into the stilling basin. The other three bull trout were moved and released into Deadwood Reservoir. Twelve rainbow trout were also implanted with radio tags and released back into the stilling basin.

In 2014, fyke netting and hook-and-line were used for sampling fish in the stilling basin below Deadwood Dam. Water temperatures at capture and release locations were within the 5°C guidelines provided by IDFG. In addition to conducting a trap-and-haul effort,

connectivity surveys, physical, hydrologic, and water chemistry data were collected throughout the year.

3.2.2.1 Fish Sampling Below Deadwood Dam

As part of the interim flow operations Reclamation proposed to conduct a trap-and-haul effort during the fall of 2014 after discharge had been reduced to 2.4 cfs. Fyke nets were operated in the stilling basin below Deadwood Dam September 30 to October 3, 2014 for a total of 266.1 hours (Table 7; Reclamation 2013b). A total of 1,328 fish representing 8 species, including 4 bull trout (4 unique fish), were captured. Speckled dace were the most abundant fish sampled (73.94 percent of the total catch) while bull trout were the least abundant fish captured, representing 0.30 percent of the total catch. The total CPUE was 4.99 fish per hour in 2014. Hook-and-line sampling was also conducted in the stilling basin below the dam for 11.3 hours on October 14 and 15, 2013. Fifteen rainbow trout were captured during this hook-and-line effort.

Table 7. Total fyke net catch summary for 2014 including numbers of each species captured (total catch), CPUE, and percent of total catch. Sampling occurred in the stilling basin just below Deadwood Dam, Idaho.

Species	Soak Time Hours = 266.1		
	Total Catch	CPUE (fish/hour)	Percent of total
Bull Trout (*Salvelinus confluentus*)	4	0.015	0.30
Cutthroat Trout (*Oncorhynchus clarki lewisi*)	4	0.015	0.30
Rainbow Trout (*Oncorhynchus mykiss*)	289	1.086	21.76
Redside Shiner (*Richardsonius balteatus)*	9	0.034	0.68
Sculpin (*Cottus spps.)*	6	0.023	0.45
Kokanee salmon (Oncorhynchus nerka)	27	0.101	2.03
Mountain Whitefish (*Prosopium williamsoni*)	7	0.026	0.53
Speckled Dace (*Rhinichthys osculus*)	982	3.691	73.95
Total	**1328**	**4.991**	

All captured fish were identified to species and enumerated; total length was recorded for all game species. PIT tags (12 mm) were inserted into the dorsal musculature of all previously untagged bull trout greater than 125 mm in total length. No bull trout captured in 2014 were recaptures from previous years. Bull trout captured ranged from 122 mm to

377 mm in total length and 16 to 550 grams in weight. There were no handling-related mortalities in 2014.

Biological samples collected from bull trout included fin clips (n=4) and scales (n=4). Fin clips were sent to the USFWS Genetics Lab in Abernathy, Washington. Genetic analysis may be used for population assignment to a specific tributary within the Payette River basin using methods described in DeHann (2012).

Bull trout scales are being analyzed by Reclamation staff to determine general age and growth patterns in the population. Digital images of scales from each fish are created and multiple readers assign ages by identifying growth annuli. Aging techniques and back-calculating length-at-age measurements from scales are described by Devries and Frie (1996). Scale samples are being housed at Reclamation's Snake River Area Office in Boise, Idaho.

3.2.2.2 Connectivity Surveys

Connectivity surveys were conducted in the Deadwood River below the dam as an ongoing effort from work initiated in 2010. In 2014, surveys were conducted from the dam downstream to Lorenzo Creek and selected locations between Lorenzo Creek and the confluence with the South Fork Payette River that were identified as potential barriers in previous years. Results will be available in the final Deadwood Flexibility Study report.

3.2.2.3 Radio Telemetry

Telemetry data will be summarized in the Deadwood Flexibility Study report.

3.2.2.4 Hydrology and Water Chemistry

Onset® TidbiT temperature loggers continued monitoring water temperatures downstream of Deadwood Dam at multiple locations in the mainstem Deadwood River and in seven tributaries to the Deadwood River: Wilson, Warmsprings, Whitehawk, No-Man, Scott, Lorenzo, and Stevens creeks (Figure 16). The loggers recorded water temperature hourly throughout the year and were manually downloaded.

Temperature data collected by the network of loggers deployed in the Deadwood River near Warmsprings Creek, a geothermally-influenced creek, were downloaded during the 2014 field season. The goal of this data collection effort was to characterize the thermal signature of Warmsprings Creek, determine whether it provides a thermal refuge for bull trout, and evaluate how different operational scenarios may affect the warm water entering the Deadwood River from Warmsprings Creek.

All temperature, water quality, and dissolved oxygen data is stored in Reclamation's Snake River Area Office and is being used for the biological and hydrologic modeling. Results will be available in the final Deadwood Flexibility Study report.

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

The 2005 Opinion identifies four terms and conditions for minimizing the effect and amount of take associated with the operation of Agency Valley Dam and Beulah Reservoir. Each of the terms and conditions addresses a different aspect of the effects of operations on bull trout. Reclamation is working to develop recommendations for a minimum pool level for Beulah Reservoir that would maintain a prey base for bull trout returning to the reservoir to overwinter (Terms and Conditions 4.a and 4.c).

In 2010, USFWS approved a time extension to allow Reclamation to collect additional data at Beulah Reservoir and its tributaries. A 4-year study was initiated in 2010 to extend fish, invertebrate, zooplankton, and water quality sampling to lower drawdown levels and to complete bioenergetics modeling. Prey base and bull trout studies (Term and Condition 4.a) were conducted during the first 3 years. In the last year, the collected data was combined with previous sampling efforts to conduct bioenergetics modeling and to develop a defensible minimum pool recommendation for Beulah Reservoir and the efficacy of prey supplementation (Term and Condition 4.b).

Reclamation will strive to maintain the reservoir pool elevation at or above 2,000 acre-feet until minimum pool recommendations are presented to USFWS in April 2015. New work will build from past prey base studies by increasing the sampling effort for prey fish and benthic invertebrates and adding sampling for zooplankton. Basic limnology data will also provide information on primary and secondary productivity. A final summary report for the prey base, bioenergetic modeling, and fish salvage work will be prepared by the April 30, 2015 deadline.

During the 2014 reporting period no additional data was collected for this study. The final report summarizing field efforts will be submitted under a separate cover and will include results of the bioenergetics modeling, fish salvage, and prey base analysis. Results from these efforts will be used to develop the conservation pool recommendations by the April 2015 deadline.

3.3.1 Temporary Water Lease

In 2011, Reclamation entered into a 4-year temporary water lease with the Vale Irrigation District to maintain reservoir pool elevation above 2,000 acre-feet until minimum pool recommendations are presented to the USFWS. The pool elevation at Beulah Reservoir fell below 2,000 acre-feet for a total of 56 days during WY14 (Figure 8). Minimum pool elevation (3284.41 feet) occurred on September 25, 2014 and carryover was 1,739 acre-feet. Evaporation loss was attributed to the difference in pool elevation between 1,739 and 2,000 acre-feet.

3.3.2 Trap-and-haul Efforts

During 2014, trap-and-haul efforts were not conducted because the spillway was not used to release water from the reservoir (Term and Condition 4.d).

3.3.3 Other Activities – Redd Counts

In 2014, redd counts were not conducted because of budget and staff shortages from partnering agencies.

3.4 Phillips Reservoir Bull Trout Sampling Plan

3.4.1 Bull Trout Monitoring

The 2014 Opinion requires a 5-year sampling plan to be developed by March 1, 2015, and implemented as soon as funding can be programmed and budgeted. The purpose of the monitoring effort is to better determine the seasonal use of Phillips Reservoir by bull trout. At the time this report was prepared, the monitoring plan had not been finalized. A pilot monitoring effort is scheduled to occur in collaboration with the Oregon Department of Fish and Wildlife (ODFW) in the spring of 2015.

3.4.2 Other Activities

A conservation recommendation for Phillips Reservoir in the 2014 Opinion encourages an evaluation of the seasonal fish passage barrier at the mouth of Deer Creek. A Deer Creek fish barrier reconnaissance survey was completed in the fall of 2014 and the findings summarized in a technical memo (Reclamation 2014b).

4. SNAKE RIVER PHYSA

4.1 Introduction and Background

The 2005 Opinion found that the proposed operations of Minidoka Dam may adversely affect Snake River physa in the Minidoka reach of the Snake River; however, insufficient information existed to adequately predict impacts. One of Reclamation's proposed actions in the 2004 consultation (Reclamation 2004) was to conduct presence/absence surveys of physa to characterize the environmental variables and physical habitats where they are found. During surveys conducted from 2006 through 2008, over 274 live physa specimens were found between Minidoka Dam downstream to above Milner Pool (Figure 17; Gates and Kerans 2010). Live physa were found in low densities, primarily among pebble and gravel substrates in the main channel (thalweg) of the Snake River from below Minidoka Dam downstream to above the Milner Pool. Physa were also found in the spillway area of Minidoka Dam, though sample sizes were too small to characterize habitat use and spatial distribution.

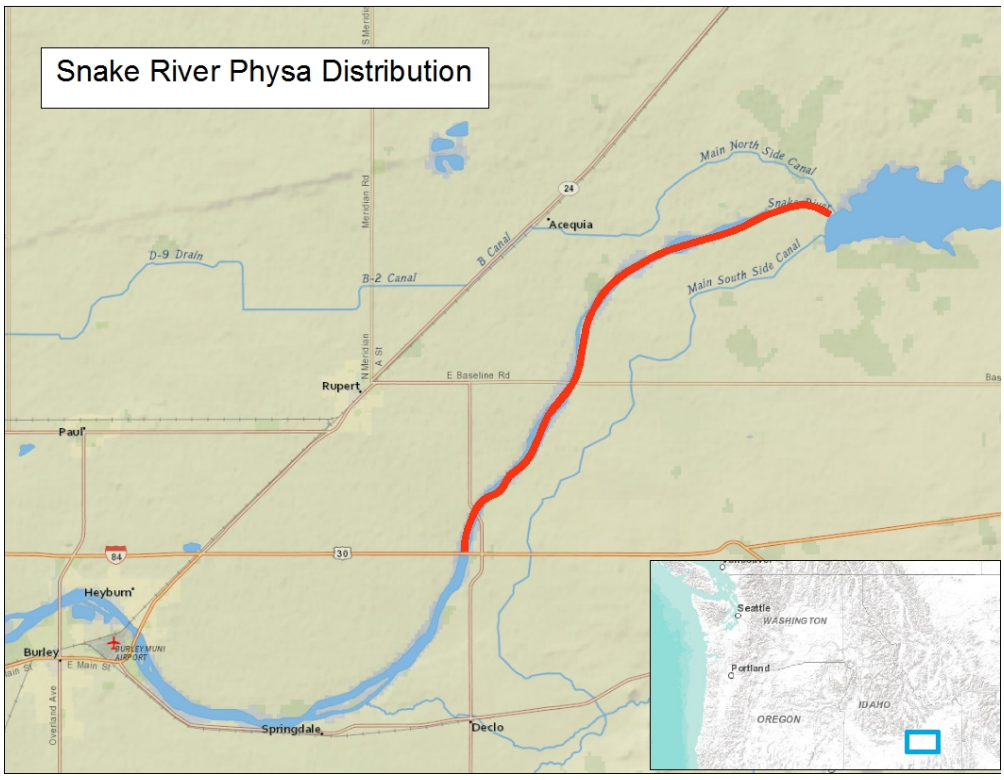

Figure 17. Red line represents the known distribution of Snake River physa (*Physa natricina*) in the Snake River above Milner Dam.

Physa surveys were not conducted from 2009 through 2011; however, during this time, data and specimens were being analyzed and a completion report was prepared for physa identification, habitat characteristics, and distribution (Gates and Kerans 2010). Survey efforts were reinitiated in 2012 in response to the Minidoka Dam spillway replacement project. Current and future Reclamation management of Minidoka Dam includes replacement of the spillway structure and two canal headworks structures. Construction is scheduled to be completed by April 1, 2015. Post-construction operations may include the diversion of more water, when available, through the Inman Powerplant located at Minidoka Dam. In consultation with USFWS and a multiagency technical team, Reclamation designed a multi-year proposal to reduce minimum spillway flow (Table 8) and monitor physa to determine what, if any, effects reduced flow has on physa occurrence and abundance in the spillway. Due to the complexity of Reclamation's proposed action, Table 8 only identifies minimum spillway and powerplant flows and does not fully represent the proposed post-construction operations comprehensively. Water rights, provisions of spaceholder contracts, commitments to implement the existing biological opinions, and Total Maximum Daily Loads (TMDL) will not change as a result of the spillway replacement project. Project operations following construction will be addressed separately to better align with ongoing actions associated with the long-term O&M of the current 2005 Opinion (USFWS 2005). The primary purpose of Table 8 is to illustrate the proposed spillway flow reduction schedule.

Table 8. Current and proposed minimum spillway and powerplant flows at Minidoka Dam.

	Spillway Flow (cfs)					Powerplant Flow (cfs)				
	2013	**2014**	**2015**	**2016**	**2017**	**2013**	**2014**	**2015**	**2016**	**2017**
Nov 01	<1	<1	<1	<100	<100	400	400	425	425	425
Dec 01	<1	<1	<1	<100	<100	400	400	425	425	425
Jan 01	<1	<1	<1	<100	<100	400	400	425	425	425
Feb 01	<1	<1	<1	<100	<100	400	400	425	425	425
Mar 01	<1	<1	<1	<100	<100	400	400	425	425	425
Apr 01	<1,300	<1,300	<1,300	<1,000	<500	<5,035	<5,035	<5,035	<5,335	<5,835
Apr 15	1,300	1,300	1,300	1,000	500	<8,850*	<8,850	<8,850	<8,850	<8,850
May 01	1,300	1,300	1,300	1,000	500	<8,850	<8,850	<8,850	<8,850	<8,850
June 01	1,300	1,300	1,300	1,000	500	<8,850	<8,850	<8,850	<8,850	<8,850
July 01	1,900	1,900	1,500	1,000	500	<8,850	<8,850	<8,850	<8,850	<8,850
Aug 01	1,900	1,900	1,500	1,000	500	<8,850	<8,850	<8,850	<8,850	<8,850
Sept 01	1,300	1,300	1,300	1,000	500	<8,850	<8,850	<8,850	<8,850	<8,850
Sept 15	<1,300	<1,300	<1,300	<1,000	<500	<5,035	<5,035	<5,035	<5,335	<5,835
Oct 01	<1,300	<1,300	<1,300	<1,000	<500	400	400	425	425	425

*Irrigation season powerplant flows are highly variable within and among years and dependent upon several factors. Accurate monthly flows cannot be precisely expressed in a single table. The maximum powerplant capacity at Minidoka Dam is 8,850 cfs.

The objectives of the Minidoka reach physa surveys in 2014 were to gather baseline data that will be used to determine trends of occurrence and abundance within the Minidoka reach; determine the effects of reduced spillway flows on physa in the Minidoka Dam spillway; further characterize physa habitats; and meet the reporting requirements of the Endangered Species Act (ESA) Section 10, Permit No. TE 056557-5.

4.2 Survey Area

The survey area is located in south-central Idaho and includes the Snake River from Minidoka Dam downstream to the upper end of Milner Pool (Figure 1, river mile [RM] 675 to RM 663). The Minidoka Dam pool elevation ranges from 4236 feet to 4245 feet; however, elevations are generally held at 4245 feet to maximize power production. The pool elevation is reduced near the end of irrigation season (September) during low-water years to avoid reducing American Fall Reservoir below 100,000 acre-feet. Minidoka Dam is operated by Reclamation and managed primarily for water storage and hydroelectric generation. Powerplant and spillway discharges from Minidoka Dam bifurcate flow between the original wetted channel of the Snake River and a series of bedrock outcrops not

originally wetted. Flows through Minidoka Dam consist of regulated discharge through the Reclamation and Inman powerplants as well as controlled and uncontrolled leakage along and possible seepage under, the spillway structure. A replacement spillway is scheduled for completion this spring (approximately April, 2015). Flows from Minidoka Dam downstream to Milner Dam are almost entirely an artifact of controlled releases at Minidoka Dam, as there are no major tributaries or irrigation returns in the Snake River along this reach.

4.3 Methods

4.3.1 Sample Locations

A before/after, control/impact (BACI) study design was implemented to examine changes in the occurrence and abundance of physa at the Minidoka Dam spillway before, during, and after planned reductions in spillway flow. Analyzing physa occurrence and abundance within the spillway in comparison to a downstream location where changes in flow are not expected to occur seeks to provide the ability to detect changes in physa occurrence and abundance due to spillway management, as opposed to changes in physa occurrence that may be simultaneously occurring throughout the study area. Two long-term survey sites were selected at locations where physa were collected during previous surveys (Gates and Kerans 2010).

The downstream site (Control) near the demolished Jackson Bridge (RM 669) is in the original Snake River channel and consists primarily of gravel substrate within a wide, shallow, braided channel. The bankfull width of the Snake River along the Jackson Bridge site is over 400 meters wide, with maximum depths of approximately 4 meters. As a result, approximately 30 percent of the river channel is exposed during non-irrigation season flows. Flows outside of irrigation season at the Jackson Bridge site typically consist of a minimum of 400 cubic feet per second (cfs) through the powerplants. This regulated winter flow is approximately 1.2 meters lower than average August bankfull width flows.

The upstream site (Impact) is located at the Minidoka Dam spillway pool (RM 674.5). The spillway pool, wetted as a result of spillway releases since Minidoka Dam was constructed in 1906, is characterized by braided flows over primarily bedrock and sand substrate. Live physa were discovered in a portion of the spillway area in 2005. It is unknown whether physa colonized the spillway from upstream or downstream, how long they have persisted in the spillway area, or whether they are ephemeral in this nonnative habitat.

Three randomly-selected transects and one permanent reference transect were derived by dividing the shoreline length of each site into 1-meter-wide cross sections perpendicular to the channel. Each transect was divided into 1-square-meter segments, and 20 segments

were randomly selected along each transect as potential sampling plots. The Jackson Bridge sampling plots were selected by sampling the first 10 plots occupied from south to north at depths equal to or greater than 1.2 meters deep since previous surveys found virtually no physa in the seasonally-dewatered channel (Gates and Kerans 2010). Spillway sampling sites were selected by sampling the first 10 plots occupied along each transect that were at least 1 meter deep, from north to south.

4.3.2 Snail Collection

Each station was sampled using a venturi suction dredge operated by a SCUBA diver. A 0.25-square-meter plot was excavated to approximately 2.5 centimeters deep at stations where the primary substrate consisted of unconsolidated material such as mud, sand, and gravel. At stations having consolidated substrates such as cobble, boulder, and bedrock, timed samples were suction dredged for a timed duration of 60 seconds. Timed samples were collected for variable-sized areas and hence, suitable only for presence/absence analysis. Each sample was transported through flexible tubing and collected in a 1,000-micrometer sieve on board the boat or buoy station from which dive operations was conducted. Samples were immediately transferred to plastic trays and examined by trained samplers from Reclamation and USFWS under the direction of John Keebaugh from the Orma J. Smith Museum of Natural History. Live physa were enumerated for each plot and returned in proximity to the location from which they were collected.

4.3.3 Habitat Measurements

Physical water quality measurements were made at each sampling plot. Water depth (meters), temperature (°C), and dissolved oxygen (milligrams per liter [mg/L]) were measured at each plot using a Hydrolab® Sonde DS5 meter and Surveyor® handheld monitor. Current velocity (meters per second [m/s]) was measured approximately 10 centimeters above the substrate at each plot using a SonTek® Argonaut ADV current meter operated by USGS staff. Acoustic Doppler Current Profiles (ADCP) were also collected by USGS staff at each transect using a TRDI® Rio Grande ADCP operating at 12 kHz. Dominant and subdominant substrate types were classified by particle size as modified from Overton et al. (1997) (Table 9). Estimates of dominant and secondary substrate composition were made by direct observation of each sampling plot by a SCUBA diver and from inspection of the sieved contents of each sampling plot by snail collection samplers on board the dive vessel.

Table 9. Substrate classifications used to characterize suction dredge plots surveyed in 2014.

Substrate Type	Size Class (mm)
Bedrock	Solid rock
Boulder	>256
Cobble	64-256
Pebble	16-64
Gravel	2-16
Sand	0.1-2
Silt	<0.1

4.4 Results and Discussion

Forty plots were sampled at each the Jackson Bridge and spillway pool sites in 2014. At the Jackson Bridge site (Control site), 9 plots (23 percent) contained live physa, ranging in abundance from 1 to 3 per plot (Figure 18). No live physa were found among the 40 samples collected at the spillway pool site (Impact site; Figure 19). Similar to previous studies, physa were broadly distributed in low densities in the permanently wetted channel of the Snake River at the Jackson Bridge site.

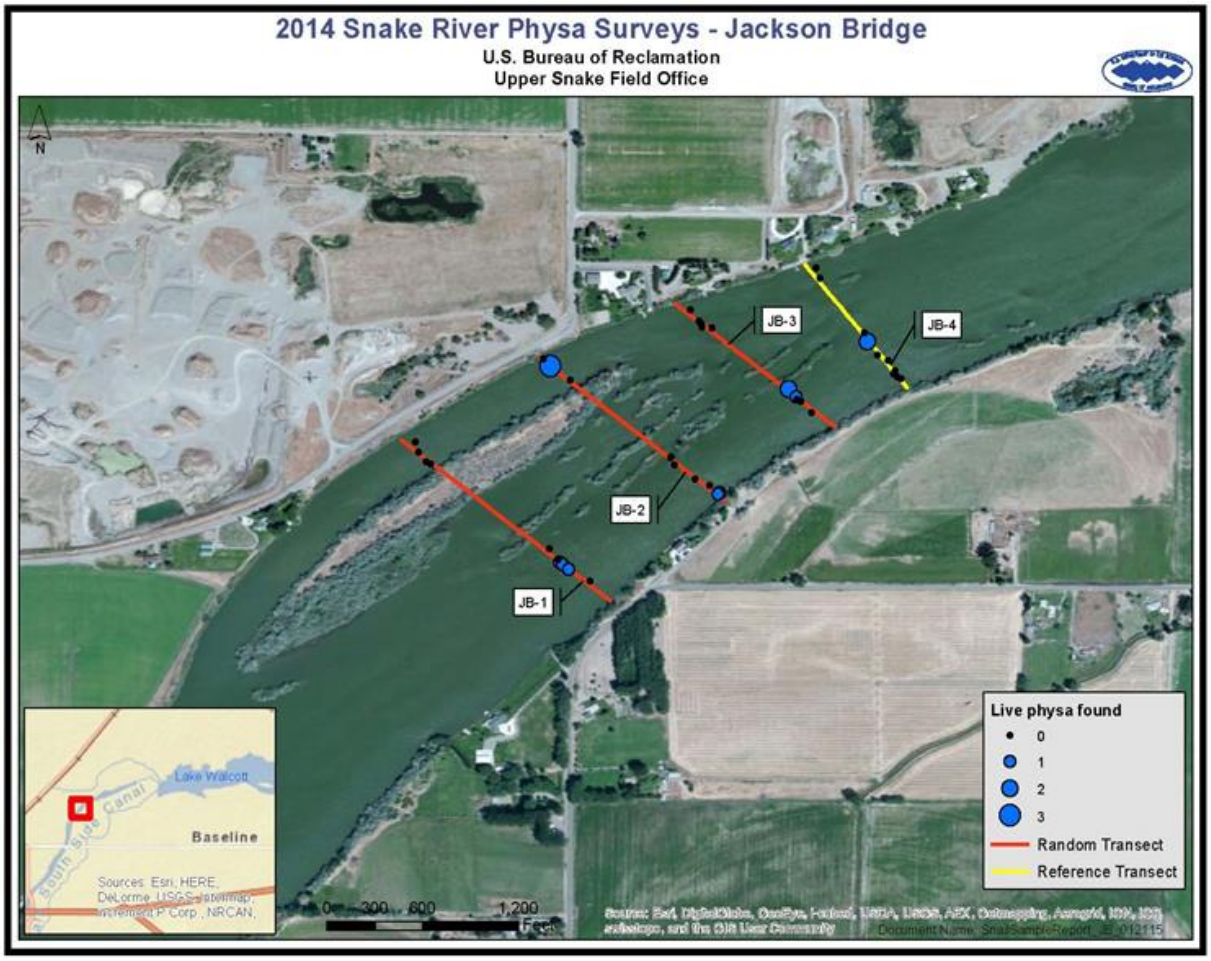

Figure 18. Distribution and abundance of Snake River physa at the Jackson Bridge monitoring site in 2014.

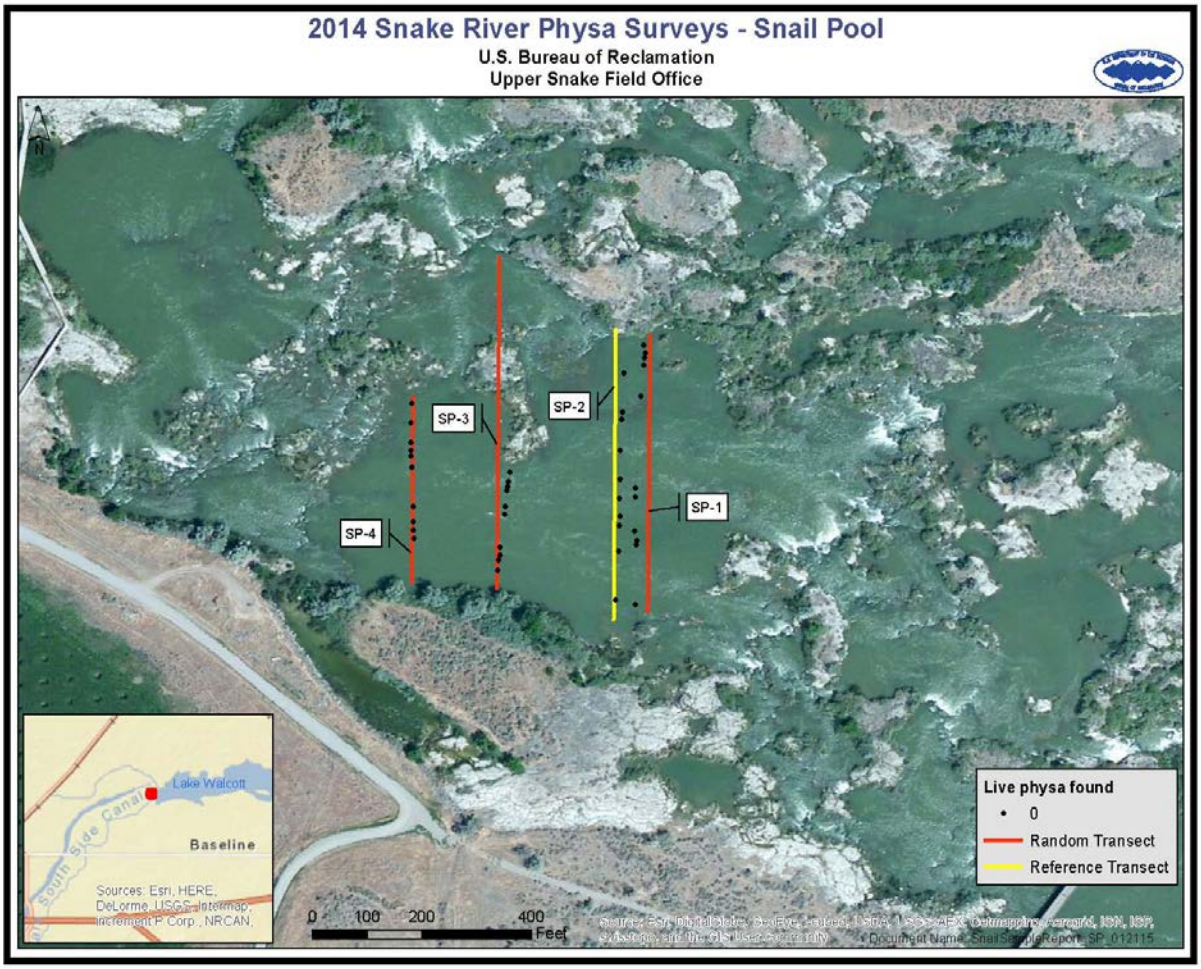

Figure 19. Distribution and abundance of Snake River physa at the spillway pool monitoring site in 2014.

A total of 13 live Snake River physa were collected during field surveys in 2014. Of these, 10 live Snake River physa were returned to the water in apparently good condition. The remaining three specimens were preserved on ethyl alcohol and are being stored at Reclamation's Upper Snake River Field Office in Heyburn, Idaho. Voucher specimens collected in 2014 will be held at Upper Snake Field Office and are available upon request to the designated depository listed in USFWS ESA Section 10 Permit No. TE056557-5.

A total of 8 timed sample plots were conducted at the spillway site in 2006. Of these plots, physa occurrence was 50 percent and ranged in abundance from 1 to 15 per plot. In 2007, 17 timed sample plots were conducted at the spillway pool, resulting in 1 plot containing 1 live physa. Physa were not detected in the spillway pool during 2012; in 2013, 2 live physa were collected from the spillway pool and in 2014, again, no live Snake River physa were detected. In response to the scarcity of physa detected at the spillway pool, Reclamation

and the Minidoka Dam Spillway Replacement Technical Team modified the sampling methodology for the 2015 field season by removing two transects from the Jackson Bridge site and adding them to the spillway pool. This will allow a greater proportion of the spillway pool to be sampled. The two new transect to be located within the spillway snail pool will be specifically located so as to intercept previous known locations of live Snake River physa. The Jackson Bridge site will consist of the reference transect and one random transect. Continued monitoring for physical and environmental parameters will also provide the basis for assessing the effects of reduced spillway flow on the suitability of the spillway pool waters for physa occurrence.

Mean physical parameters observed at the two survey sites are identified in Table 10, separated by positive and negative occurrences for live Snake River physa. Range and mean physical parameters are displayed in Table 11.

Table 10. Mean physical parameters observed at Jackson Bridge plots with (+) and without (-) physa and spillway pool plots for 2014.

Parameter	Jackson Bridge Physa (+) n=9	Jackson Bridge Physa (-) n=31	Spillway Pool Physa (+) n=0	Spillway Pool Physa (-) n=40
Flow (m/s)	0.25	0.27	na	0.2
Temp (°C)	22.9	22.4	na	21.8
DO (mg/L)	9.47	8.8	na	8.0
Depth (m)	1.62	1.59	na	na

Table 11. Range and mean of physical habitat parameters measured during the 2014 physa survey. The mean (x) is given in parenthesis.

Site	Current Velocity (m/s)	Temperature (°C)	Dissolved Oxygen (mg/L)	Depth (meters)
Jackson Bridge	0.02-0.9 (0.27)	21.5-24 (22.6)	6.1-10.6 (8.9)	0.91–2.44 (1.59)
Spillway Pool	0.01-0.44 (0.20)	21.3-22.6 (21.8)	7.5-8.7 (8.0)	na

It should be noted, in 2014 slightly shallower depths were surveyed in the Jackson Reach (2014 mean depth 1.59 m), relative to previous years (e.g., 2012 mean depth = 1.8 m), in an attempt to characterize habitat use by Snake River physa near the annual fluctuation zone. The fluctuation zone is that portion of the Snake River in the Minidoka Reach that becomes dewatered as a result of annual reductions in river flow following irrigation season water deliveries. The Minidoka Reach of the Snake River fluctuates approximately 1.2 meters annually as a result of operations, with the minimum elevations occurring November through March. Consistent with previous year's work, live Snake River physa are found within the permanently wetted footprint of the river; however, occurrence and density appear to decrease as you reach the margin of that zone.

5. YELLOW-BILLED CUCKOO

5.1 Introduction

The yellow-billed cuckoo is a Neotropical bird species that breeds in North America and winters primarily south of the U.S.-Mexico border. A petition to list the yellow-billed cuckoo (*Coccyzus americanus*) was filed in 1998. The petitioners stated that "habitat loss, overgrazing, tamarisk invasion of riparian areas, river management, logging, and pesticides have caused declines in yellow-billed cuckoo." In the 90-day finding published on February 17, 2000, USFWS indicated that these factors may have caused loss, degradation, and fragmentation of riparian habitat in the western United States, and that loss of wintering habitat may be adversely affecting the cuckoo. In December 2013, the USFWS proposed to list the Western Distinct Population Segment (DPS) of the yellow billed cuckoo as threatened and initiated the 12-month review period. The yellow-billed cuckoo was subsequently listed as threatened in November 2014 (79 FR 67154). Most Idaho records are of isolated, non-breeding individuals (USFWS 1985). Although occasional reports of this bird are noted, including several birds at Lawyers Creek in Lewis County in 1979, six sightings in the vicinity of Lake Walcott State Park between 1978 and 2005, and six at Cartier Slough Wildlife Management Area (WMA) on the Henry's Fork of the Snake River in 1980, nesting attempts or young have only been observed in southeastern Idaho. Although it has been suggested breeding populations of yellow-billed cuckoos in Idaho are extirpated (Reese and Melquist 1985), suitable habitat exists in multiple locations in southeastern Idaho where limited breeding is thought to occur.

In response to the proposed listing in 2013, Reclamation conducted surveys during the summer of 2014 at four areas within the Snake River Corridor (South Fork Snake River, McTucker Bottoms, Cartier Slough WMA, and Fort Boise WMA, Figures 20 through 24). The above locations were chosen based on potential yellow-billed cuckoo habitat availability as it relates to Reclamation operations. Yellow-billed cuckoos are found in large, dense riparian habitats along rivers, lakes and reservoirs. Reclamation water operations on the upper Snake River have the potential to impact the dense riparian vegetation and water critical to yellow-billed cuckoos.

The breeding range of the entire species formerly included most of North America from southeastern and western Canada to northern Mexico. Yellow-billed cuckoos generally arrive on their breeding grounds by mid-June and the breeding season varies regionally based on availability of preferred food. In the Pacific Northwest, research shows nesting peaks in mid-June through August. Cuckoos may go unnoticed because they are slow moving, use few vocalizations, and prefer dense vegetation. In the West, they favor areas with a dense understory of willow (*salix spp*.) combined with mature cottonwoods (*Populus spp*.) and generally within 100 meters of slow or standing water (Gaines 1974; Gaines

1977; Gaines and Laymon 1984). It feeds on insects, mostly caterpillars, but also beetles, fall webworms, cicadas, and fruit (primarily berries).

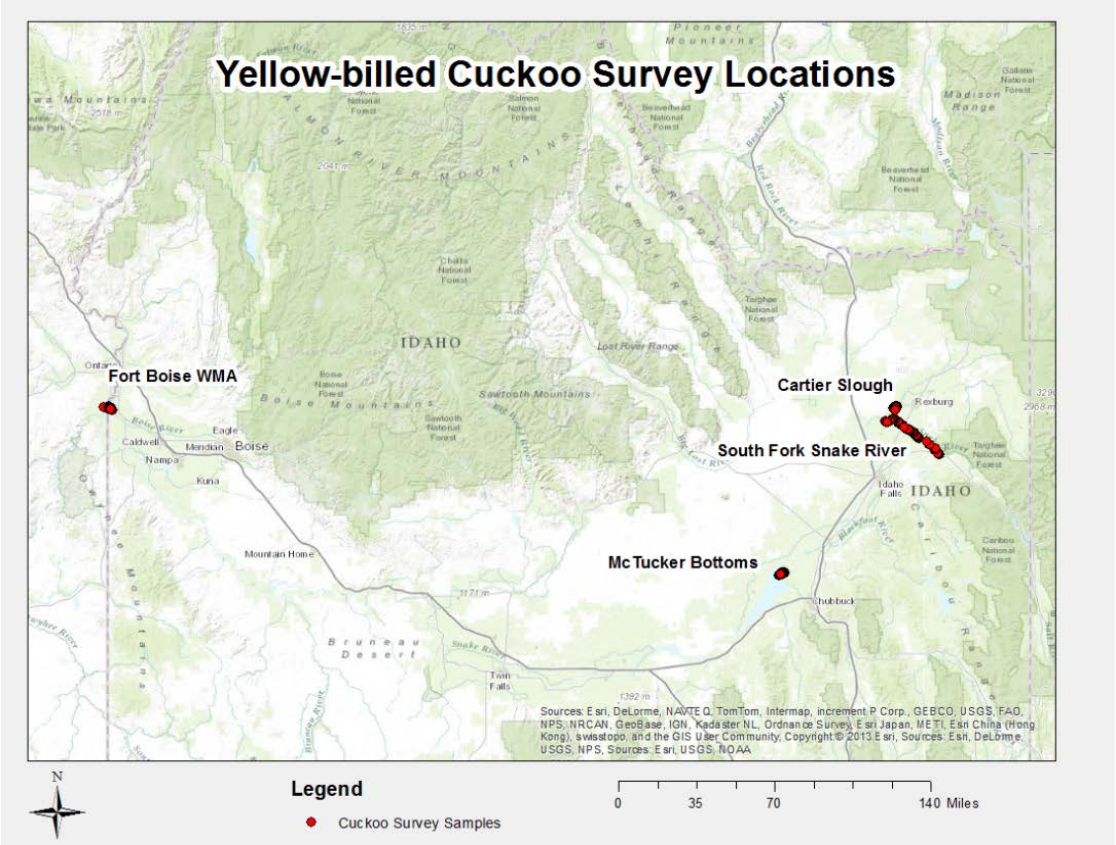

Figure 20. Yellow-billed cuckoo surveys in the Snake River corridor in 2014.

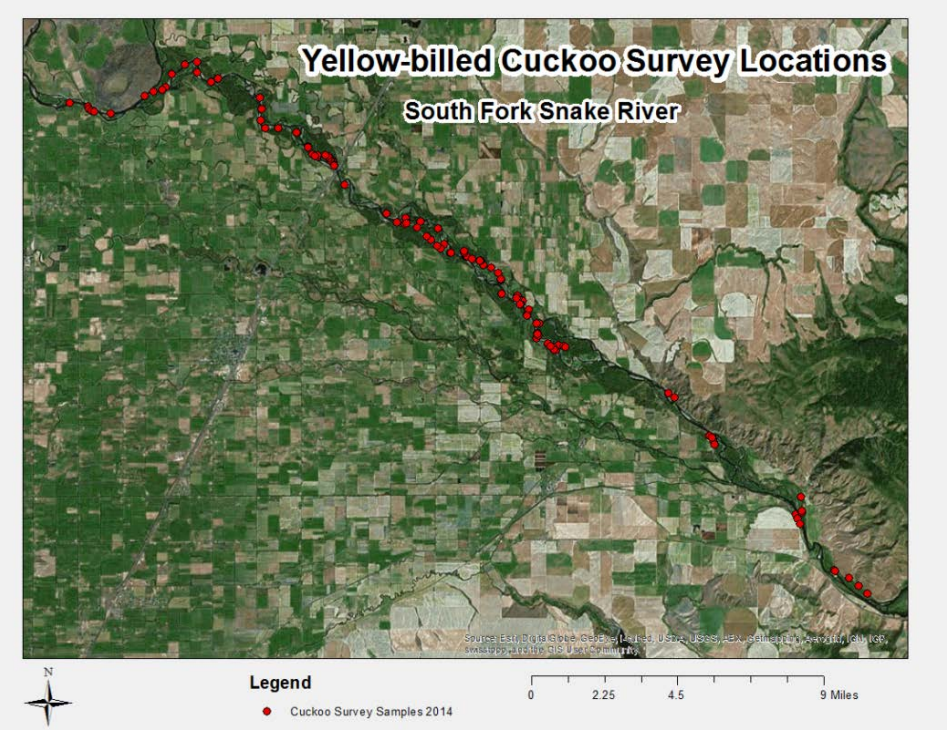

Figure 21. Yellow-billed cuckoo surveys on the South Fork Snake River in 2014.

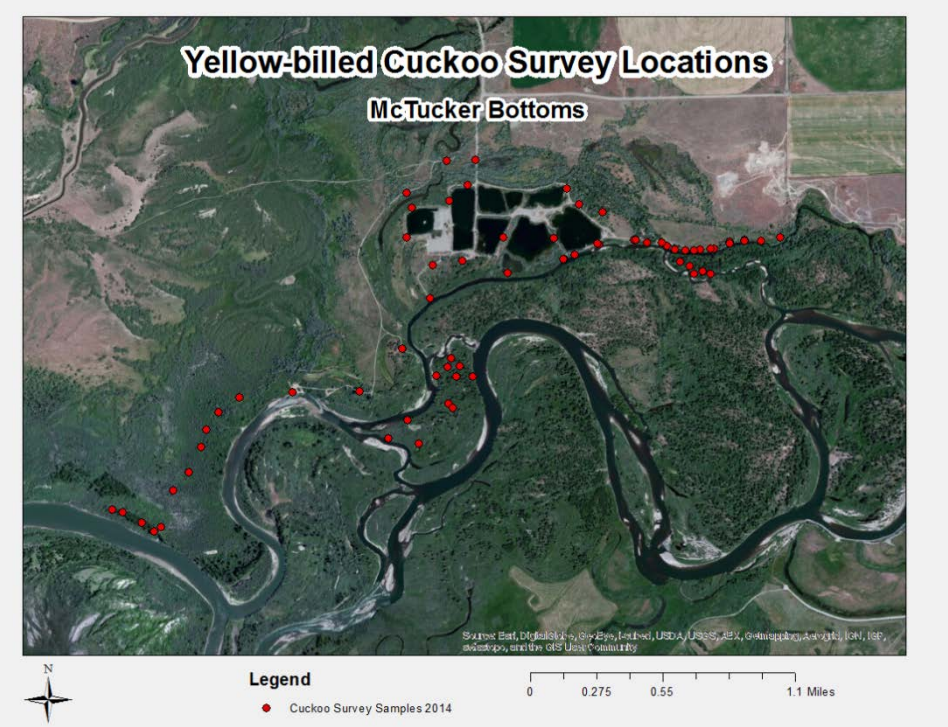

Figure 22. Yellow-billed cuckoo surveys at McTucker Bottoms WMA in 2014.

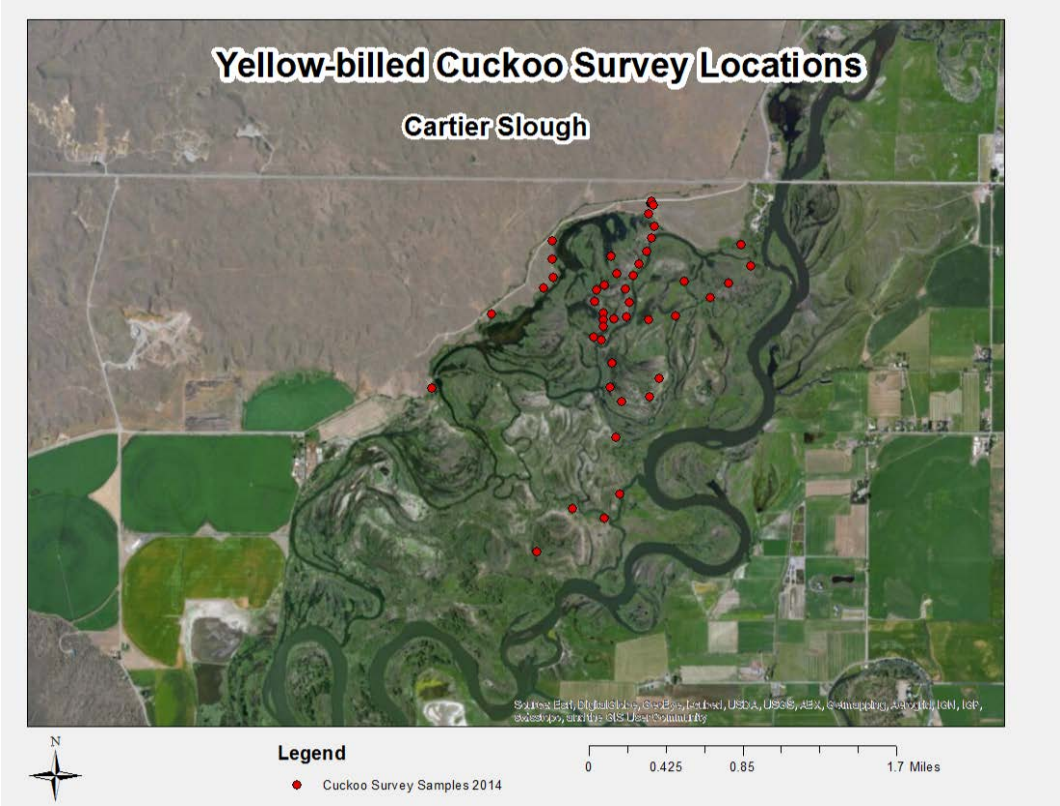

Figure 23. Yellow-billed cuckoo surveys at Cartier Slough WMA along the Henrys Fork River in 2014.

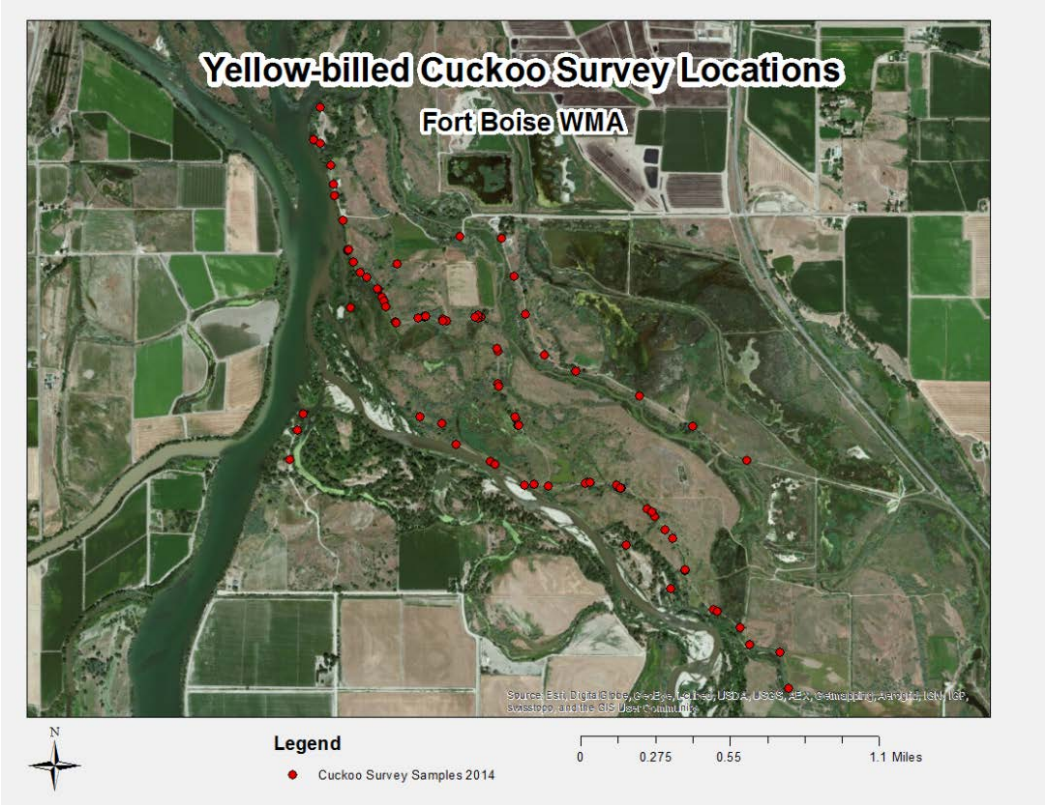

Figure 24. Yellow-billed cuckoo surveys at Fort Boise WMA along the Boise and Snake Rivers in 2014.

In the Pacific Northwest (Washington, Oregon, Idaho), the species is generally considered rare. In Idaho it is only known to occur in the southeastern portion of the state, primarily along the South Fork Snake River. It has been suggested that the number of breeding pairs within the state is as low as 10, while some researchers suggest the species no longer breeds in Idaho, with isolated sightings being attributed to annual migration. Yellow-billed cuckoos are also extremely rare in Washington and Oregon, occurring primarily west of the Cascades Range. The available data suggest that the number of breeding pairs in Oregon are extremely low, with pairs numbering in the single digits, and that the yellow-billed cuckoo have likely been extirpated as a breeder in Washington.

5.2 Survey Area

Reclamation conducted surveys during the summer of 2014 at four areas within the Snake River Corridor in southern Idaho as identified above. The locations were chosen based on potential yellow-billed cuckoo habitat availability as it relates to Reclamation's operations.

5.3 Methods

The surveys followed accepted and standardized sampling protocols detailed in Halterman, Johnson, and Holmes (2013). Two observers were present for each survey for safety and to aid in cuckoo detection. Surveys were conducted monthly from June through August (twice in July) and were initiated 30-minutes prior to sunrise and lasted until 12:00 P.M. Areas of potentially suitable habitat were previously selected using geographical information system (GIS) and knowledge of local habitat conditions. Areas identified as potential habitat contained a multi-layered canopy (grass, shrub, willow, and cottonwood) located within 400 meters of water. Only large (>640 acres) areas of contiguous habitat were surveyed. Researchers wore cryptic clothing and utilized 10x50 high-definition binoculars to aid in cuckoo detections. The following survey sequence was utilized at each site:

- Prior to initiation of each survey period, wind speed, temperature, humidity, ambient noise level, and precipitation (categorized on the data sheet) were recorded using a Kestrel 3500 Weather Meter and observation. Observations were standardized using the scales and descriptions provided by Halterman, Johnson, and Holmes (2013).
- Surveys were initiated by entering the pre-identified habitat area, establishing a broadcast point, and waiting wait one minute while record the time and location.
- Following the one-minute waiting period, five kowlp calls (one broadcast unit) were broadcast using pre-recorded calls on a FoxPro Game Caller unit. Following each broadcast call, researchers listened and carefully observed the surrounding habitat for cuckoos responding to the broadcast.
- If no cuckoo was detected at the broadcast-point, the researchers continued approximately 100 meters (determined using a laser rangefinder) along the transect and initiated a new broadcast-point. While traversing to the next broadcast point, researchers observed surrounding habitat for yellow-billed cuckoo activity.
- When a yellow-billed cuckoo was detected at a broadcast point, the broadcast was terminated and the following information was recorded using information provided in Halterman, Johnson, and Holmes (2013):
    - Time of detection
    - Detection type
    - Compass bearing
    - Estimated distance
    - Accuracy of estimate

  - Vocalizations
  - Behavior/breeding code
  - Additional notes
- Following observations and recording pertinent information regarding the detection, researchers moved 300 meters further along the transect before conducting the next survey broadcast, so as to avoid detecting the same individual yellow-billed cuckoo.

5.4 Results

Reclamation's objective was to determine yellow-billed cuckoo presence and identify potential breeding/nesting activity at select locations in the upper Snake River basin by conducting presence/absence surveys with sampling protocols designed to identify nesting locations to confirm breeding pairs. In total, there were 18 days of sampling effort with a total of 4,191 survey minutes (approximately 70 hours) accounting for 368 samples (Table 12). McTucker Bottoms WMA was the only location to have been visited less than four times, due to technical difficulties.

During Reclamation's investigations, one yellow-billed cuckoo response was reported. The response was documented at Fort Boise WMA on June 16. Subsequent surveys in the same area produced no call back, and thus this occurrence was possibly from a migrant bird not yet on a nesting site. No other call backs were recorded during the rest of the surveys. Additionally, no yellow-billed cuckoo was observed during physical observation during the entire survey period. Although recording one call back was unexpected, it should not be surprising as the last estimate of nesting pairs in Idaho is believed to be no more than 10 to 20 breeding pairs within the Snake River basin in Idaho (Reynolds and Hinckley 2005).

Table 12. Yellow-billed cuckoo data summary for the 2014 field season.

Location	Date	Time Surveyed (min)	Samples	Encounters
South Fork Snake River	6/18/2014	275	18	0
	7/9/2014	240	14	0
	7/10/2014	210	20	0
	7/22/2014	200	22	0
	7/23/2014	241	21	0
	8/4/2014	215	20	0
	8/5/2014	210	12	0
McTucker Bottoms WMA	6/17/2014	295	25	0
	7/8/2014	270	21	0
	8/6/2014	135	22	0
Cartier Slough WMA	6/19/2014	270	17	0
	7/8/2014	210	25	0
	7/24/2014	295	20	0
	8/3/2014	270	20	0
Fort Boise WMA	6/16/2014	285	31	1
	7/11/2014	240	29	0
	7/24/2014	180	13	0
	8/7/2014	150	18	0
Totals:	18 days	4191 (~70 hours)	368	1

6. OTHER ACTIVITIES

6.1 Water Quality

Reclamation participated in several water quality related activities in the upper Snake River basin during 2014. As part of Idaho and Oregon's ongoing TMDL development and implementation activities, Reclamation staff from the Snake River Area Office and Pacific Northwest Regional Office participated in all appropriate watershed advisory groups and watershed council meetings in the upper Snake River basin. These included activities in the North Fork Payette River, Lower Payette River, Middle Snake River, Lake Walcott, and American Falls Reservoir Watershed Advisory Groups, as well as the Malheur Watershed Council.

Reclamation also provided technical assistance to irrigation system operators and other appropriate entities throughout its project areas in the upper Snake River basin. Reclamation's Pacific Northwest Regional Laboratory provided analytical laboratory services to several entities in the basin, including:

- Idaho Department of Environmental Quality (IDEQ)
- Aberdeen Springfield Irrigation District
- Duck Valley Reservation
- Burley Irrigation District
- Lower Boise River Watershed Advisory Group
- A & B Irrigation District
- Minidoka Irrigation District
- Lake Walcott Watershed Advisory Group
- University of Idaho (Kimberly Field Office)
- Oregon Stream Restoration Monitoring
- Warm Springs Irrigation District
- Malheur Soil & Water Conservation District

In addition, Reclamation has developed and implemented a basin-wide temperature monitoring study for the upper Snake River basin. In 2014, Reclamation and USGS maintained a total of 52 stream temperature loggers throughout the basin. The intent of the ongoing study is to describe temperature regimes in the Snake River relative to Reclamation's management activities; this work will continue through 2015. The information from this study was reported in Reclamation's 2012 Annual Report to the NOAA Fisheries Service.

Reclamation also performed routine water sampling across the region. Reclamation monitored nutrients in the drains that return water to Lake Lowell to identify the effects of added nutrients on the water quality in Lake Lowell. In 2014, Reclamation performed routine water quality sampling at Jackson Lake, Island Park, Little Wood, American Falls, Deadwood, Arrowrock, Anderson Ranch, Beulah, Ririe, Palisades, Owyhee, Black Canyon, Thief Valley, Bully Creek, Lake Lowell, Cascade, Unity, Warm Springs, and Walcott reservoirs. This sampling was performed as part of an ongoing regional reservoir sampling regime and invasive species monitoring (zebra/quagga mussels). Similar sampling is scheduled for the 2015 field season. The conditions at American Falls Reservoir did not trigger sediment and nutrient monitoring in 2014. When threshold conditions are met, monitoring is performed to track the effects of low pool elevations on water quality below the reservoir.

7. LITERATURE CITED

Parenthetical Reference	Bibliographic Citation
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Boise Project Board of Control 2015a	Boise Project Board of Control. 2015a. 2014 Annual Report – Article 404 Dissolved Oxygen Monitoring Plan FERC-NO. 4656-020. Boise Project Board of Control. Boise, Idaho.
Boise Project Board of Control 2015b	Boise Project Board of Control. 2015b. 2014 Annual Report – Article 406 Fish Salvage and Recovery Plan FERC-NO. 4656-020. Boise Project Board of Control. Boise, Idaho.
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Parenthetical Reference	Bibliographic Citation
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