RECLAMATION

Managing Water in the West

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

2007 Annual Report

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

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I. Introduction

The Bureau of Reclamation (Reclamation) consulted with the U.S. Fish and Wildlife Service (FWS) on 12 proposed actions involving the effects of future operations and routine maintenance at 12 Federal projects in the upper Snake River basin. The FWS completed a non-jeopardy biological opinion (Opinion) in March 2005 for Reclamation operations and maintenance activities in the Snake River basin above Brownlee Reservoir. The Opinion (FWS 2005) contains a 30-year incidental take statement (ITS) and corresponding reasonable and prudent measures (RPM) that outline nondiscretionary actions to minimize take for Utah valvata (*Valvata utahensis*) and bull trout (*Salvelinus confluentus*).

Section 9 of the Endangered Species Act (ESA) defines take as any action that can harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in such conduct toward a listed species. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be a prohibited taking under the ESA; provided that such taking is in compliance with the terms and conditions of the ITS. The ITS has two main components: a monitoring component to ensure the action agency does not exceed the amount or extent of incidental take described in the ITS, and RPMs to minimize the amount or extent of take (without altering the basic design, location, scope, duration, or timing of the action). The Opinion requires that Reclamation provide an annual report to the FWS reporting incidental take monitoring efforts, and implementation status of all RPMs and terms and conditions.

This document is submitted as Reclamation's annual report for the 2007 operating season (October 1, 2006 to September 30, 2007) and follows the outline established in Reclamation's 2006 Annual Report (Reclamation 2007a).

II. Summary of 2007 Operations

Despite the near average carryover storage conditions, the entire Snake River basin experienced well below normal winter snowpack and subsequent spring runoff in 2007 (Reclamation 2007b). Unregulated runoff for the April through July period was 54% of average for the Snake River at Heise, 56% for the Payette River at Horseshoe Bend, and 47% for the Boise River near Boise. Other tributaries were lower, such as the Owyhee River at 23% of average.

Of the three major reservoir systems, only the Payette system refilled completely in 2007; the Boise and Upper Snake systems did not. Insufficient water was available to Reclamation to provide 487,000 acre-feet, the upper limit of flow augmentation to be provided in any given year. However, 427,000 acre-feet was made available for flow augmentation by taking extraordinary measures in accordance with the terms of the Nez Perce Water Rights Settlement, namely by releasing water stored in powerhead space in Anderson Ranch and Palisades Reservoirs. The 427,000 acre-feet includes 60,000 acre-feet of natural flow rights, a small portion (10,500 acre-feet) of which is considered to occur during the irrigation season but outside of the April 3 to August 31 migration period.

Flow information for 2007 water years (October 1, 2006 to September 30, 2007) can be found at Reclamation's hydromet website (http://www.usbr.gov/pn/hydromet/; Reclamation 2007c). Figures 2-6 and 11-16, presented in Sections III and IV, respectively, depict daily average reservoir elevations, acre-feet contents, storage and outflow for American Falls Reservoir and, Minidoka Reservoir and Figures 11 - 16 depict daily reservoir elevations, acre-feet contents, storage and outflow for Anderson Ranch Reservoir, Arrowrock Reservoir, Deadwood Reservoir, and Beulah Reservoir.

III. Utah Valvata

Summary of the Utah Valvata Incidental Take Statement and 2007 Operations

The FWS determined incidental take at each reservoir and river reach using operational indicators (reservoir elevations and river stage heights for each project) and the population impacts that are expected to result when exceeding these operational thresholds (i.e.: the percent of snails affected based on an estimated amount of benthic habitat that may be exposed at a specific reservoir elevation and/or river stage height). The FWS further determined that all snails exposed in dewatered habitat will be subject to lethal take. These effects, operational indicators, and expected frequency are summarized in Table 1 on page 4. Figure 1 shows the location of Utah valvata in the action areas.

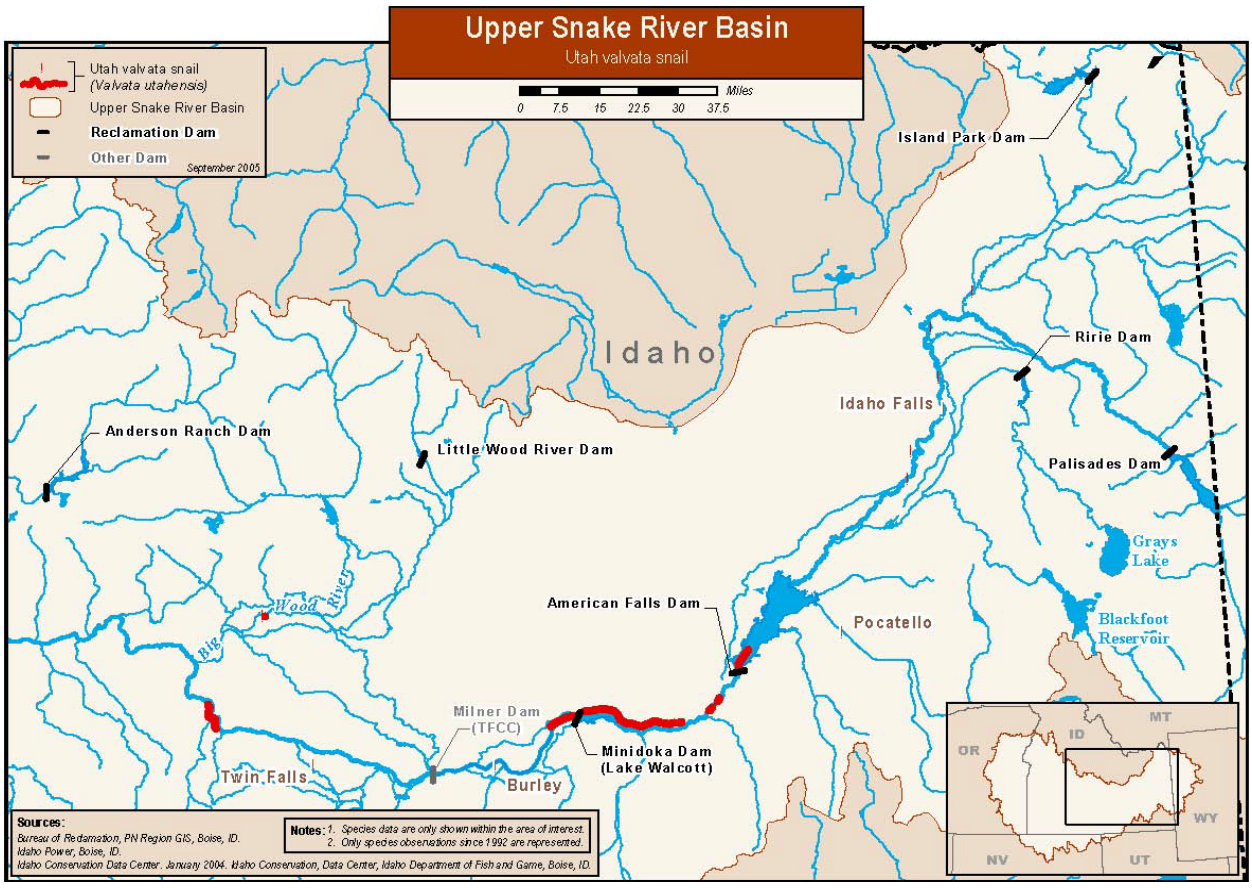

Figure 1. Known distribution of Utah valvata populations associated with Reclamation facilities in the upper Snake River basin.

Table 1. Summary of amount or extent of anticipated take of Utah valvata associated with Reclamation facility operations.

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency	2007 operation (Oct. 2006 to Sept. 2007)	Quick reference: Times threshold was exceeded
American Falls Dam and Reservoir	Up to 85 percent of Utah valvata in the reservoir are affected by stranding and desiccation when the reservoir is drafted to its lowest levels.	Reservoir storage volume falls to 0 percent of capacity (475 acres of wetted habitat), corresponding to a reservoir surface elevation of 4295.6 ft.	Summer and early fall	2 of 30 years	In water year 2007 the lowest reservoir storage volume was 21,812 ac-ft. on Sept 19, 2007(see Figure 2).	0 of 2 years
	Between 40 and 85 percent of Utah valvata in the reservoir are affected by stranding and desiccation when the reservoir is drafted to low levels.	Reservoir storage volume is between 475 and 22,351 AF (surface elevation ranges between 4,295.6 and 4,303.4 feet)	Summer and early fall	2 of 30	In water year 2007 the lowest reservoir storage volume was 21,812 ac-ft (4303.32-4308.39 ft.) btw. Sept. 18 – 21, 2007 (see Figure 3).	1 of 2 years 2007: 4 days
	Between 5 and 40 percent of Utah valvata in the reservoir are affected by stranding and desiccation when the reservoir is drafted as part of normal operations.	Water stored in and released from American Falls Reservoir.	Year-round	30 of 30	Figure 2 depicts American Falls content in acre feet for water year 2007. Storage began in early Oct and continued thru April and then releases began.	2 of 30 years 2006 – all year 2007 – all year
Neely Reach	Up to 54 percent of Utah valvata in the Snake River, Neeley reach, are affected by stranding and desiccation when river flows are at their lowest levels.	Minimum winter flows at the Snake River at Neeley gage reach 350 cfs.	Winter	9 of 30 years	In water year 2007 flows at Neeley Reach were less than 350 cfs from Nov. 16 to Dec. 6. (Figure 4).	2 of 9 years 2006: 13 days 2007: 21 days

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency	2007 operation (Oct. 2006 to Sept. 2007)	Quick reference: Times threshold was exceeded
Minidoka Dam and Lake Walcott	Up to 0.5 percent of Utah valvata in the lake are affected by exposure and desiccation when the lake is drafted annually.	Lake Walcott is drafted to a level, not to exceed, 1.5 vertical meters below full pool. Full pool is 4245 feet; 1.5 meters below full pool is 4240.08 feet)	Summer and early fall	28 of 30 years	The reservoir was at its lowest elevation of 4239.47 (1.7 vertical meters below full pool) on March 7, 2007 (Figure 5).	2 of 28 years
	Up to 10.5 percent of Utah valvata in the lake are affected by exposure and desiccation when the lake is drafted beyond typical operations.	Lake Walcott is drafted to a level 2.1 vertical meters below full pool. Full pool is 4245 feet; 2.1 meters below full pool is 4238.11 feet)	Summer and early fall	2 of 30	The reservoir was at its lowest elevation of 4239.47 (1.7 vertical meters below full pool) on March 7, 2007 (Figure 5).	0 of 2 years
	Any Utah valvata present in the Snake River, Minidoka reach, above the area submerged by the minimum flow of 400 cfs are affected by stranding and desiccation.	Minimum flows at the Snake River near Minidoka Dam gage falls to 400 cfs.	Winter	30 of 30 years	During the winter Reclamation's operation were consistently around 500 cfs with the lowest recorded flow of 485 cfs on Oct. 29 and Nov. 03, 2006 (see Figure 6).	2 of 30 years 2006: all winter 2007: all winter
	Any Utah valvata in the spillway are affected by stranding and desiccation.	Flows through the spillway are shut off.	Late fall and winter	30 of 30 years (exceeded one additional year since 2006)	Spillway shutoff period was approximately Sep 15, 2006 – Apr 23, 2007. During the winter seepage was observed consistently at 50 – 70 cfs.	2 of 30 years 2006:fall/winter 2007:fall/winter

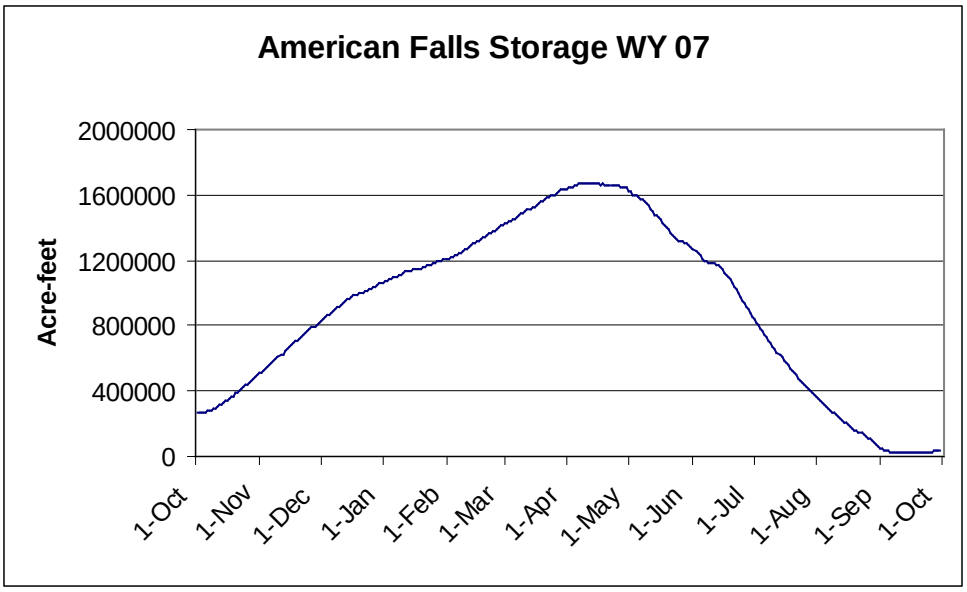

Figure 2. American Falls Dam reservoir storage volumes (acre-feet) for the 2007 water year (WY 07).

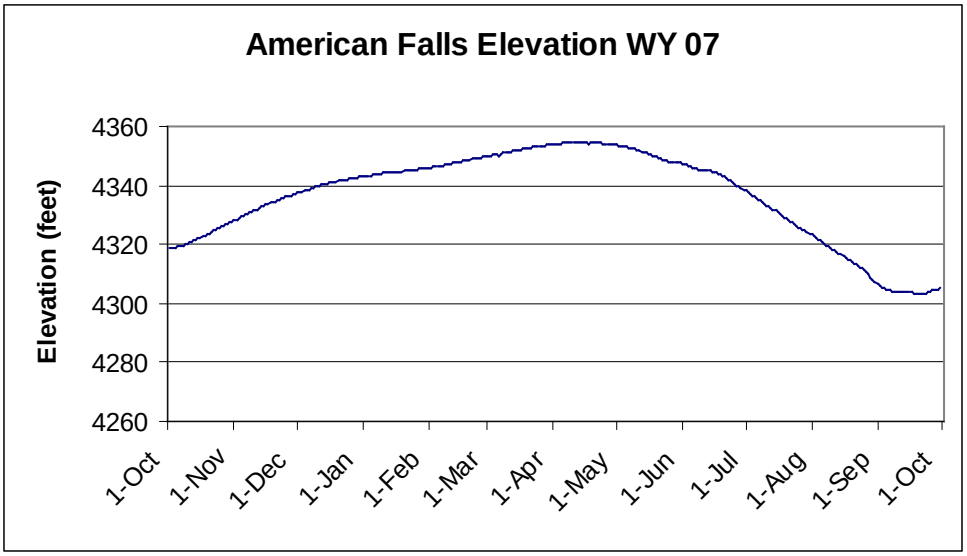

Figure 3. Reservoir elevations at American Falls Dam for the 2007 water year (WY07).

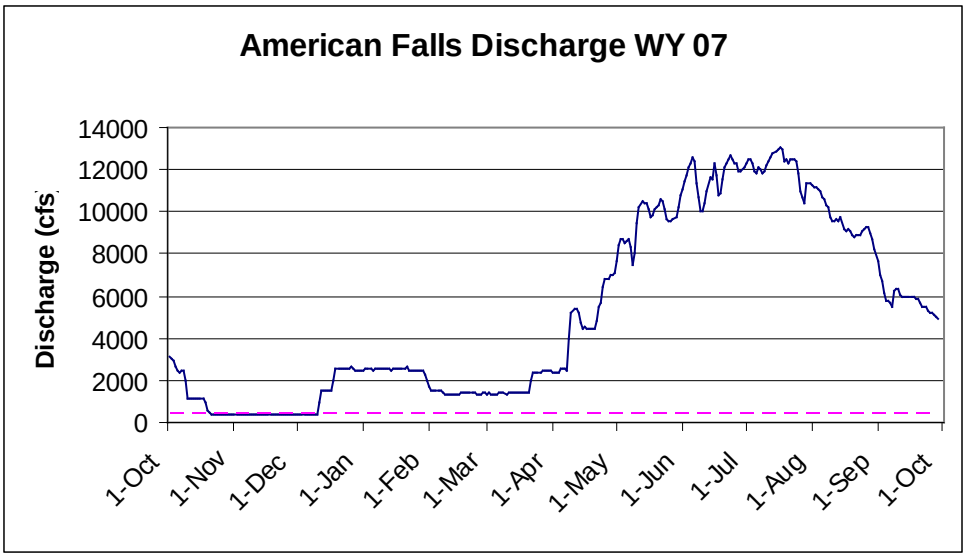

Figure 4. Discharge from American Falls Reservoir for the 2007 water year (WY 07). The bottom dotted line represents Reclamation's operational threshold discharge flow of 350 cubic feet per second (cfs).

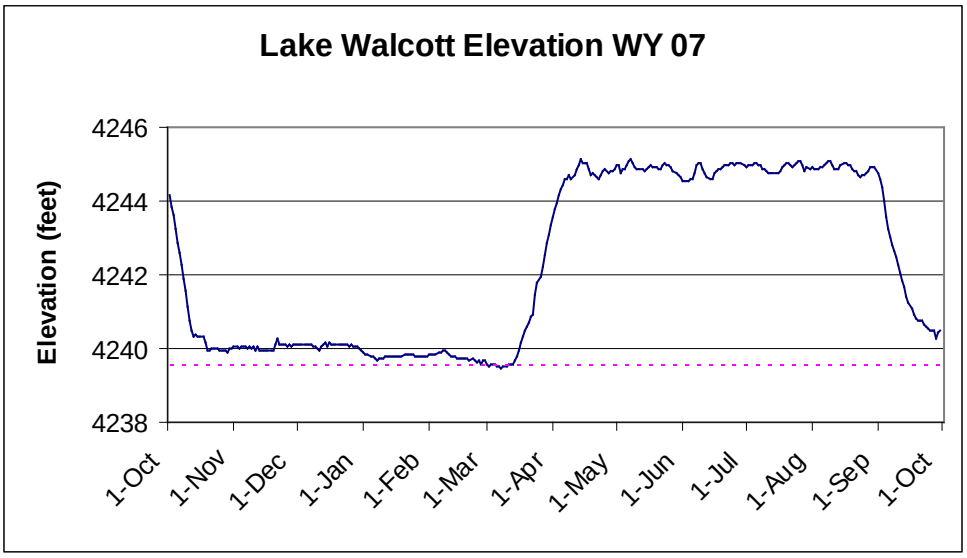

Figure 5. Reservoir elevation at Lake Walcott for the 2007 water year (WY 07). The bottom dotted line represents Reclamation's over-winter threshold elevation of 4239.5 feet.

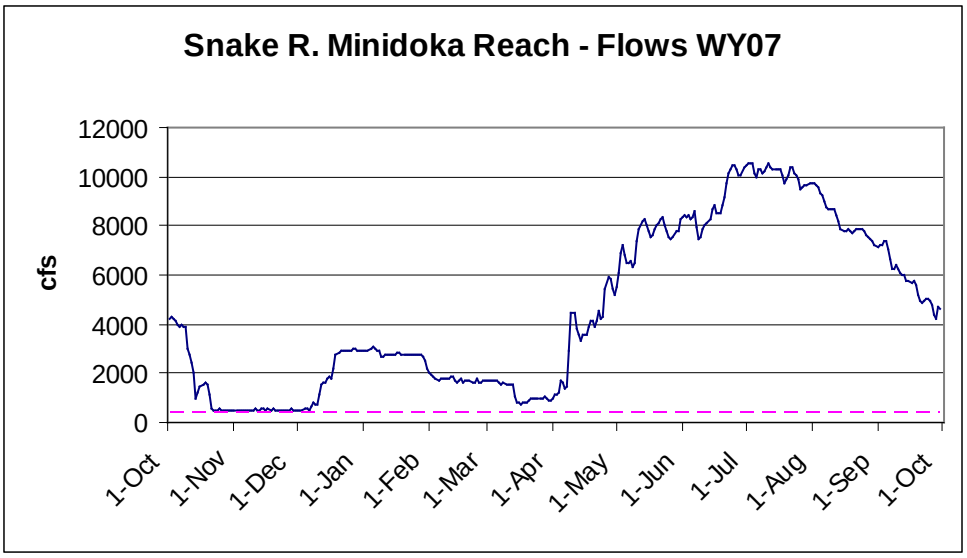

Figure 6. Snake River Minidoka reach river flows cubic feet per second (cfs) for the 2007 water year (WY07). The bottom dotted line represents Reclamation's operational threshold discharge flow of 400 cfs.

Monitoring for Utah Valvata

Sample Locations

Five monitoring sites were selected at locations where Utah valvata snails were detected during previous distribution surveys. All monitoring sites are located in regulated river reaches or reservoirs. The five sites, listed from downstream to upstream, are as follows: lower Lake Walcott, upper Lake Walcott (Coldwater Area), Snake River at Vista (Neely reach), American Falls reservoir, and Upper Snake River near Idaho Falls. Beginning in 2006, Reclamation discontinued annual monitoring surveys for each site and initiated monitoring surveys on an alternate year schedule. Utah valvata monitoring surveys occurred at lower and upper Lake Walcott and the Neely reach of the Snake River in the summer and fall of 2006 (even year survey schedule) and will occur at American Falls Reservoir and the upper Snake River in the summer and fall of odd years (beginning 2007). The upper Snake River site is characterized by a free-flowing riverine channel with bedrock, boulder, gravel, and fine sediments. Adjacent backwater and oxbow habitat and large woody-debris is common in this reach. The American Falls Reservoir site has deeper (>10 m depth) habitat where the river channel was originally located. The reservoir has a broader, uniform bottom characterized by fine sediments.

In 2007 Reclamation initiated a presence/absence survey protocol for the Utah valvata monitoring surveys. Fore and Clark (2005) compared the statistical power of two alternative sampling designs to detect changes in threatened and endangered snail species populations in the Mid-Snake River in south central Idaho. Their specific research goal was to determine which sampling approach would have the best chance of detecting a change associated with different hydroelectric project management scenarios. Fore and

Clark (2005) summarized the data as 1) the average number of snails collected across quadrats (density/m^2) and 2) the proportion of quadrats that had snails present. They calculated the minimum detectable difference that each measure could detect with a two-sample *t* test. The density measure was highly variable and even a complete loss of snails failed to represent a statistically significant change for most sites. Despite alterations (i.e., log-transformed data, increased replicates, and larger quadrats), statistical power to detect change remained low.

However, Fore and Clark (2005) found proportion measures were much more precise and could detect a 34% reduction in the proportion of quadrats with snails present. As the number of quadrats was increased, the smaller the change that could be detected (ex., 50 quadrats = 18% change). In addition to being a more sensitive indicator, the proportion measure is quicker to observe for each sample which means that a larger area can be surveyed during the same amount of time.

Using GIS, Reclamation created a 100-meter grid layer over the lower half of American Falls Reservoir and assigned a random numeric value to each quadrat. A random number generator was then utilized to randomly select 50 numeric values. The corresponding quadrats were selected as potential sample locations. Using GPS, Reclamation personnel navigated to each quadrat and collected a sample from within the 100-meter square. Samples were collected in 30 of the 50 quadrats due to time constraints.

In the upper Snake River Reclamation personnel moved upstream collecting samples in potential Utah valvata habitat. No random or stratified sampling techniques were utilized. Utah valvata habitat was simply identified and surveyed.

Snail Collection

Plots were sampled with a Venturi suction dredge operated by a SCUBA diver. A 0.25 m^2 plot was excavated approximately 2.5 cm deep by the vacuum dredge. The sample was transported through flexible tubing, and collected in a 1000 μm sieve. No dewatered sites were sampled. Samples were immediately searched for live Utah valvata. When the first live Utah valvata was encountered, the presence of Utah valvata was noted for that plot and the sample was returned to the collection point. We assumed that all live Utah valvata encountered with broken shells were the result of our sampling.

Habitat Measurements

Water depth, temperature, and dissolved oxygen were measured with a Yellow Springs Instruments water quality meter. Macrophyte presence was recorded for all plots. Dominant substrate types were visually determined and recorded.

Monitoring Surveys

In June, 2007 surveys were conducted in American Falls Reservoir (Figure 7) and the upper Snake River (Figures 8 and 9). Specific site names for the upper Snake River are as follows: Sunnyside Park in Idaho Falls, Idaho; Roberts-Deer Park near Roberts, Idaho; and the confluence of the Henry's Fork and South Fork of the Snake River. A

total of 30 and 32 samples were collected, respectively, in American Falls Reservoir and the Upper Snake River in June. Percent occurrence of live Utah valvata was 30% for American Falls Reservoir, 0% for Sunnyside Park, 20% for Roberts-Deer Park, and 80% for the confluence. (Table 2)

Table 2. Total number of sites surveyed and the respective percent occurrence at each monitoring location during the summer and fall of 2007.

	June			August		
Study Site	**# Sites**	**# Sites -w- UV**	**% Occurrence**	**# Sites**	**# Sites -w- UV**	**% Occurrence**
American Falls	30	9	30.0%	0	0	na
Sunny Side Park	12	0	0.0%	20	10	50.0%
Roberts-Deer Park	10	2	20.0%	26	17	65.4%
Confluence	10	8	80.0%	10	5	50.0%

No samples were collected from American Falls Reservoir in August due to rapidly decreasing water levels. Reclamation personnel were unable to launch the boat and were therefore unable to collect samples. A total of 56 samples were collected in the upper Snake River. Percent occurrence of live Utah valvata was 50% for Sunnyside Park, 65.4% for Roberts-Deer Park, and 50% for the confluence. (Table 2) Sampling was conducted above Sunnyside Bridge in June and below Sunnyside Bridge in August. No Utah valvata snail mortality was encountered while sorting samples.

As has been encountered in previous years, Utah valvata habitat was characterized as dominated with fines. Although Utah valvata were encountered in sand, small gravel, medium gravel, and some cobbles, the substrate types still consisted of fines occupying the interstitial space associated with the small and medium gravel with intermittent cobble. The Utah valvata appear to occupy this space where velocities are near zero and fines are deposited. No Utah valvata were found in sand-only substrates. All plots containing live Utah valvata contained silt. Although Utah valvata were occasionally encountered in sites with macrophytes present, the snails do not appear to be dependent upon the macrophytes. Utah valvata and macrophytes are each associated with fines and subsequent low water velocities, with little to no dependence on each other.

Utah valvata readily occupy a wide range of dissolved oxygen concentrations and water temperatures. The species only habitat requirement appears to be any amount of silt, whether it be small silt deposits associated with the interstitial space located within gravel and cobble substrates to vast expanses of silt depositional zones associated with reservoir

pools. Water quality data collected in 2007 was consistent with previous years measurements. The water quality data summary for the 2007 field season is listed in Table 3.

In the upper Snake River, Utah valvata appear to occupy nearly all available habitat. Our sampling protocol consisted of locating suitable Utah valvata habitat and subsequently collecting a sample. At nearly every patch of suitable habitat, live Utah valvata were encountered. The one exception to this is the portion of the Sunnyside pool located above Sunnyside Bridge in Idaho Falls, ID. No live Utah valvata, or Utah valvata shells were encountered in this area, despite the presence of large amounts of suitable habitat. This is likely due to the very high density of Pisidium sp. located at his site (>15,000/m^2 in every sample). Pisidium sp. likely competes directly with Utah valvata and does not allow successful colonization.

Although density data was not collected for each sample, counts were conducted on selected plots due to the high density of adult Utah valavata observed. Several plots collected in the Upper Snake River in June and August had densities of adult Utah valvata >1000/m^2.

Table 3. Table displaying summary water quality data for 2007 field season.

	June					
	Mean			Range		
Site	Temp (^{o}C)	DO (ppm)	Depth (ft)	Temp (^{o}C)	DO (ppm)	Depth (ft)
American Falls R.	16.68	7.28	33.61	18 - 19.9	6.8 - 9.5	9.0 - 50
Sunnyside Park	15.09	9.96	16.58	15 - 15.2	9.6 - 10.4	10.0 - 25
Roberts-Deer Park	15.17	11.70	5.00	14.6 - 15.8	11.3 - 12.4	2.0 - 19
Confluence	18.17	9.30	4.01	17.3 - 19.1	8.2 - 10.7	2.0 - 9.0
	August					
	Mean			Range		
Site	Temp (^{o}C)	DO (ppm)	Depth (ft)	Temp (^{o}C)	DO (ppm)	Depth (ft)
American Falls R.	na	na	na	na	na	na
Sunnyside Park	19.63	8.46	15.99	19.4 - 20.2	8.0 - 9.0	5.0 - 25
Roberts-Deer Park	19.13	8.37	6.12	17.2 - 20.3	7.0 - 10.8	1.0 - 13

2007 USBR
American Falls *Utah valvata* Monitoring

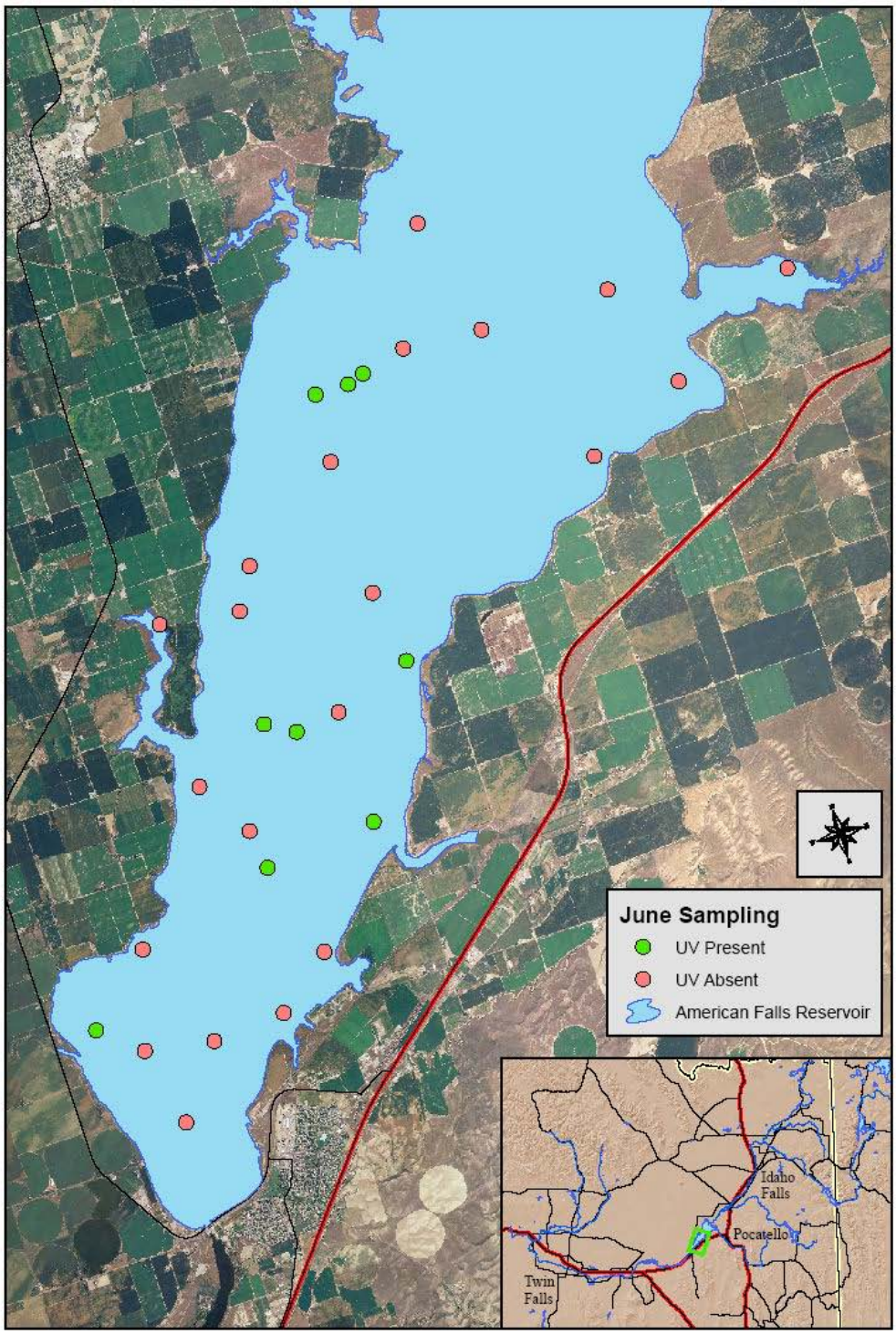

Figure 7. Map showing random survey locations on American Falls Reservoir for the June, 2007 Utah valvata annual monitoring activities.

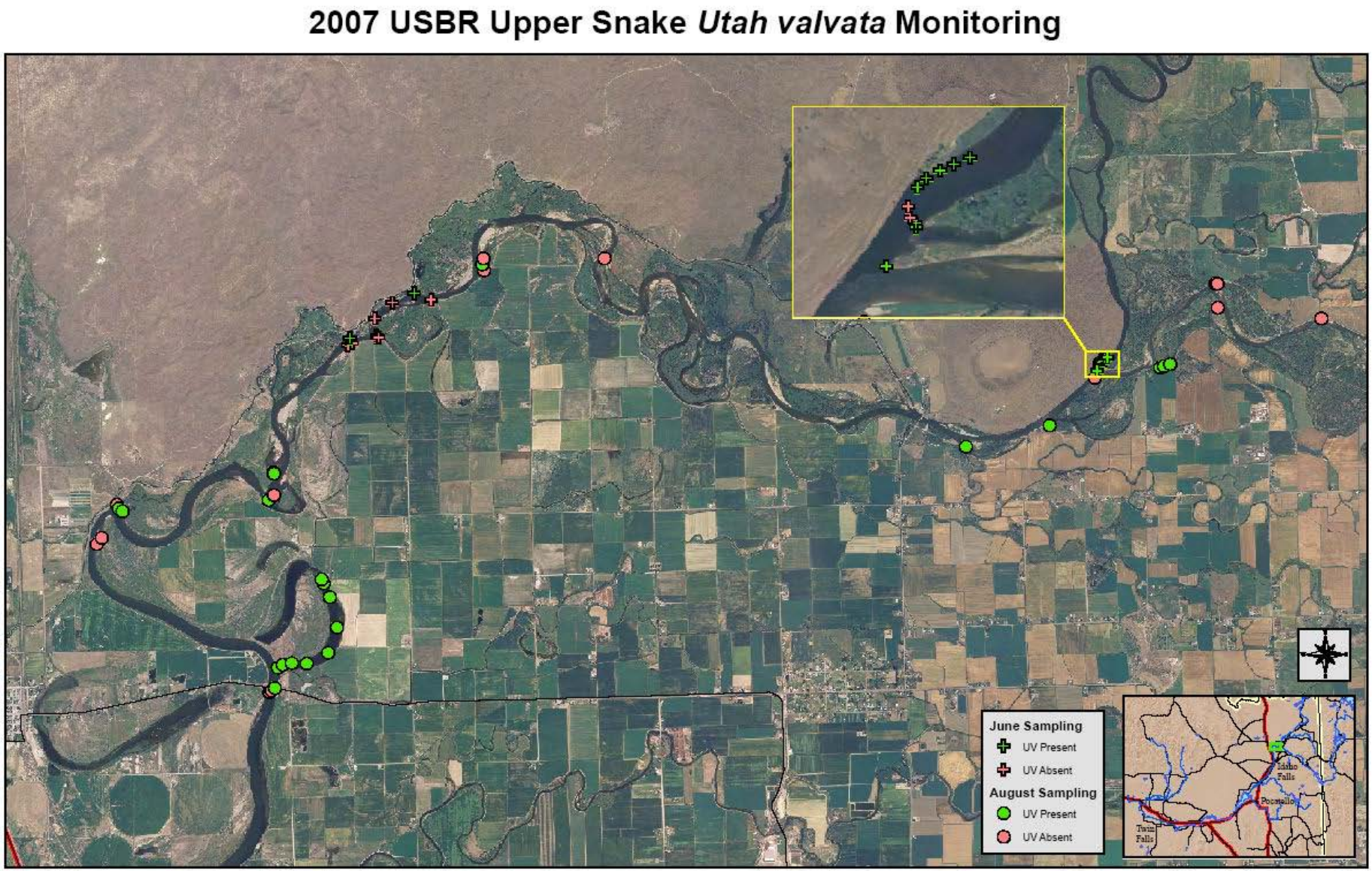

Figure 8. Map showing survey locations on the upper Snake River near Roberts, Idaho for the June and August, 2007 annual Utah valvata monitoring activities.

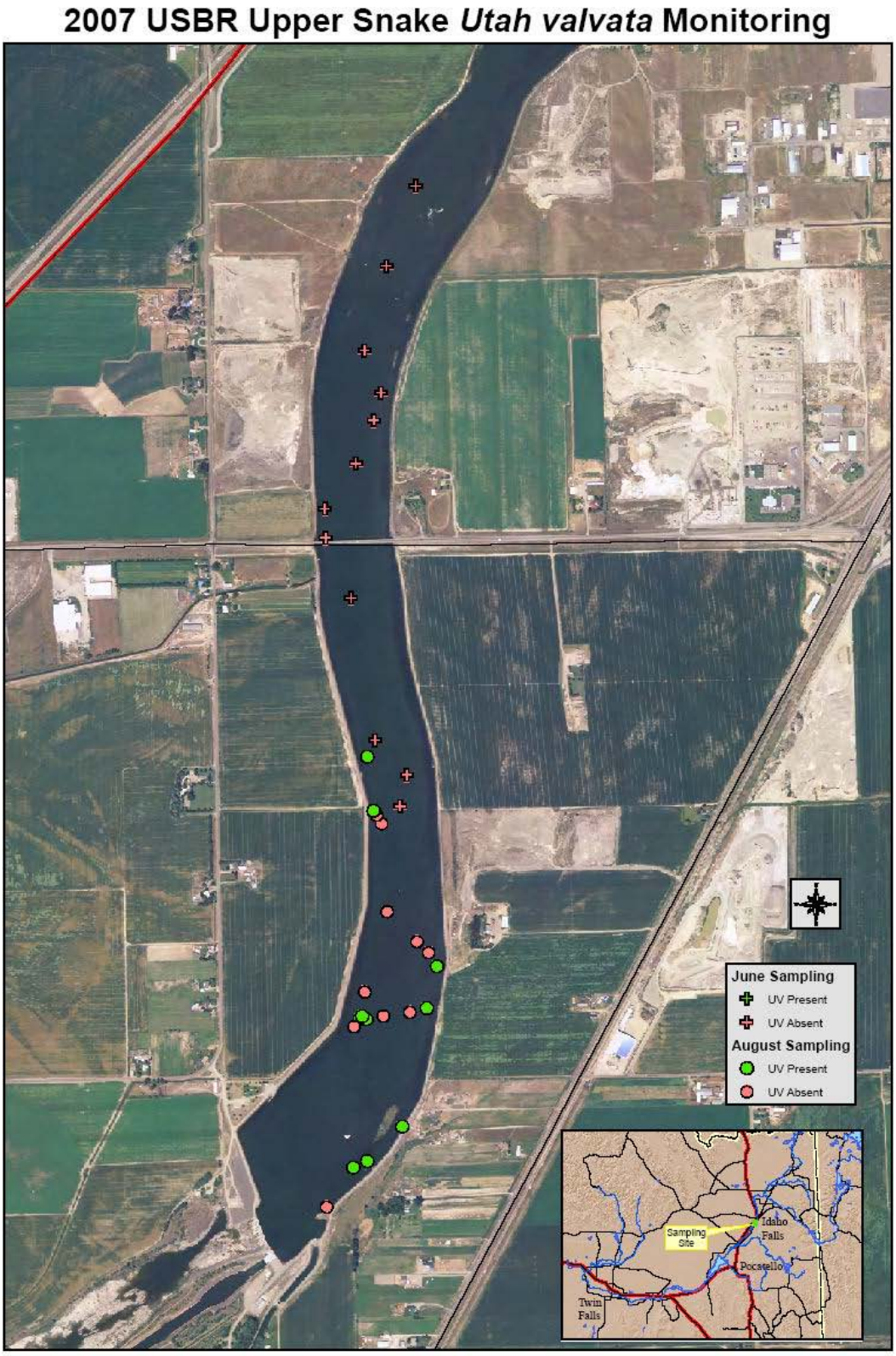

Figure 9. Map showing survey locations on the upper Snake River (Sunnyside Park) near Idaho Falls, Idaho for the June and August, 2007 annual Utah valvata monitoring activities.

Implementation of the Reasonable and Prudent Measures and Associated Terms and Conditions

The FWS identified one RPM and two T&Cs for American Falls Dam and downstream reaches to reduce the take associated with the operation of the project. The RPM states that Reclamation shall implement measures to minimize the amount and the effect of take of Utah valvata from stranding, exposure, and desiccation within American Falls Reservoir and downstream reaches associated with operation of American Falls Dam and Reservoir.

T&C 1.a: Within the range of operations defined in the proposed action, minimize the frequency, extent, and duration of drawdown of American Falls Reservoir to levels below 50,000 acre-feet for the period of the proposed action.

> Activities: Reclamation will use available storage from upstream reservoirs to increase or maintain inflow to American Falls Reservoir and will use water from Lake Walcott earlier to meet downstream irrigation needs when American Falls Reservoir drops below 100,000 acre-feet.
>
> Duration: Throughout the duration of the Biological Opinion.
>
> Evaluation: Reclamation will provide FWS with reservoir elevation data resulting from operations and a description of operational actions taken, if needed, to minimize drawdown below 50,000 acre-feet in each annual report.

T&C 1.b: When Reclamation drafts American Falls Reservoir to less than 50,000 acre-feet, Reclamation shall report to the Service when the operations occurred, the duration, and the conditions leading to such operation.

> Activities: Reclamation will report to FWS when American Falls Reservoir drops below 50,000 acre-feet.
>
> Duration: Throughout the duration of the Biological Opinion.
>
> Evaluation: In the event that American Falls Reservoir is drafted to below 50,000 acre-feet, Reclamation will provide a written explanation in its annual report.

American Falls Dam and Reservoir

Initial reservoir content for American Falls Reservoir in water year (WY) 2007 was 267,000 acre-feet on October 1, 2006 (Figure 2). This reservoir carry over content resulted from a near average water supply, near-normal irrigation demands, and fulfillment of Reclamation's downstream flow augmentation obligations under the NOAA Fisheries Biological Opinion and the Nez Perce Settlement for WY 2006.

Since the Palisades Project came on line, 50 years ago, the upper Snake River reservoir system has been operated to hold storage in upstream reservoirs to enhance the subsequent year's storage and to increase winter stream flow in the river reaches above American Falls. Delivery of water below Milner for flow augmentation reduced American Falls reservoir content disproportionate to the system totals and contributed to levels lower than average in American Falls Reservoir at the end of the irrigation season.

Discharge below American Falls Dam was decreased to the 350 cfs operating threshold shortly after the irrigation season ended in October 2007 (Figure 4). Discharge was reduced to facilitate the utilization of storage water in Lake Walcott and Milner Lake at the end of the irrigation seasons. Reduction in flow from American Falls allowed Lake Walcott to reach the winter operating storage elevation level with out wasting water and at the same time allowed storage water in Milner Lake to be evacuated for an annual dam inspection. This type of coordinated operating procedure is typical, however, wet and rainy conditions in the fall of 2006 led to a need for greater decreases in discharge from American Falls Reservoir to achieve target reservoir elevations for this annual operation.

Fall precipitation, in the form of rain was above average but overall snow accumulation at the higher elevations was below average. With good carryover storage in the upstream reservoirs, discharge from the upper reservoirs was higher than in recent years; this resulted in an increase of in-flow to American Falls Reservoir. Therefore, outflow was increased to approximately 2500 cfs. As a result, the opportunity for hydropower production by Reclamation and Idaho Power Company was increased and the potential for erosion of the American Falls shoreline caused by winter storms was reduced or minimized. Snow accumulation in the Snake River watershed was well below average by mid-December but near average by January 10. Dry weather persisted for the remainder of January.

In response to the dry weather conditions and forecasts, discharge from American Falls Reservoir was ramped down to 1400 cfs at the end of January. February precipitation was near normal, then, drought prevailed for the remainder of 2007. March temperatures were warm throughout the basin. Normally, irrigation begins at the lower elevations about April 1 and proceeds up the valley until irrigators near Ashton, on the Henrys Fork and in Swan Valley, near Palisades Dam typically begin diverting during the last weeks of May. However in 2007 conditions were warm and dry which resulted in irrigation withdrawal from the upper basin starting about a month earlier than average. This resulted in a longer irrigation season. The longer irrigation season, compounded with low natural stream flow led to a high demand on stored water throughout the basin. The 1400 cfs discharge below American Falls Dam continued until March 20, when flows were increased to fill Lake Walcott in order to meet irrigation demand.

American Falls Reservoir filled on April 8 and remained full for only 3 days. Unregulated flows of the Snake River measured at Heise reached a peak on May 14, about two weeks earlier than average. At that time Palisades Reservoir held almost 1.1million acre-feet of storage, 500 thousand acre-feet more than the average of the previous five years. With that much storage in Palisades and with Jackson Lake full by May 22, it was not anticipated that American Falls and Palisades would not be able to fulfill the demand. Reclamation's original operating plan was to deliver 200,000 acre feet from Jackson Lake to meet anticipated water demands for the irrigation season. Jackson Lake discharge was projected to ramp down from 2000 cfs on July 1 to about 1800 cfs on September 30.

March through July precipitation was extremely low. NRCS reported that precipitation accumulated at SnoTel sites in the upper Snake River set record lows and was in the lowest five percentile among the years of record. The resulting low inflow and coincident dry soils caused high demand for stored water. In July 2007 American Falls seemed to be on track for meeting demand, storage was higher than the same time in 2002, 2003 and 2004. However, in previous years drafts had slowed by the last week of August, but in 2007 drafts continued at much higher levels. The other recent years are not comparable because rain in May of 2005 reduced demand and normal winter snow accumulation increased supply in 2006.

A reduced draft in late August and early September in prior years was an artifact of maturing crops, depleted storage accounts, and the desire to preserve some water for the subsequent year. In 2007, an unexpected demand for water stored at Reclamation facilities continued despite the groundwater mitigation procedures designed to balance the demands of surface and groundwater. The mitigation rule is that if an organization has storage remaining at the end of the year, that organization is not entitled mitigation. This rule reduced the incentive for any organization to preserve carry over supplies for following year and increased the incentive to deplete their supplies so they would qualify for mitigation water. In addition a shift in crop types designed to supply food to meet the growth of the dairy industry, may also be contributing to late season demands, also.

As previously stated, it was believed that American Falls and Palisades storage could support demand with only 200,000 acre-feet delivered from Jackson Lake based on May forecasts. In early July, flows from American Falls were increased, reaching 4,500 cfs, by mid-August and held at that level for almost 6 weeks to the end of September. Based on earlier forecasts, flows less than 2,000 cfs had been originally projected. Jackson Lake drafted 550,000 acre-feet by the end of irrigation season, when 200,000 acre-feet had been projected based on the earlier forecasts.

Reclamation also moved water from Palisades Reservoir, Island Park Reservoir and Ririe Reservoir to American Falls reservoir to reduce the duration of low content in American Falls. Palisades Reservoir reached 5% of capacity on August 24. American Falls was at 7.5% of capacity (125,000 acre-feet) on August 24.

The physical constraints of the system limited Reclamation ability to move the water faster from the upper reservoirs. In addition to moving water from the upper reservoirs Reclamation also began using Lake Walcott water earlier than normal to help meet demands and reduce the rate of drawdown on American Falls Reservoir.

Despite Reclamations efforts to keep American Falls reservoir above 50,000 acre feet as identified in Term and Condition 1a of the Opinion, late season water demands resulted in American Falls content falling below 100,0000 acre feet on August 27, and eventually reaching 50,000 acre feet on August 31. American Falls Reservoir continued to be depleted at unusually high rates to mid September, reaching its lowest remaining storage content of 21,800 acre-feet on September 19, 2007.

Reclamation contacted FWS staff via email shortly before August 31 to notify them of the possibility of American Falls content going below 50,000 acre feet. Reclamation staff discussed options with FWS staff related to the low reservoir volumes and the alternative of lowering Lake Walcott below its normal operating range of 5 feet to mitigate impacts to American Falls Reservoir. American Falls reservoir is the largest Reservoir in the system and Lake Walcott is significantly smaller therefore the ability to preserve reservoir content in American Falls was limited. Additionally the Utah valvata population in Lake Walcott is fairly stable and further reductions on Lake Walcott would impact that particular population. As a result, it was concluded that Reclamation would stay within normal operating ranges in Lake Walcott.

Once demand dropped off at the end of the irrigation season American Falls Reservoir was allowed to refill reaching 50,000 acre feet by October 10.

Minidoka Dam and Lake Walcott

At the beginning of the 2007 water year, Lake Walcott had already been drafted one foot below the normal, summer, elevation of 4245.0 feet (Figure 5). The draft continued until it fell within the winter operating range of 4239.5 to 4240.0 feet on October 19, 2006. The winter low occurred on March 7, 2007. March 7 and 8 were very windy at Minidoka and the last observation on March 7 was among the lowest of the 15 minute, observations for that day. Lake Walcott was refilled, in part, by reducing downstream discharges on March 13, and by releasing water from American Falls starting March 20. The reservoir reached its summer level on April 12.

Discharge below Minidoka Dam (Figure 6) followed American Falls discharge plus reach gains from the end of the irrigation season, until March 13, after Lake Walcott's ice cover was substantially melted and discharge was decreased to help fill Lake Walcott. Flows were maintained to meet downstream irrigation demand, Idaho Power Company's flow requirements below Milner and Reclamation's augmentation flows through the summer.

Lake Walcott was drafted early in 2007, beginning on August 30, to slow the rate of draft on American Falls while meeting downstream demands. Four of the five foot change from summer to winter operating levels occurred in the first 2 weeks of September. The Lake dropped another one half foot by the end of the water year to reach 4240.43 on September 30.

IV. Bull Trout

Summary of the Salvelinus Confluentus Incidental Take Statement and 2007 Operations

Bull trout are present in four of Reclamation's facilities in the upper Snake River basin (Figure 10). Summary of the Bull Trout Incidental Take Statement including monitoring efforts and RPMs during the 2007 water year are described in this section. The FWS 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. The FWS then described the amount or extent of incidental take at each facility based on operational thresholds (FWS 2005). Table 4, summarizes the effects, the operational thresholds and their expected frequency and timing.

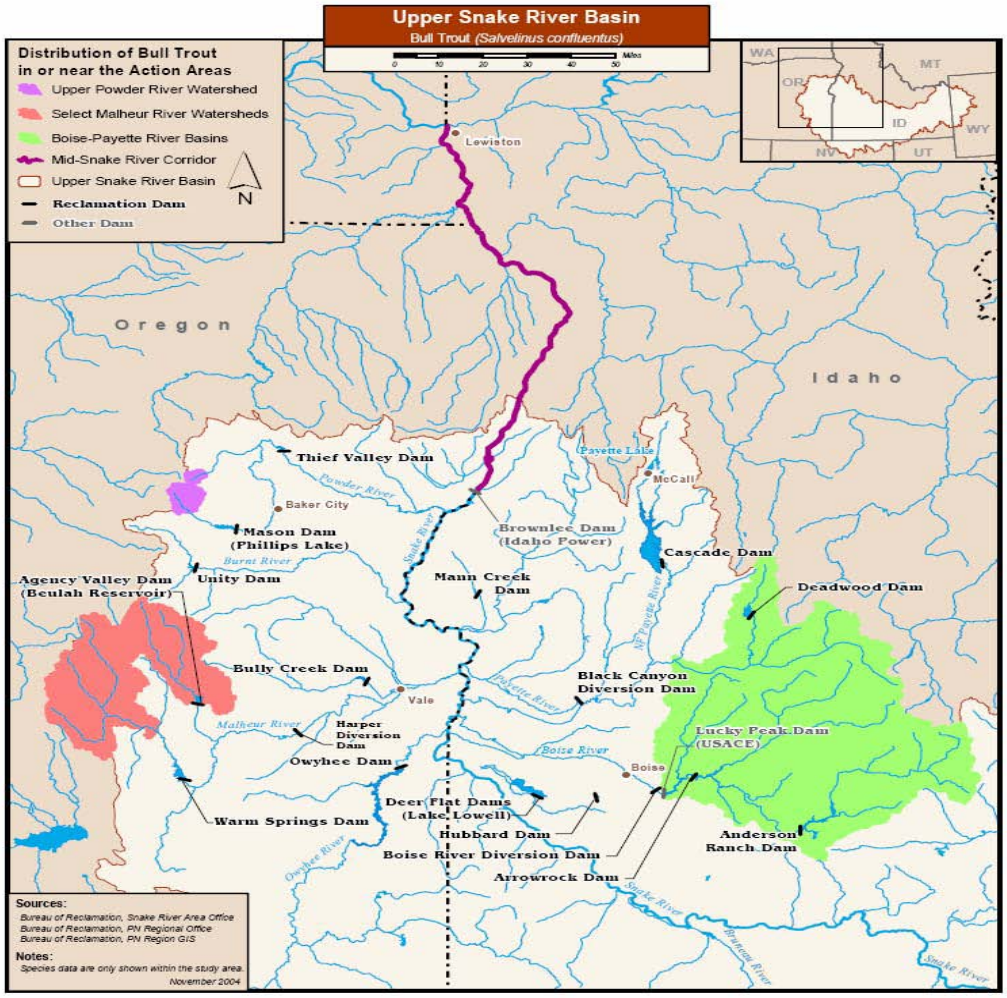

Figure 10. Known distribution of bull trout populations associated with Reclamation facilities in the upper Snake River basin (Reclamation 2004).

Table 4. Summary of amount or extent of anticipated take of bull trout associated with Reclamation facility operations during the 2007 reporting period.

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency	2007 Operations (Oct. 2006 to Sept 2007)	Quick reference: 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 by the end of June.	June 30	3 of 30 years	Reservoir volume was at 151,520 acre-feet June 30, 2007.	1 of 3 years 2007: yes
	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
	Up to 2 percent of bull trout in the reservoir are entrained into Lucky Peak Reservoir.	Discharge exceeds 695 cfs while the reservoir water surface elevation is less than 3,111 feet.	July through September	30 of 30 years	Res. surface elevation was below 3,111 at the same time discharge was above 695 cfs for 48 days between July 25 and Sept. 03, 2007 (Figure 12).	2 of 30 years 2006: 6 days 2007: 48 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 below3,100 feet.	September 15 through October 31	18 of 30 years	Reservoir elevations were between 3,114 and 3,155 from Sept 15, 2006 to Oct. 31, 2006.	0 of 18 years
	Up to 5 percent of bull trout in the reservoir are entrained into Lucky Peak Reservoir, as averaged over any consecutive 5-year period.	Discharge exceeds 695 cfs while the reservoir water surface elevation is less than 3,111 feet.	Winter	20 of 30 years	Reservoir elevations did not go below 3,111 in the winter months of 2007.	0 of 20 years

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency	2007 Operations (Oct. 2006 to Sept 2007)	Quick reference: Times threshold was exceeded
Anderson Ranch Dam	Up to 50 percent of the North and Middle Fork Boise Rivers' spawning population 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 SF Boise River.	Water is discharged over the spillway.	Spring	6 of 30 years	Spillway use did not occur during the reporting period.	1 of 6 years 2006: 9 days
	Up to 50 percent of the North and Middle Fork Boise Rivers' spawning population 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 water year 2007 are shown in Figure 13.	2 of 30 years 2006:spring/fall 2007:spring/fall
	Up to 4 percent of bull trout in reservoir experience degraded water quality.	Reservoir storage volume falls below 62,000 acre-feet.	Summer	2 of 30 years	Reservoir storage volume was maintained above 62,000 acre-feet (Figure 14).	0 of 2 years
Deadwood Dam	Up to 2 to 4 percent of bull trout in Deadwood Reservoir are entrained into the Deadwood River below the dam.	Water discharged over the spillway.	Spring	11 of 30 years	Water discharged over the spillway May 23 – June 24, 2007.	2 of 11 years 2006: 32 days 2007: 33 days
	Up to 2 to 4 percent of bull trout in Deadwood Reservoir are affected by degraded water quality.	Reservoir storage volume falls below 50,000 acre-feet.	August through October	2 of 30 years	Reservoir storage volumes were maintained above 55,762 acre-feet in 2007 (Figure 15).	0 of 2 years

Facility	Anticipated Take	Operational Indicators	Critical Season	Frequency	2007 Operations (Oct. 2006 to Sept 2007)	Quick reference: Times threshold was exceeded
Deadwood Dam	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 discharged over the spillway May 23 – June 24, 2007.	2 of 11 years 2006: 32 days 2007: 33 days
	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 increases, fall reductions, winter discharge	30 of 30 years	All releases are deep water releases except for water discharged over the spillway.	2 of 30 years 2006: all year 2007: all year
Agency Valley Dam	Up to 10 percent of bull trout in Beulah Reservoir are entrained into the NF Malheur River below the dam.	Water is discharged over the spillway.	May through June	3 of 30 years	Spillway was not used during this reporting period.	1 of 3 years 2006: 53 days
	All bull trout that return to Beulah Reservoir to over winter are affected by a reduced prey base.	Reservoir storage volume falls below 2,000 acre-feet.	August through October	10 of 30 years	Reservoir storage volume fell below 2,000 acre-feet from Oct. 01 to Oct. 25, 2006 and Aug. 27 to Sept. 30 2007 (Figure 16).	1 of 10 years 2007: 60 days

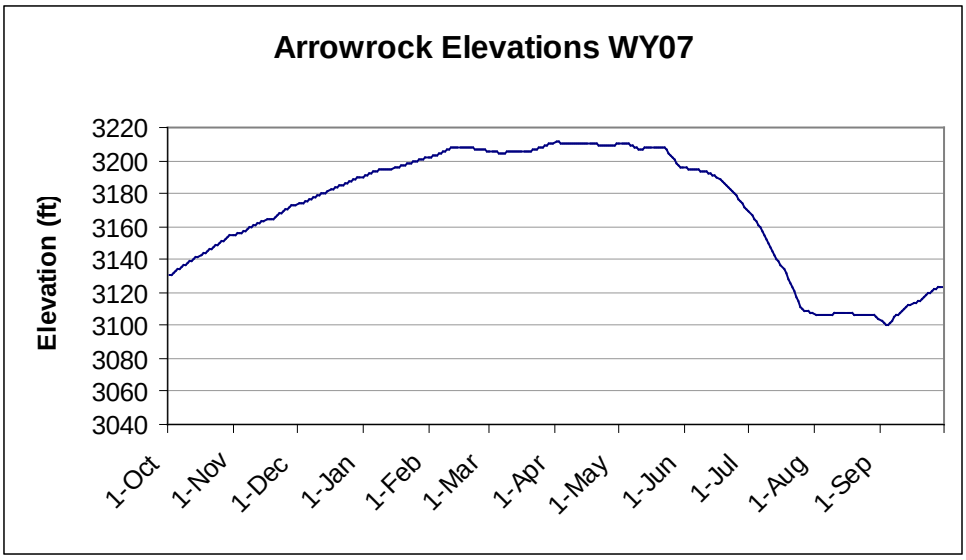

Figure 11. Arrowrock Reservoir elevation (feet above sea level) for the 2007 water year (WY07).

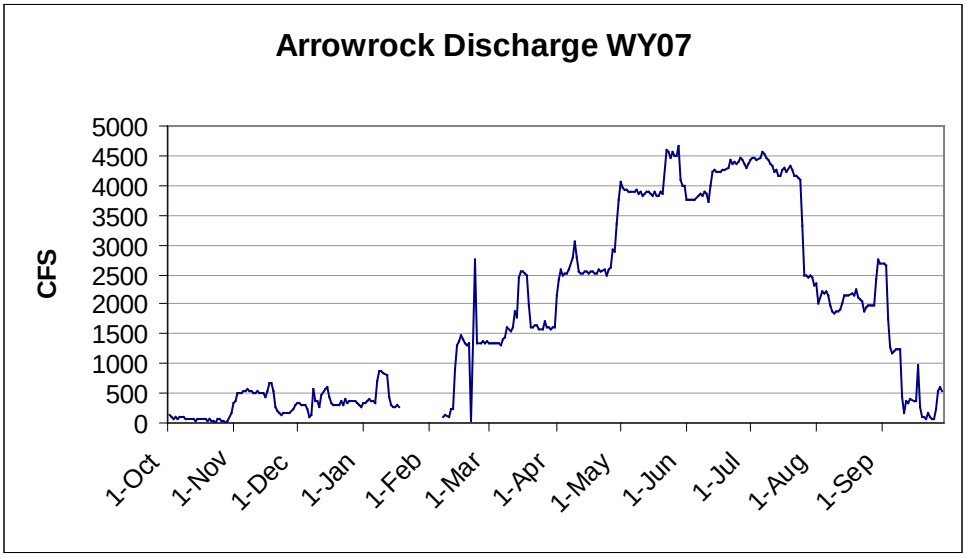

Figure 12. Arrowrock Reservoir discharge cubic-feet-per-second (CFS) for the 2007 water year (WY07). (Data is not available between January 19 and February 07, 2007.)

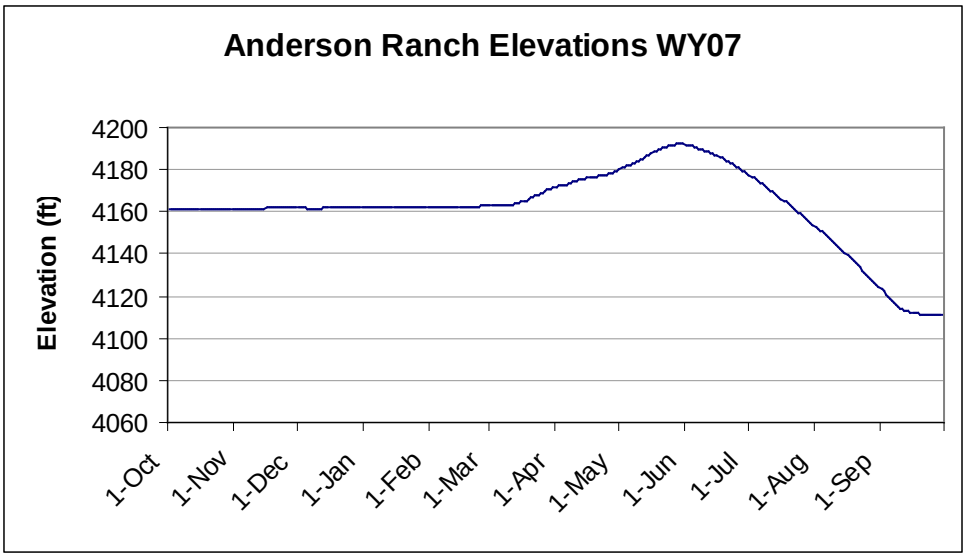

Figure 13. Anderson Ranch Reservoir elevations (feet above sea level) for the 2007 water year (WY07).

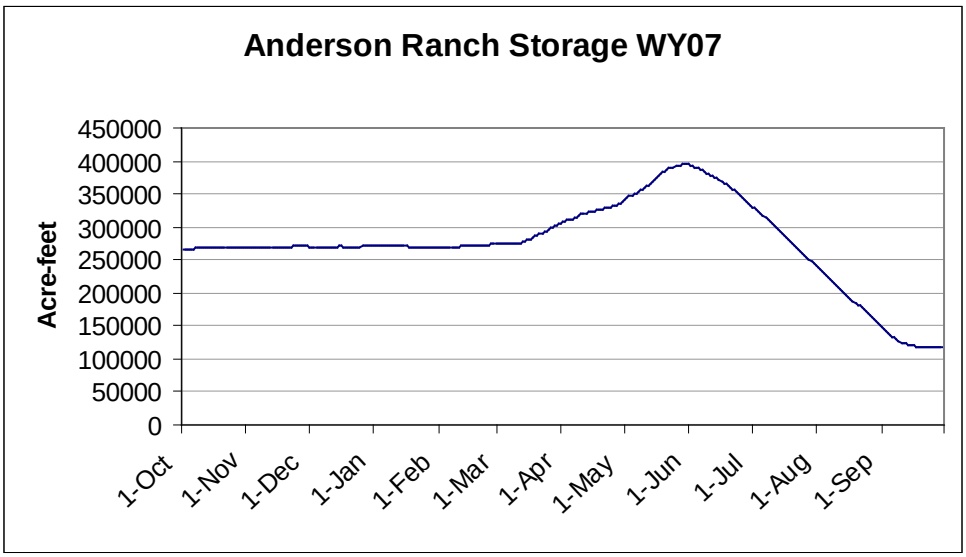

Figure 14. Anderson Ranch Reservoir storage volumes (acre-feet) for the 2007 water year (WY07).

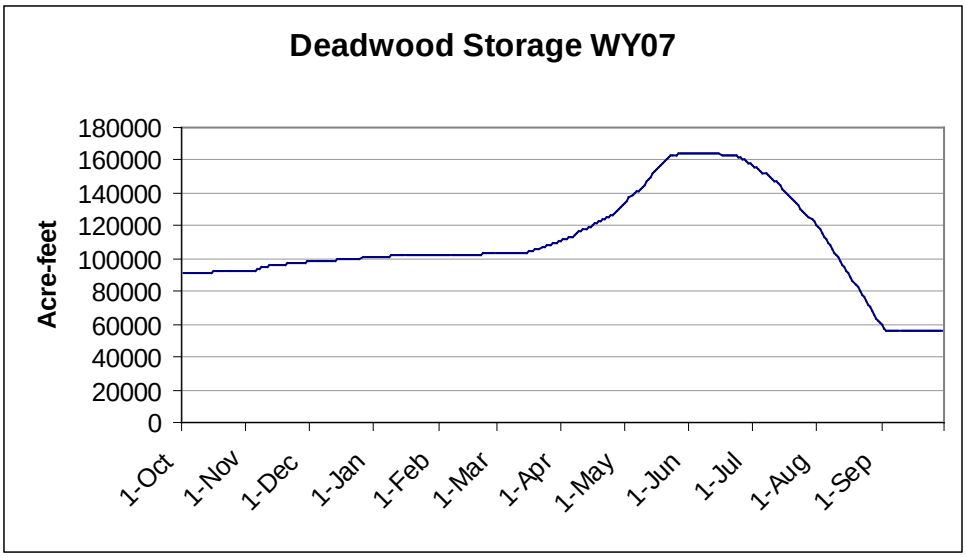

Figure 15. Deadwood Reservoir storage volumes (acre-feet) for the 2007 water year (WY07).

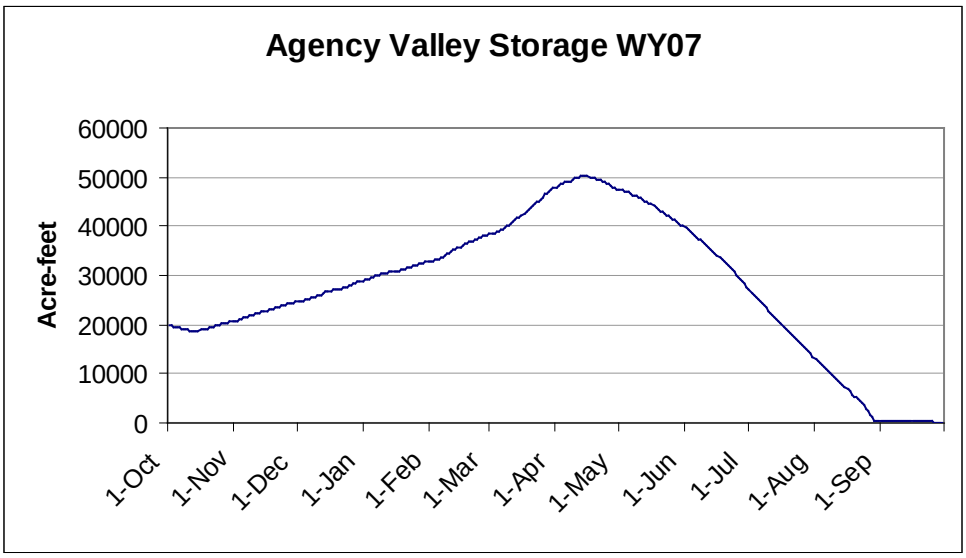

Figure 16. Agency Valley Reservoir storage volumes (acre-feet) for the 2007 water year (WY07).

Monitoring for Bull Trout

The Implementation and Monitoring Plan (Reclamation 2005b) identifies how Reclamation will monitor bull trout. Monitoring elements include 1) evaluating operational indicators, 2) tracking population trends, and 3) estimating the proportion of annual take. Operations for water year 2007 are evaluated and summarized through Reclamation's hydromet system (Reclamation 2007c) to ensure that operations would not exceed the thresholds defined in the ITS. Operational thresholds affecting amount or extent of anticipated take are described in Table 4. Monitoring population trends may not occur annually.

Boise River Basin

Operational indicators were monitored and reported in hydromet, no bull trout field monitoring activities took place during the 2007 water year. Reclamation implements trap and haul efforts below Arrowrock Reservoir every year the spillway is used or a minimum of every two years (Terms and Conditions 1.d.). The spillway was neither used nor did the routine scheduling of trap and haul occur in 2007.

Payette River Basin

Operational indicators were monitored and reported in hydromet and picket weirs were operated on tributaries to Deadwood Reservoir to monitor bull trout during the 2007 water year. A summary of picket weir operations is described in the ***Picket weir*** section of this report.

Malheur River Basin

Operational indicators were monitored and reported in hydromet, additional monitoring work included bull trout redd counts in the North Fork Malheur River (performed by Oregon Department of Fish and Wildlife; ODFW).

In 2006 and 2007, North Fork Malheur River basin bull trout redd counts totaled 97 and 110, respectively. Assuming 2.68 bull trout per redd (Al-Chokhachy et al. 2005), an estimated 259 adfluvial bull trout were present in 2006, and 294 bull trout in 2007. Figure 17 depicts the number of redds observed in the North Fork Malheur River basin, and carryover of reservoir storage in Beulah Reservoir.

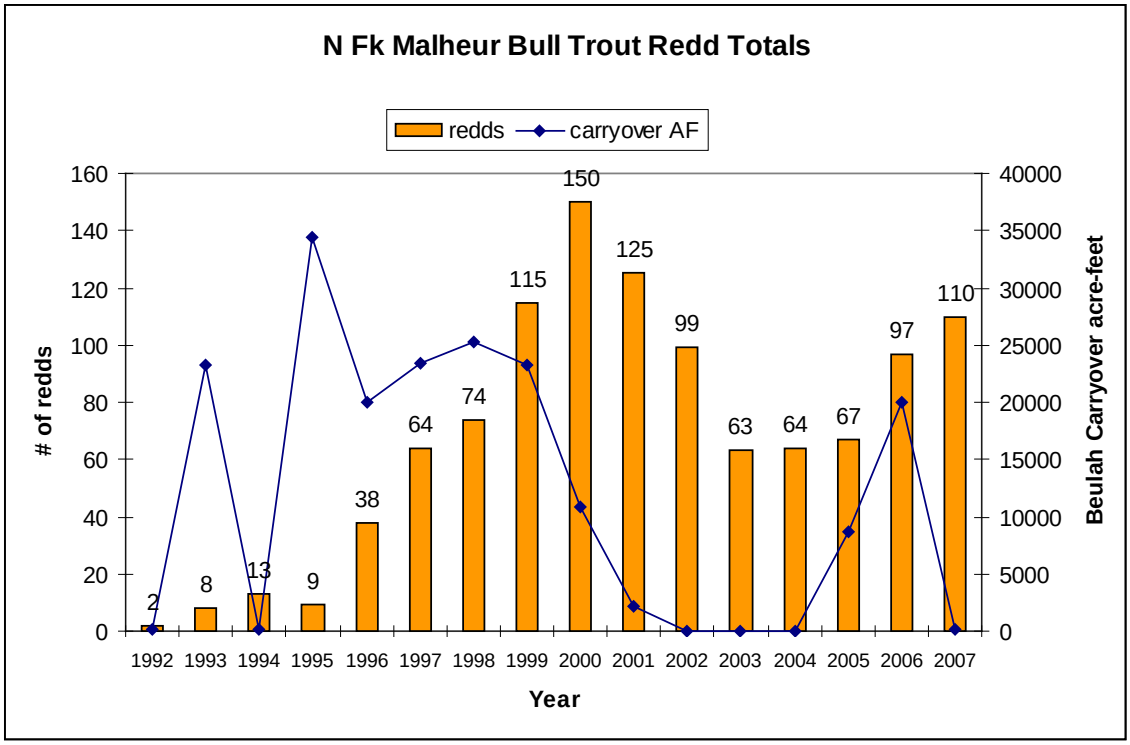

Figure 17. Malheur River bull trout redds observed in the North Fork Malheur River watershed between 1992-2007.

Implementation of Reasonable and Prudent Measures and Associated Terms and Conditions

The ITS includes four RPMs and associated multiple terms and conditions to minimize incidental take of bull trout related to Reclamation's operations at its facilities within the identified action area where bull trout are present: Arrowrock, Anderson Ranch, Deadwood, and Agency Valley dams and associated reservoirs. In 2007 Reclamation focused monitoring and implementation activities at both Deadwood and Beulah reservoirs. The sequence of activities presented in this document reflects the priorities identified by the FWS in the ITS and has been further documented in Reclamation's Monitoring and Implementation Plan (Reclamation 2005b). This document presents the activities for each location.

Boise River Basin

Monitoring work described in the Implementation and Monitoring Plan (Reclamation 2005b) was conducted during the 2007 water year, no further work took place in the Boise River basin during this reporting period.

Payette River Basin - Deadwood River System (data collection)

Data collection and processing as part of the Deadwood Reservoir Operations Flexibility Study began in 2006 and continued during 2007. Study objectives are described in the Deadwood Reservoir Flexibility Study framework (Reclamation 2008) and encompass both the Deadwood Reservoir and the Deadwood River reach (located below the dam extending to the confluence with the South Fork of the Payette River).

Deadwood River System - Reservoir and tributaries

Bull trout were captured in the reservoir using fyke nets and in the tributaries using picket weirs. Most captured bull trout were surgically equipped with radio transmitters and subsequently released at the point of capture. Physical hydrologic and limnologic data were collected within the reservoir and selected tributaries. A detailed description of these activities occurring within Deadwood Reservoir and its tributaries is presented below.

Fyke netting/ radio tracking

A total of 751 fish, including 10 bull trout, were sampled in Deadwood Reservoir in 2007 using fyke nets (Reclamation 2007d). Fyke netting occurred from early May to mid July. Species composition for fish sampled in the fyke nets was similar to previous accounts for littoral fish assemblages in the reservoir. Mountain whitefish and speckled dace were the most abundant fish sampled (cumulatively 73% of the total catch) while bull trout represented 1% of the total catch; rainbow trout (11%), cutthroat trout (6%), and longnose dace (5%) were also sampled (Reclamation 2007d).

Nine bull trout were surgically implanted with radio transmitters in 2007; eight were captured in fyke nets and one from a tributary picket weir. (A summary of picket weir operations is described in the ***Picket weir*** section of this report.)

A total of 14 bull trout were tracked by radio during the 2007 field season, including five bull trout from the 2006 tagging efforts. Behavior of radio tagged bull trout varied between the 2006 and 2007 field season. Variable environmental conditions including hydrology, project operations, and the Rattlesnake Complex Fire in 2006 precludes behavioral results based on radio telemetry at this time. However, some general behaviors can be noted from the 2006 and 2007 field seasons. Tagged bull trout generally dispersed throughout the reservoir during the winter and spring then congregated near the mouth of tributaries (pre migration). Tagged fish left the reservoir to migrate into tributaries by August 12 and returned to the reservoir by October 11, in both years. In 2007, tagged fish moved into Trail, Deer and South Fork Bear creeks as well as the Deadwood River compared to tagged fish moving solely into Trail Creek in 2006.

Confirmed mortalities of tagged bull trout during this reporting period included seven bull trout that were tagged in 2007 and three bull trout that were tagged in 2006. Two bull trout tagged in 2007 as well as one tagged in 2006 were still being tracked in the reservoir through the end of the reporting period. No tagged bull trout were entrained in 2007.

Fin clips and muscle plugs were also collected from sampled bull trout. Fin clips were collected from all bull trout and muscle plugs collected from the first five bull trout that

were sampled. Fin clips were sent to the FWS Genetics Lab, Abernathy, WA. Genetic analysis may be used for population assignment to natal streams in the drainage (above or below the reservoir). Muscle plugs are being used in an associated isotope study. The collection of fin clips and muscle plugs were non-lethal and occurred while the bull trout were being implanted with radio tags.

Bull trout collections, tagging, and radio tracking efforts during the 2008 field season will be similar to those in 2007. Bull trout tagging and tracking efforts are scheduled to continue through 2009.

Picket weirs

In a collaborative effort between Reclamation and the IDFG, temporary picket weirs were installed on selected tributaries to Deadwood Reservoir in order to evaluate bull trout populations. Weirs captured upstream and downstream migrating fish and were installed on Basin Creek, Beaver Creek, Deadwood River, Trail Creek, and South Fork Beaver Creek. They were installed on September 13 and removed on October 15 (Hebdon 2007). The Basin Creek weir did not have an upstream trap installed due to the physical stream structure as well as the desire to minimize the escapement of upstream migrating kokanee. Weirs were occasionally breached because of heavy rain causing increased stream and debris flow.

Thirteen bull trout were handled at the five weirs throughout the season (Table 5). Lengths for all captured bull trout ranged from 70 to 460 mm. Nine of these bull trout had not been previously handled in prior trapping activities. Two previously radio tagged fish were captured at weirs in 2007 (Hebdon 2007). Of the 13 captured bull trout two were mortalities that washed into the trap.

Basin Creek Two bull trout were handled at the Basin Creek weir. One bull trout was fitted with a PIT tag, the other escaped prior to tagging. The Basin Creek weir was breached and repaired on two occasions (September 01 and September 23; Table 5).

Beaver Creek Two bull trout were handled at the Beaver Creek weir. One bull trout was fitted with a PIT tag the other escaped prior to tagging. The weir was breached and repaired on four occasions (September 01, 19, 20, and 23; Table 5).

Deadwood River Three bull trout were handled at the Deadwood River weir. One of the three bull trout was previously radio tagged and PIT tagged (originally captured in a fyke net at the mouth of Trail Creek on July 10). Another bull trout was fitted with a radio tag and PIT tag after being captured in the downstream trap box. The third bull trout was fitted with a PIT tag after being caught in the upstream trap box and was recaptured in the

downstream trap box three weeks later. The weir was intentionally breached on September 22 to prevent damage due to high water (Table 5).

South Fork Beaver Creek One bull trout was handled at the South Fork Beaver Creek weir, this fish was accidentally dropped while handling and escaped prior to tagging. The weir was breached and repaired on four occasions (September 01, 05, 20, and 23; Table 5).

Trail Creek Three live bull trout were handled at the Trail Creek weir, additionally two mortalities were found washed into the weir. One of the three live bull trout was previously radio tagged and PIT tagged (originally captured in a fyke net at the mouth of Trail Creek in late June or early July). The other two live bull trout were captured in the upstream trap box and fitted with PIT tags. The weir was breached and repaired on two occasions (August 24 and September 23; Table 5).

Picket weirs will be operated by the IDFG in 2008, dates and locations will be similar to those in 2007. Reclamation will provide assistance throughout the 2008 field season.

Table 5. Dates that weirs were breached and number of bull trout handled at each weir on Deadwood Reservoir tributaries, 2007.

Tributary	Dates breached	Number of bull trout handled
Basin Creek	09/01, 09/23	2
Beaver Creek	09/01, 09/19, 09/20, 09/23	2
Deadwood River	09/22 (intentionally to avoid damage)	3
South Fork Beaver Creek	09/01, 09/05, 09/20, 09/23	1
Trail Creek	08/24, 09/23	5 (2 mortalities)

Hydrologic and Limnologic

Water quality data were collected during the 2007 reporting period to be used in reservoir modeling efforts (Reclamation 2008). These data included water temperature, dissolved oxygen, pH, turbidity, fluorescence, and conductivity at designated water column profile locations. These water profiles were taken with a Hydrolab instrument at four locations in the reservoir weekly from May 10 through October 29, 2007. Hydrolab readings were also taken at Deadwood River and Trail Creek weekly during this same time period. Three additional profile locations were sampled in the reservoir bi-weekly from mid May through July. In addition, water chemistry samples were collected at the surface, middle and bottom of the water column for each of the designated profile locations. Water chemistry samples were also collected at Trail Creek and Deadwood River. Water chemistry samples were analyzed by the laboratory for nitrate/nitrite, ortho-phosphorus, ammonia, total Kjeldahl nitrogen, chlorophyll-a (surface reservoir samples only), total organic carbon, dissolved organic carbon, and turbidity. The water samples were processed at Reclamation's Water and Soil Laboratory, Boise, Idaho. Sampling locations for hydrology and limnology data are depicted in Figure 18, water quality samples are depicted in Figure 19.

Onset ® TidbiT temperature thermographs were located in five tributaries to the reservoir and the Deadwood River. These thermographs recorded hourly water temperature data throughout the year and were manually downloaded a minimum of two times per year.

An acoustic Doppler current meter (ADCM) was installed at the mouth of the Deadwood River into Deadwood Reservoir. In addition to river stage the ADCM recorded water temperature and water velocity. Data from the ADCM was transmitted via satellite to Reclamation's Hydromet website (Reclamation 2007c).An AquaRod ® Water Level and Temperature Logger was located in Trail Creek. These recorders are designed to measure river stage height. The AquaRod recorded water stage hourly throughout the year. Data was manually downloaded at least twice a year. On several occasions, flow measurements were made at these locations for the purposes of developing stage/discharge relationships in order to quantify flow and water quality constituent concentrations entering the reservoir.

A temperature data logger was deployed in the reservoir October 2006 for the purpose of measuring reservoir temperature below the ice cover. It was subsequently retrieved in June 2007 and downloaded to retrieve the data. A Lake Diagnostic System (LDS) was installed in Deadwood Reservoir in July 2007. The LDS measures water column temperature and dissolved oxygen as well as meteorological forcing data for modeling efforts. These meteorological data include short wave radiation, net radiation, air temperature, relative humidity, wind speed, and wind direction. Data obtained by the LDS are transmitted via satellite communication to Boise, Idaho on a daily basis. These data can be viewed on the Centre for Water Research, University of Western Australia's website (CWR 2008).

Hydrologic and limnologic data will continue to be sampled through the 2009 field season. Incorporation of these data into the modeling efforts as well as additional study background information is described in the Deadwood Reservoir Flexibility Study framework (Reclamation 2008).

Deadwood River System – Deadwood River Reach: Downstream of Deadwood Dam to the confluence with the South Fork Payette River

Bull trout were captured in the Deadwood River below the reservoir using both fyke nets and hook and line sampling methods. Most captured bull trout were surgically implanted with radio transmitters and released at the point of capture. Hydrologic and water quality data were collected within the river reach and selected tributaries. Physical habitat data were also collected. A detailed description of these activities occurring within the Deadwood River Reach and its tributaries is presented below.

Fyke netting/ radio tracking

On September 18, 2007 an angler caught a bull trout in the stilling basin below the dam. This prompted Reclamation with the help of the IDFG to organize a bull trout sampling effort. A total of ten bull trout were captured using a fyke net and hook and line sampling in the stilling basin below Deadwood Dam between September 18 and October

6 (Table 6). Captured bull trout ranged in length from 250 mm to 379 mm TL and from 148 g to 514 g in weight. All of these bull trout were implanted with radio transmitters, four of which were equipped with temperature and depth sensors.

Tagged bull trout were tracked weekly (weather permitting) by helicopter or ground surveys. All of the tagged bull trout stayed between the dam and Wilson Creek until the week of November 7. After the week of November 7 four of the ten bull trout moved downstream, past the confluence of Wilson Creek, and dispersed throughout the Deadwood River. There were no confirmed mortalities of bull trout below Deadwood Reservoir during this reporting period.

Kokanee, rainbow trout, and speckled dace were also captured in the fyke net while angling produced bull trout, whitefish and rainbow trout. Due to limited time and resources, counts and lengths for species other than bull trout were only taken for one fyke net set (Table 7).

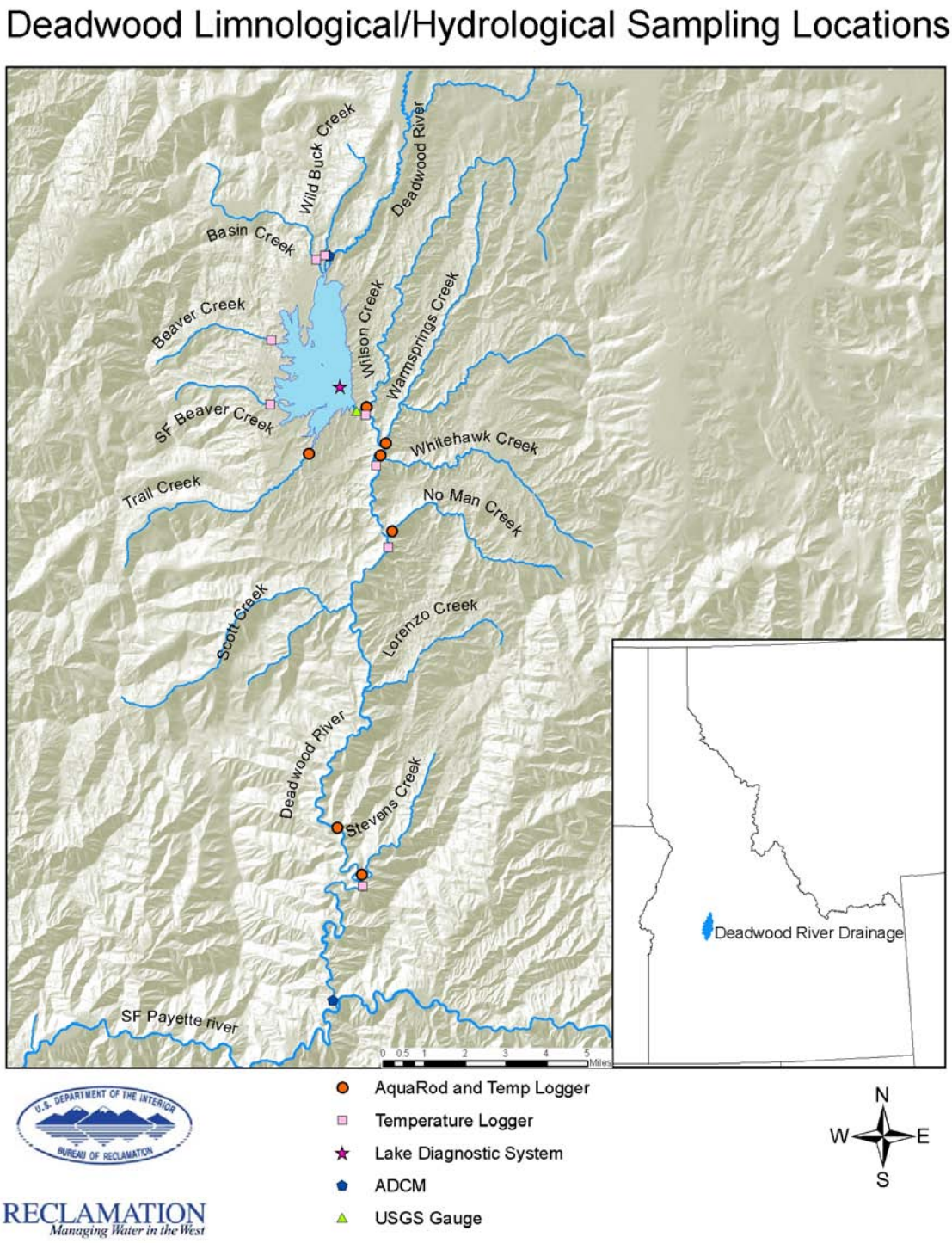

Figure 18. Limnologic and hydrologic sampling locations in the Deadwood study area, Idaho 2007. Equipment used to record data varied between locations and included AquaRods and Temperature Loggers, Temperature Loggers, a Lake Diagnostic System, acoustic Doppler current meter (ADCM), and a U.S. Geological Survey water gauge (USGS gauge)

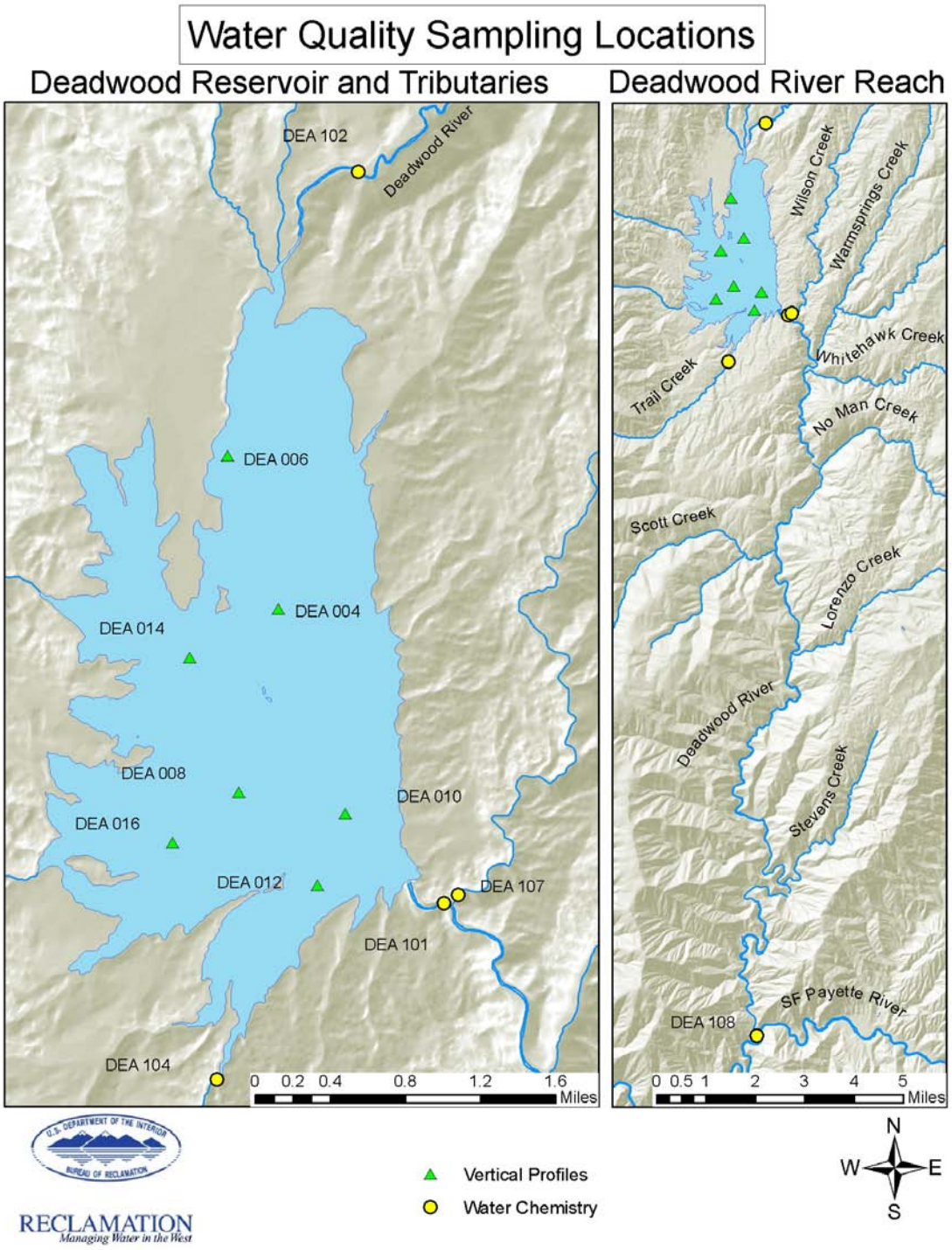

Figure 19. Water quality sampling locations in the Deadwood Reservoir and tributaries and the Deadwood River Reach study sections. Vertical profiles and water chemistry samples were collected in both reaches. Sample locations DEA 012, 014, and 016 were sampled twice a week from May 10 through June 30, 2007; all remaining locations were sampled weekly from May 10 through October 29, 2007

Table 6. Bull trout captured in Deadwood River below the dam.

Date	Fork Length (mm)	Total Length (mm)	Weight (g)
9/19/2007	299	319	288
9/26/2007	283	300	249
9/27/2007	315	334	286
10/6/2007	358	379	514
10/6/2007	315	332	338
10/6/2007	235	250	148
10/6/2007	313	330	370
10/6/2007	304	319	294
10/6/2007	252	261	202
10/6/2007	300	316	326

Table 7. Fish captured in fyke net in the stilling basin below Deadwood Dam on September 26, 2007, Rainbow Trout (RB), Speckled Dace (SPD) and Kokanee (KOK).

Species	Total Length (mm)
RB	259
RB	246
RB	214
SPD	110
SPD	127
SPD	100
SPD	80
SPD	105
SPD	101
SPD	101
SPD	98
SPD	103
SPD	105
SPD	100
SPD	93
SPD	87
SPD	90
KOK	230
KOK	250
KOK	225
KOK	168
KOK	218
KOK	180

Fin clips and muscle plugs were collected from sampled bull trout. Fin clips were collected from all bull trout and muscle plugs collected from the first five bull trout sampled. Fin clips were sent to the FWS Genetics Lab, Abernathy, WA. Genetic analysis may be used for population assignment to natal streams in the drainage (above or below the reservoir). Muscle plugs are being used in an associated isotope study. The collection of fin clips and muscle plugs were non-lethal and occurred while the bull trout were being implanted with radio tags. Genetic results from fish collected in 2007 are expected to be available in January 2008.

Bull trout collections, tagging, and radio tracking efforts during 2008 will be similar to those in 2007. Sampling efforts in the stilling basin to collect bull trout will depend on available resources. Bull trout tagging and tracking efforts are scheduled to continue through 2009.

Hydrologic and Limnologic

Water quality data were collected during the 2007 reporting period to be used in riverine and aquatic habitat modeling efforts (Reclamation 2008).

Water quality data were collected during the 2007 reporting period for the purposes of incorporation into riverine and habitat modeling efforts (Reclamation 2008). These data included water temperature, dissolved oxygen, pH, turbidity, and conductivity at designated mainstem and tributary locations. In addition, water chemistry samples were collected. Water chemistry samples were analyzed by the laboratory for nitrate/nitrite, ortho-phosphorus, ammonia, total Kjeldahl nitrogen, chlorophyll-a (surface reservoir samples only), total organic carbon, dissolved organic carbon, and turbidity. Water quality sampling sites included the Deadwood River below the dam and near the confluence with the South Fork Payette River, in addition to Wilson Creek. The water samples were processed at Reclamation's Water and Soil Laboratory, Boise, Idaho Sampling locations for hydrology and water quality data are depicted in Figures 18 and 19.

A total of nine Onset ® TidbiT temperature thermographs were located in six tributaries to the Deadwood River as well as within the mainstem Deadwood River in three locations. The tributary locations included: Wilson, Warmsprings, Whitehawk, Scott, No-man, and Stevens Creeks. These thermographs recorded hourly water temperature data throughout the year and were manually downloaded a minimum of two times per year. The mainstem locations are illustrated in Figure 18.

An acoustic Doppler current meter (ADCM) was installed near the confluence of the Deadwood River with the South Fork of the Payette River. The ADCM recorded water temperature, water velocity, and water depth. Data from the ADCM was transmitted via satellite to Reclamation's Hydromet website (Reclamation 2007c).

AquaRod ® Water Level and Temperature Loggers were installed in Wilson, Warmsprings, Whitehawk, No-man, and Stevens Creeks. An AquaRod was also installed in the Deadwood River near Julie Creek, however, due to equipment malfunctions; data from this site will not be available until the device is downloaded during the 2008 field

season. These recorders are designed to measure river stage. The AquaRods recorded water height stage hourly throughout the year. Data was manually downloaded at least twice a year. On several occasions, flow measurements were made at these locations for the purposes of developing stage/discharge relationships in order to quantify flow and water quality constituent concentrations entering the river.

Light Detection And Ranging, (LiDAR) technology was also used in 2007 to map aquatic habitat in Deadwood River below the dam for modeling purposes.

Hydrologic and water quality data will continue to be sampled through the 2009 field season. Incorporation of these data into the modeling efforts as well as additional study background information are described in the Deadwood Reservoir Flexibility Study framework (Reclamation 2008).

Deadwood River System (discussion)

The FWS Opinion identifies five terms and conditions for Reclamation to address in order to minimize the effect and/or amount of take associated with the operation of Deadwood Dam.

Each one of these terms and conditions addresses a different aspect of the effects of operations on bull trout. However, addressing these aspects individually limits the ability to understand how much flexibility Reclamation has in operation of the system as a whole, and the systemic impacts of individual changes in operations. By addressing the terms and conditions jointly and looking at the system in its entirety, Reclamation's ultimate goal is to manage operational flexibility to minimize biological impacts. The Deadwood Reservoir Flexibility study was initiated in 2006 to collectively address all five terms and conditions and their relative tradeoffs and balances when looking for system flexibility in minimizing impact.

The terms and conditions of the Opinion made several assumptions regarding the operation effects on bull trout. Therefore, before an evaluation of the operational flexibility to minimize impacts to bull trout can be done, there needs to be an understanding of what those impacts are, and to what degree they can be quantified. The Deadwood Reservoir Flexibility Study framework (Reclamation 2008) outlines the terms and conditions, hypotheses, assumptions, and assessments as well as identifying data needed to test the hypotheses.

The year 2007 was the second year of an intensive six year data collection process to establish a comprehensive understanding of physical and biological factors limiting bull trout productivity as well as understanding bull trout movement in the reservoir and in the river below the dam. Physical and water quality data collection instruments were deployed in Deadwood Reservoir and the Deadwood River above and below the dam to gather hydrology and limnology data such as temperature, river transect morphology, inflow and outflow quantities, water quality, and reservoir profile characteristics. The information collected within the reservoir is the key to providing the resulting habitat

conditions in the reach below the dam under varying operational conditions.

Evaluating the flexibility of the operational effects of Deadwood Dam on aquatic fauna requires an understanding of the potential overall ecosystem response to an operational change over time. Coupling the measured physical parameters (LiDAR, LDS, water quality) with measured biological parameters over the next several years will allow for a holistic system analysis of the terms and conditions for Deadwood Reservoir operations and its influence on bull trout populations.

The FWS 2005 Upper Snake Opinion identified that operations at Deadwood Dam cause harm and harassment to bull trout. Bull trout captured and tagged below Deadwood Dam could help address the terms and conditions associated with Deadwood Dam. The terms and conditions discuss possible harm and harassment associated with low winter stream flows, low summer temperatures, the lack of biologically significant ramping rates, and disruption of migratory cues below the dam as well as entrainment over or through the dam. Bull trout captured below the dam will be tracked during these events to see if there is possible harm or harassment. Bull trout were collected in the Deadwood River below the dam for the first time in 2007. Sampling efforts varied from those used in previous efforts; angling and fyke nets set in the stilling basin will be used again in 2008. Biological data collection included collection of baseline water quality samples, fish tissue samples, fish length and weight, as well as collection of weekly bull trout movement within the basin.

In 2007, Reclamation continued work on a six year telemetry program to monitor migration and movement patterns of bull trout in the reservoir. Fyke nets were used to try to capture bull trout from early May through mid July in the reservoir; fyke nets and angling were used in the stilling basin below the dam from mid September through mid October; and weirs were placed (by the IDFG) on five tributaries to the reservoir. A total of 28 new bull trout were captured including nine in the reservoir, nine in tributaries to the reservoir, and 10 below the dam. Most bull trout (when captured the first time) are implanted with a PIT tag and most are fitted with a radio tag in addition to having a genetic sample collected and other biological data recorded (Reclamation 2007d). Nineteen of the 28 total bull trout were implanted with radio transmitters.

Telemetry results for 2006 and 2007 have shown variability in bull trout migratory behavior and timing, therefore, no conclusions can be made at this time. General trends, however, have been observed during the last two years. Tagged bull trout tend to disperse throughout the reservoir during the winter and spring, hold near the mouths of tributaries early summer, move into the tributaries starting in June and return to the reservoir near the end of October. Telemetry work will continue through 2009.

Annual mortality of radio tagged bull trout was higher during 2007 than in 2006. Seven of the nine bull trout tagged in 2007 died in 2007 (77%) compared to only three of the eight that were tagged in 2006 died that same year (38%). Five bull trout that were tagged in 2006 were still alive in the spring of 2007; however, three of these five were

confirmed mortalities in 2007. Mortality rates were highest during the spawning migration. Seven of the ten mortalities in 2007 occurred while bull trout were not in the reservoir pool.

Additional data and methodology can be found in the Technical Report for Idaho Fish and Game Permit Number F-10-99, Deadwood River Bull Trout Monitoring Activities, Annual Report - December 2007 (Reclamation 2007d).

Malheur River Basin - Beulah Reservoir (data collection)

Data collection efforts by the U.S. Geological Survey (USGS) continued during 2007 in Beulah Reservoir to exam the bull trout prey base. Study design and methodology for the prey base study is described in Rose and Mesa (2007). Sampling efforts included fyke and trammel netting in the reservoir. Trap and haul efforts were not conducted during the 2007 reporting period because water was not discharged over the spillway.

Fish sampling efforts on Beulah Reservoir were part of a prey base study examining the effects of drawdown on the bull trout prey base (Rose and Mesa 2008). Sampling efforts collected fish representing every species historically found in the Malheur drainage. Over 12,000 fish were collected including a total of ten bull trout (three recaptures) (Table 8).

Table 8. Bull trout (BT) captured by the USGS Prey Base study using fyke nets and trammel nets in Beulah Reservoir, 2007.

Species	Fork Length (mm)
BT	263
BT	286
BT	285
BT	275
BT	272
BT	380
BT	334
BT	333
BT	320
BT	385

Malheur River Basin - Beulah Reservoir (discussion)

In an effort to address Term and Condition 4.a. "Reduce the frequency and extent of drawdown of Beulah Reservoir to reduce harm and harassment associated with reduced or eliminated prey" (FWS 2005), Reclamation entered into an interagency agreement in 2006 with the USGS to evaluate the impact of specific reservoir volumes or levels on the fishery and to identify the threshold at which bull trout and/or their prey are

harmed.

Beulah Reservoir pool fell below 2000 acre-feet from August 27 to October 26 in 2007; a level at which the FWS indicated that migratory bull trout in the North Fork Malheur River basin and the prey base in the reservoir would be adversely affected (FWS 2005). The relationship between reservoir elevation and the effect to the bull trout prey base is currently being studied by the USGS, Cook, WA. This study is completing the third of a three year investigation examining the bull trout prey base in Beulah Reservoir. At this time final results are pending the completion of spring 2008 sampling and a more comprehensive analysis of the observed effects over multiple years and a range of reservoir conditions.

Preliminary results from the 2007 field season indicate that inshore fish community was similar between spring and fall but the offshore fish species composition changed between periods. The relative abundance and biomass between species also changed between seasons for both offshore and inshore fish communities (Rose and Mesa 2007). These results suggest that the fish community may recover quickly after a low drawdown year.

Implementation of terms and conditions 4b and 4c depend on the results and recommendations of the Prey Base Investigation described above.

The Term and Condition 4.d. requires Reclamation to continue efforts to trap and return bull trout that are entrained at Agency Valley Dam back to Beulah Reservoir or the North Fork Malheur River upstream from the dam. Efforts to move bull trout will take place in all years when the spillway is used at Agency Valley Dam. The spillway was not used during the 2007 water year precluding trap and haul efforts.

Spawning surveys were initiated by the ODFW in the North Fork Malheur River upstream from Beulah Reservoir in 1992 to determine the time and location of spawning bull trout and to monitor general population trends. Redd counts from 1996 through 2000 showed an increasing trend from less than 50 to more than 150 redds for the North Fork Malheur population, then a decline to 63 redds in 2003, and an increase since 2003 to 110 redds in 2007 (Figure 17). Good water years and the prohibited take of bull trout might be attributable to the increase from 1992 to 2000. The North Fork Malheur River basin, upstream from Beulah Reservoir, had a “no-bait” restriction imposed in 1999 in an effort to increase survival rate of bull trout captured and released by anglers. Declines in observed redds through 2005 may be attributable to drought conditions.

V. Other Activities

Physa Surveys

In 2005, the Bureau of Reclamation finalized Section 7 ESA consultation with FWS for future Reclamation operations on 12 Federal projects located in the Snake River basin above Brownlee Reservoir (Reclamation 2004, 2005a; FWS 2005). One of Reclamation's proposed actions was to conduct up to 3 years of Snake River physa (Physa natricina; SRP) surveys from below Minidoka Dam downstream to above Milner Pool, as described in a March 16, 2005 memo, Amendment to Reclamation's 2005 Biological Assessment.

Reclamation's proposed action included establishing and working with a Technical Team to help design survey and study protocols, review and interpret the results, and provide biological recommendations. The Implementation Plan for the Proposed Action of SRP surveys (Reclamation 2005b) describes more fully the specific tasks associated with the SRP surveys and roles and responsibilities of the Technical Team to accomplish the proposed action's goals. As described in the biological assessment's amendment, Reclamation proposed up to 3 years of presence/absence surveys in a 5-year period, beginning in fall, 2005 following the same protocol (Reclamation 2005c).

Reclamation initiated surveys in 2006 surveying in August and October. In 2007 surveys for SRP were again conducted in August and October in the same locations. August surveys occurred in the Snake River below Minidoka Dam, from the boat launch rapids, downstream to just below Jackson Bridge (Figure 20). Fifteen transects were established and 10, 0.25m^2 samples were collected along each transect. All samples were preserved in 70% ethyl alcohol solution and transported to the Albertsons College Museum of Natural History in Caldwell, Idaho. Museum personnel are currently sorting and identifying the samples.

Surveys for SRP conducted in October (2006 and 2007)were conducted by performing 60 second timed searches. Samples were collected from the Snake River immediately below the old powerhouse at Minidoka Dam, downstream to, and including, the boat launch rapids (Figure 21). In addition, two transects were established in low water riffles located below the USGS gauging station. Samples were again preserved and transported to Caldwell.

Figure 20. Snake River physa survey transects located in the Snake River from the boat launch below Minidoka Dam downstream to below Jackson Bridge. Study transect locations were the same for 2006 and 2007.

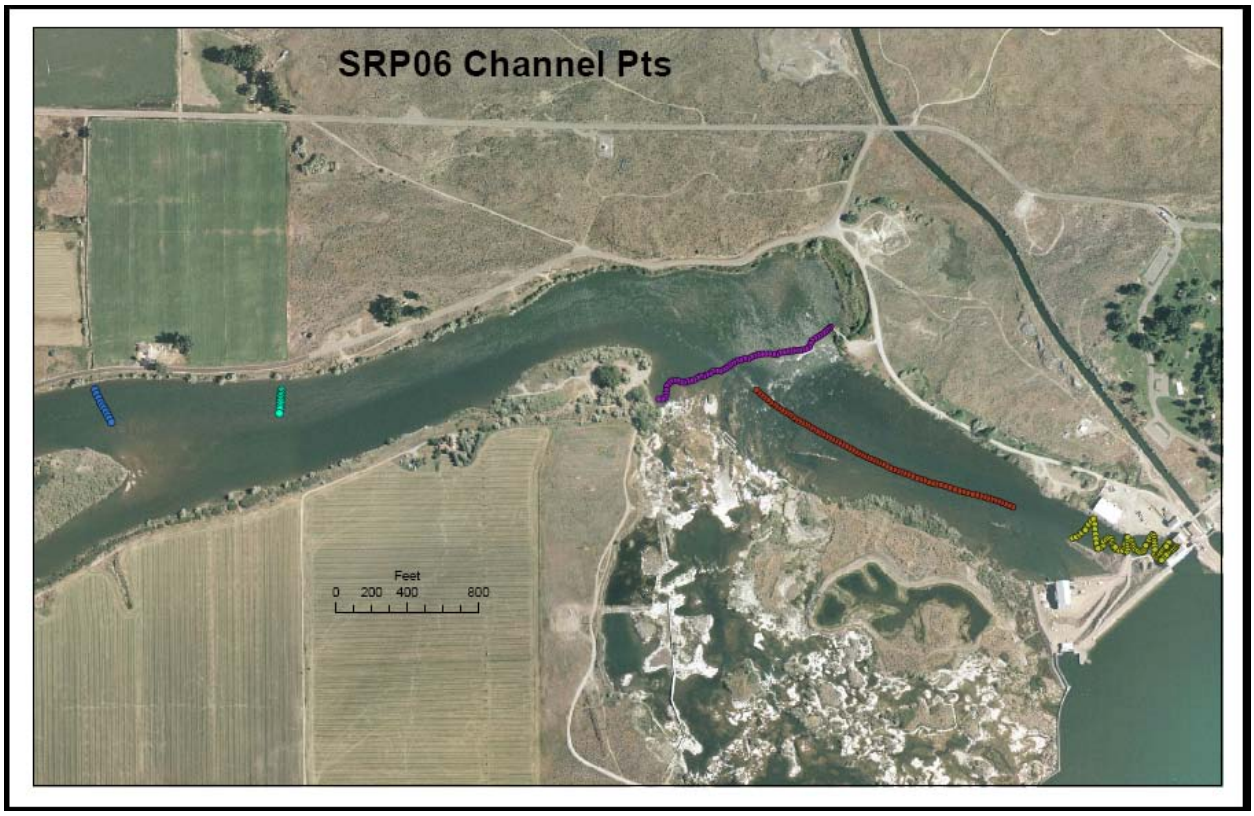

Figure 21. Snake River Physa (SRP) survey points from below Minidoka Dam. Survey points (Pts) were the same for 2006 and 2007.

The 2007 samples are currently being sorted and identified, consistent with the 2006 samples.

The 2006 sample management was completed in 2007. All samples were sorted, identified to species, cataloged and stored. Samples were handled by museum curators at the Orma J. Smith Museum of Natural History, located at Albertsons College in Caldwell, ID. Suspected Snake River physa were encountered in 230 samples, of which 34 samples had alive-when-captured Snake River physa. The remaining samples had shell only specimens.

A subsample of the alive-when-captured Snake River physa were sent to two independent researchers for the purpose of identification verification. Specimens were sent to the University of Michigan for analysis by Dr. John Burch and Chowan College for analysis by Dr. Amy Wethington. Both Dr. Burch and Dr. Wethington are nationally recognized experts in the field of aquatic snail identification. Each researcher is currently conducting physiological, morphological and genetic analysis to verify the identification of the specimens. Final results are expected in the spring of 2008.

Water Quality

Reclamation participates in several water quality related activities in the upper Snake River Basin. This discussion describes the breadth of Reclamation's participation in 2007. First, as part of Idaho and Oregon's on-going Total Maximum Daily Load (TMDL) development and implementation activities, Snake River Area Office and/or Pacific Northwest Region Reclamation staffs participated in all appropriate watershed advisory group and watershed council meetings in the Upper Snake River Basin. These included activities in the Upper Boise River, Lower Boise River, North Fork Payette River, Lower Payette River, Mid Snake River, Lake Walcott, and American Falls Reservoir Watershed Advisory Groups, as well as the Owyhee/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 Region Laboratory provided analytical laboratory services to several entities in the basin. These entities included:

Idaho Department of Environmental Quality

Aberdeen Springfield Irrigation District

Lower Boise River Watershed Advisory Group

A & B Irrigation District

Minidoka Irrigation District

Lake Walcott Watershed Advisory Group

Malheur Watershed Council

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 2007, Reclamation and the USGS maintained a total of 51 stream temperature loggers throughout the basin. The intent of the on-going study is to describe temperature regimes in the Snake River relative to Reclamation's management activities. This information was reported in Reclamation's 2007 Annual Report to the National Marine Fisheries Service (Reclamation 2007b).

Reclamation also performed sediment and nutrient monitoring above and below American Falls Reservoir from August 22 through October 23, 2007. This monitoring was performed to track the effects of low pool elevations on water quality below the reservoir.

Lastly, Reclamation performed routine water quality sampling at Island Park Reservoir, American Falls Reservoir, Lake Walcott, Palisades Reservoir and Jackson Lake in 2007. This sampling was performed as part of an on-going regional reservoir sampling regime.

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