Chapter 2 DESCRIPTION OF THE PROPOSED ACTIONS

2.1 Introduction

Reclamation's proposed actions in the upper Snake are described in its 2004 Upper Snake BA and supporting documents. The 2004 Upper Snake BA described 11 actions. A twelfth action was added by submittal of an Amendment to NMFS. Figure 2-1 shows the locations of facilities in the upper Snake River basin associated with the proposed actions. Tables 2-1, 2-2, and 2-3 present summary information on the Federal storage, diversion, and power facilities included in the 12 proposed actions. These features and facilities are part of 12 Federal projects (Baker, Boise, Burnt River, Little Wood River, Lucky Peak, Mann Creek, Michaud Flats, Minidoka, Owyhee, Palisades, Ririe, and Vale Projects).

These actions are briefly described here with reference to documents for more information about operations and routine maintenance activities. This 2007 Upper Snake BA proposes some changes to the proposed actions from that described in the 2004 Upper Snake BA.

2.2 Proposed Actions Description

The 12 proposed actions described here are authorized, funded, or carried out by Reclamation by virtue of Congressional or Secretarial authorizations, Congressional appropriations, and contracts with Reclamation. Reclamation received authorization for each of its projects from either Congress or the Secretary of the Interior, who had authority under the 1902 Reclamation Act to approve construction after a finding of feasibility. The Congressional and Secretarial authorizations state the purposes to be served by each project. Congress has directed in the Reclamation laws that Reclamation enter into contracts with project water users. These contracts set out, among other things, Reclamation's obligations to store and deliver project water to irrigation districts, municipalities, and other entities. Additionally, the 1902 Reclamation Act requires that Reclamation comply with state law with regard to control, appropriation, use, and distribution of waters. Water can only be stored and delivered by a project for authorized purposes for which Reclamation has asserted or obtained a state water right in accordance with Section 8 of the Reclamation Act of 1902 and applicable Federal law. Reclamation must honor senior or prior water rights in storing and diverting project water. Conversely, project water is protected from diversion by junior appropriators by state watermasters. The active cooperation

of the state water rights administrators is essential in ensuring that any water Reclamation delivers for flow augmentation or any other purpose reaches the targeted points of delivery. Reclamation has no discretion except to deliver water in accordance with the project water rights and in accordance with state water law.

The upper Snake proposed actions include one or more of the following activities:

- Future storage of water in reservoirs and its release from dams that the United States owns. Storage and releases occur in accordance with authorized project purposes, Reclamation contracts, Federal law, and state water law.
- Future diversion or pumping of water into facilities that Reclamation owns or operates.
- Future hydropower generation at Reclamation powerplants.
- Future routine maintenance activities at dams, reservoirs, on-stream diversion structures and pumping plants, and Reclamation hydropower plants, regardless of whether the operation and maintenance responsibility has been transferred to another entity.
- Future provision of salmon flow augmentation by acquiring water through rental pools and leasing or acquiring natural flow rights consistent with the Nez Perce Water Rights Settlement (Nez Perce Tribe et al. 2004).
- Surveys of ESA-listed aquatic snails below Minidoka Dam.

Reclamation's 12 proposed actions are listed below:

- Future operations and routine maintenance (O&M) in the Snake River system above Milner Dam (Michaud Flats, Minidoka, Palisades, and Ririe Projects).
- Future operations in the Little Wood River system (Little Wood River Project).
- Future O&M in the Owyhee River system (Owyhee Project).
- Future O&M in the Boise River system (Arrowrock Division of the Boise Project and the Lucky Peak Project).
- Future O&M in the Payette River system (Payette Division of the Boise Project).
- Future O&M in the Malheur River system (Vale Project).
- Future O&M in the Mann Creek system (Mann Creek Project).
- Future O&M in the Burnt River system (Burnt River Project).
- Future O&M in the upper Powder River system (Upper Division of the Baker Project).

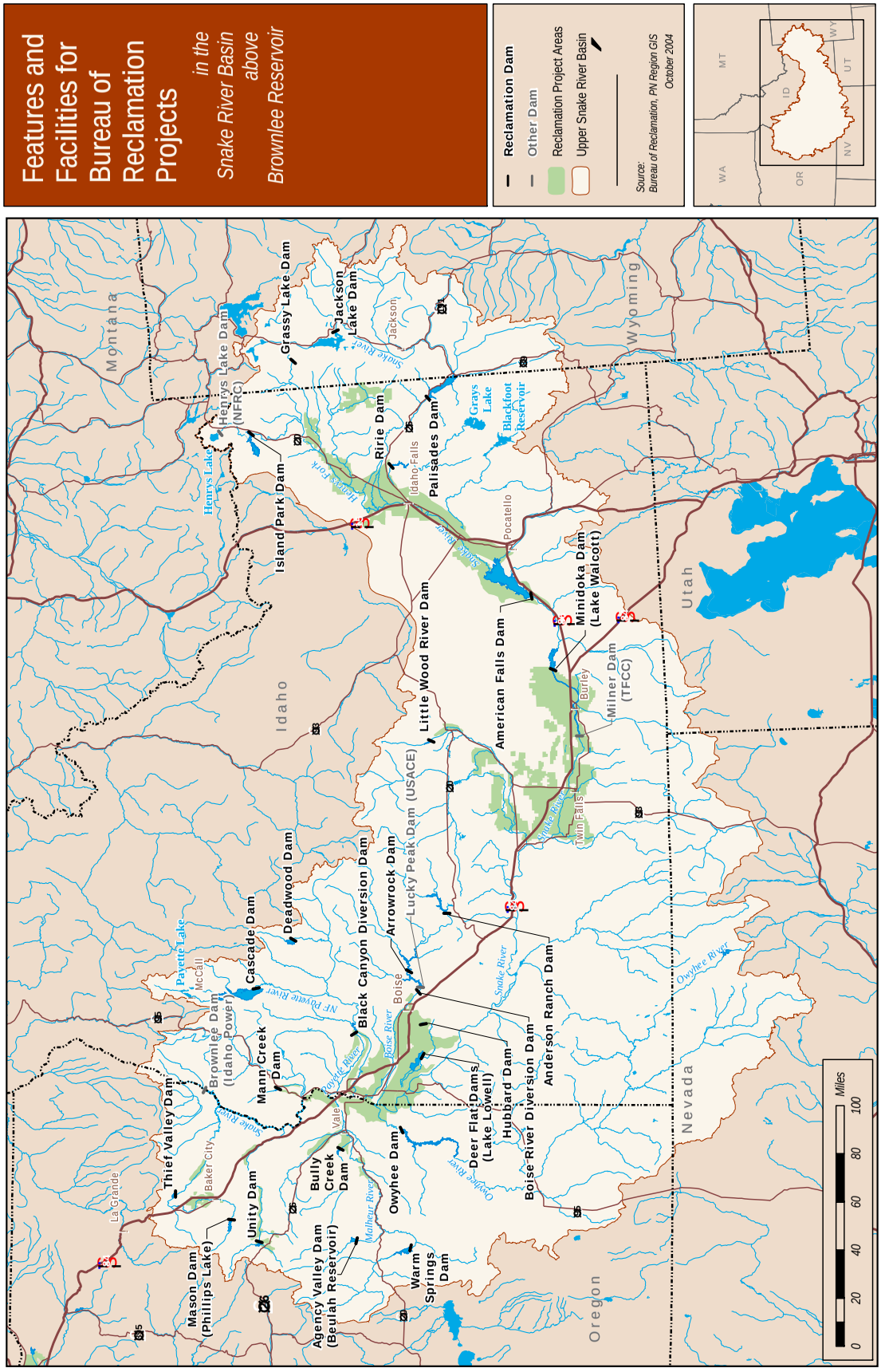

Figure 2-1. Features and facilities for Bureau of Reclamation projects in the Snake River basin above Brownlee Reservoir.

Table 2-1. Federal storage facilities included in the proposed actions.

Storage Facility [1]	Stream and River Mile	Active Capacity [2] (acre-feet)	Powerplant Owner	Operating and Maintaining Entity
Minidoka Project				
Jackson Lake Dam	Snake River 988.9	847,000	No powerplant	Reclamation
Grassy Lake Dam	Grassy Creek 0.5	15,200	No powerplant	Fremont-Madison Irrigation District
Island Park Dam	Henry Fork 91.7	135,205	Non-Federal	Fremont-Madison Irrigation District
American Falls Dam	Snake River 714.0	1,672,590	Non-Federal	Reclamation
Minidoka Dam	Snake River 674.5	95,200	Reclamation	Reclamation
Palisades Project				
Palisades Dam	Snake River 901.6	1,200,000	Reclamation	Reclamation
Ririe Project				
Ririe Dam	Willow Creek 20.5	80,541	No powerplant	Reclamation
Little Wood River Project				
Little Wood River Dam [3]	Little Wood River 78.8	30,000	Non-Federal	Little Wood River Irrigation District
Owyhee Project				
Owyhee Dam	Owyhee River 28.5	715,000	Non-Federal	Owyhee Irrigation District
Boise Project				
Anderson Ranch Dam	S.F. Boise River 43.5	413,074	Reclamation	Reclamation
Arrowrock Dam	Boise River 75.4	272,224	No powerplant	Reclamation
Hubbard Dam	New York Canal	1,177	No powerplant	Boise Project Board of Control
Deer Flat Dams	New York Canal	159,365	No powerplant	Boise Project Board of Control
Deadwood Dam	Deadwood River 18.0	153,992	No powerplant	Reclamation
Cascade Dam	N.F. Payette River 38.6	646,461	Non-Federal	Reclamation
Lucky Peak Project				
Lucky Peak Dam [4]	Boise River 64.0	264,371	Non-Federal	Army Corps of Engineers
Vale Project				
Warm Springs Dam [5]	Malheur River 114.0	169,714	No powerplant	Warmsprings Irrigation District
Agency Valley Dam	N.F. Malheur River 15.0	59,212	No powerplant	Vale Oregon Irrigation District
Bully Creek Dam	Bully Creek 12.5	23,676	No powerplant	Vale Oregon Irrigation District
Mann Creek Project				
Mann Creek Dam	Mann Creek 13.2	10,900	No powerplant	Mann Creek Irrigation District
Burnt River Project				
Unity Dam	Burnt River 63.6	24,970	No powerplant	Burnt River Irrigation District
Baker Project				
Mason Dam	Powder River 122.0	90,540	No powerplant	Baker Valley Irrigation District
Thief Valley Dam	Powder River 70.0	13,307	No powerplant	Lower Powder River Irrigation District

1 Reclamation owns all facilities unless otherwise indicated.
2 Active capacity is the volume of storage space that can be filled and released for specific purposes.
3 The Little Wood River Irrigation District owns the Little Wood River Dam.
4 The Army Corps of Engineers owns Lucky Peak Dam; Reclamation administers water service and repayment contracts for irrigation.
5 Reclamation has a one-half interest in Warm Springs Reservoir and associated storage.

Table 2-2. Federal diversion facilities included in the proposed actions.

Diversion Facility	Stream	Owner	Operating and Maintaining Entity
Minidoka Project			
Cascade Creek Diversion Dam	Cascade Creek	United States	Fremont-Madison Irrigation District
Minidoka Northside Headworks	Snake River	United States	Minidoka Irrigation District
Minidoka Southside Headworks	Snake River	United States	Burley Irrigation District
Unit A Pumping Plant	Snake River	United States	A & B Irrigation District
Milner-Gooding Canal Headworks	Snake River	United States	American Falls Reservoir District No. 2
Michaud Flats Project			
Falls Irrigation Pumping Plant	Snake River	United States	Falls Irrigation District
Owyhee Project			
Tunnel No. 1	Owyhee River	United States	Owyhee Irrigation District
Dead Ox Pumping Plant	Snake River	United States	Owyhee Irrigation District
Ontario-Nyssa Pumping Plant	Snake River	United States	Ontario-Nyssa and Owyhee Irrigation Districts
Gem Pumping Plants #1 and #2	Snake River	United States	Gem Irrigation District
Boise Project			
Boise River Diversion Dam	Boise River	United States	Boise Project Board of Control *
Black Canyon Diversion Dam	Payette River	United States	Reclamation
Vale Project			
Harper Diversion Dam	Malheur River	United States	Vale Oregon Irrigation District
Bully Creek Diversion Dam	Bully Creek	United States	Vale Oregon Irrigation District
Mann Creek Project			
Mann Creek Dam Outlet	Mann Creek	United States	Mann Creek Irrigation District
Baker Project			
Savely Dam and Lilley Pumping Plant	Powder River	United States	Lower Powder River Irrigation District

* The Boise Project Board of Control operates and maintains the dam. Reclamation operates and maintains the powerplant.

Table 2-3. Federal powerplants included in the proposed actions.

Powerplant	Stream	Impoundment	Nameplate Rating
Palisades Powerplant	Snake River	Palisades Dam	176,600 kW
Inman and Minidoka Powerplants	Snake River	Minidoka Dam	28,500 kW
Anderson Ranch Powerplant	South Fork Boise River	Anderson Ranch Dam	40,000 kW
Boise River Diversion Powerplant	Boise River	Boise River Diversion Dam	1,500 kW
Black Canyon Powerplant	Payette River	Black Canyon Diversion Dam	8,000 kW

- Future O&M in the lower Powder River system (Lower Division of the Baker Project).
- Future O&M in the upper Powder River system (Upper Division of the Baker Project).
- Future O&M in the lower Powder River system (Lower Division of the Baker Project).
- Future provision of salmon flow augmentation from the rental or acquisition of natural flow rights.
- Surveys and studies of ESA-listed aquatic snail species on Snake River above Milner Dam.

Figure 2-1 shows the locations of the 12 projects. Tables 2-1 through 2-3 show the facilities associated with each project.

The 2004 Upper Snake BA and Amendment (USBR 2004a and 2005a) describes the activities associated with these proposed actions. The *Operations Description for Bureau of Reclamation Projects in the Snake River Basin above Brownlee Reservoir* (2004b) comprehensively describes the authorities, future operations, and routine maintenance activities. The future operation and routine maintenance of the upper Snake projects remain substantially as described in these documents. However, Reclamation is proposing to make adjustments in the timing of flow augmentation water delivery, if NMFS deems the changes will benefit the listed Snake and Columbia River salmon and steelhead and their designated critical habitat.

2.3 Refinements to Upper Snake Flow Augmentation

Flow augmentation activities are associated with several of the proposed actions listed above, using water stored in Reclamation projects and also acquired natural flow rights. Acquisition and delivery of stored water is associated with three of the actions: O&M actions in the Snake River system above Milner Dam, the Boise River system, and the Payette River system. Acquisition and delivery of natural flow rights for flow augmentation is associated with O&M in the Malheur River system and the lease of 60,000 acre-feet of natural flow rights in the Snake River below Milner Dam.

Reclamation has continually modified its operations in the upper Snake to help protect and recover species that have been listed under the ESA. Beginning in 1991, Reclamation committed to delivering water to Brownlee Reservoir to augment flows below the Hells Canyon Hydropower Complex in the lower Snake and Columbia Rivers. Reclamation has continued to work to improve the reliability and amount of

water available to augment flows, operating within applicable institutional and legal constraints. Reclamation's delivery of salmon flow augmentation from upper Snake River projects includes a release regime that considers the needs of the ESA-listed salmon and steelhead and other ESA-listed species such as snails in the Snake River and bull trout in the Boise and Payette River systems.

Appendix C provides background information on the history of upper Snake flow augmentation activities, sources of flow augmentation water, and the conditions associated with providing flow augmentation from the upper Snake given the context of Reclamation's project operations and the Federal and state regulatory environment. The following sections describe the biological hypothesis for shifting the timing of some upper Snake flow augmentation water and describes how Reclamation proposes to operationally implement the proposed shift.

2.3.1 Overview

Emerging data on juvenile Snake River fall Chinook salmon migration and continued analysis of temperature data indicate that a change in timing of upper Snake flow augmentation releases may be desirable. Accordingly, Reclamation is proposing to refine its flow augmentation activities to provide water earlier in the spring season, during the May to early July period, inasmuch as possible, as opposed to the current emphasis on delivery in the June to August period. Under the current and historical patterns of releases, Reclamation has generally provided water beginning after the spring freshet when maximum storage has been achieved (which typically occurs in June) and continuing through August 31, the end of the juvenile migration season at Lower Granite Dam (April 3 through August 31). These summer augmentation flows were targeted primarily to improve conditions for Snake River fall Chinook salmon as they were then understood. However, after approximately mid-July, and especially in August, it is often necessary to provide releases of colder water from Dworshak Reservoir to prevent the occurrence of critically warm temperatures in the lower Snake River. While the current timing of augmentation releases from the Snake River provides a flow benefit, it can exacerbate this temperature control problem as water temperatures from Brownlee Reservoir releases can be warmer than desired.

NMFS staff have recommended that the regional priority on flow augmentation for the summer period be relaxed, with flow augmentation water from the upper Snake best delivered by July 31 (Graves et al. 2007). Since the 1990s, upper Snake flow augmentation was managed to benefit juvenile Snake River fall Chinook salmon migrating during the July and August period. At that time the ESU was at an extremely depressed level. However, data now indicate that the majority of the Snake River fall Chinook ESU are actively migrating primarily in June and early July rather than in July and August in the Snake River, with 95 percent of the juveniles migrating past Lower Granite Dam by mid-July in recent years (2004-to-2006) (Cook et al. 2007).

Population metrics for Snake River fall Chinook salmon are much stronger than those of most spring migrating ESUs in the interior Columbia River basin (Good et al. 2005). Accordingly, NMFS is recommending that upper Snake flow augmentation delivery be shifted to an earlier release to provide more benefit to spring and early summer migrants. This shift in timing is anticipated to benefit Snake River and Columbia River ESUs/DPSs. NMFS' staff recommendation is currently undergoing formal review by its Northwest Fisheries Science Center. Changing the release timing would also avoid increasing summer releases from Hells Canyon Dam when water temperatures are warmer than desired. In addition, providing water earlier may conserve Dworshak Reservoir storage and may improve the efficacy of Dworshak Reservoir releases. The proposed timing shift for upper Snake flow augmentation delivery has been incorporated into the *Comprehensive Analysis* (USACE et al. 2007b) and is included in the effects analysis of this BA. NMFS will also consider this proposed refinement as it prepares biological opinions for the FCRPS and Upper Snake remand consultations.

Based on these observations and NMFS' recommendations, Reclamation has investigated shifting reservoir releases for flow augmentation to earlier in the spring subject to confirmation of the biological benefits by NMFS. Reclamation reviewed system operational flexibility, state accounting procedures, and operational thresholds identified to minimize incidental take for other ESA-listed species (bull trout and aquatic snails) to determine if it would be possible to shift the timing of flow augmentation to release more water during the spring, which would more closely mimic the shape of the natural spring freshet. Reclamation has made an initial determination that it can achieve this and still operate within the range of operations articulated in the 2004 Upper Snake BA and supporting documents. This shift in delivery of flow augmentation water can be accomplished in accordance with the Nez Perce Water Rights Settlement.

Reclamation is willing to modify the flow augmentation releases, within the limits established by the Nez Perce Water Rights Settlement, in a manner that best serves the needs of listed salmon and steelhead as determined by NMFS and supported by the science. Reclamation proposes to use an adaptive management approach with respect to its flow augmentation releases from the upper Snake and can refine releases to an earlier timeframe if NMFS confirms its biological benefits. Conversely, if new data reveal that a different schedule would better benefit listed fish, or that a shift in timing from the mid-July through August period to the spring period is not helpful, Reclamation will adapt accordingly, within the constraints defined in the Nez Perce Water Rights Settlement and described in Chapter 2 and documents referenced there.

Anticipated flows under current flow augmentation management were modeled and described in the 2004 Upper Snake BA. Reclamation has conducted additional modeled analyses presented in this 2007 Upper Snake BA to assess operational

flexibility to implement the proposed refinements to flow augmentation management. It is important to note that the annual volume would not change, only the timing of augmentation delivery.

Reclamation proposes to address its year-to-year decisions on managing reservoir releases for flow augmentation with the Technical Management Team (TMT), which coordinates in-season flow augmentation from the FCRPS. The TMT is an interagency technical team that makes recommendations on FCRPS dam and reservoir operations for ESA-listed salmon. Membership includes representation from the FCRPS action agencies (Reclamation, BPA, and USACE), NMFS, and Tribal and state fish managers. While Reclamation is proposing to follow an adaptive management approach in providing water for flow augmentation, it is important to note that limitations exist. For example, Reclamation typically makes flow augmentation decisions in April and May and may need significant lead time in order to change the start date for flow augmentation releases from those established. Possible effects on other ESA-listed species will need to be considered for the timing and volume of releases, as would constraints on changes in river stages after the spring freshet.

The proposed operations described here are an example of what could be done and also represent the system operational flexibility that Reclamation believes to be possible. Actual implementation of earlier spring flow releases may require a transition period to develop smooth operations and address the institutional and administrative issues. Some examples may include: agreement on accounting procedures; estimating available water for flow augmentation prior to full reservoir accrual; irrigator willingness to commit rental volumes prior to final fill; public concerns about not filling reservoirs completely; and the challenge of balancing these operations so as not to affect the resident ESA species including bull trout and aquatic mollusks. In spite of these considerations, Reclamation believes that most reservoir storage releases for flow augmentation can be shifted from the current period of June through the end of August to a primarily May to July period as described in the following text. Some storage releases will remain in August because of either operational constraints or water year type. Natural flow rights continue to be provided in the April 3 through August 31 period.

2.3.2 Proposed Flow Augmentation Operational Refinements

The following text describes the proposed operational refinements that can be implemented to shift flow augmentation delivery to the spring season. Appendix C provides background information on flow augmentation, including the potential sources of flow augmentation water.

2.3.2.1 Snake River above Milner Dam System

Reclamation obtains flow augmentation water using uncontracted storage, powerhead space in some years, and water leased from the Water District 01 Rental Pool and Shoshone-Bannock Tribes Tribal Water Bank (see Table C-1). The potential for earlier flow augmentation releases past Milner Dam, along with volume distribution, would largely depend on the water year type. Water is typically "spilled" past Milner Dam during the spring in most years. "Spill" past Milner Dam refers to natural flows that are in excess of demands for storage or irrigation, which essentially means any flow above zero cubic feet per second (cfs) (the State-recognized minimum flow). Flows are also released for a specific purpose, such as for flow augmentation or Idaho Power's 200 cfs release to meet its Federal Energy Regulatory Commission (FERC) license requirement (when available) for the Milner Powerplant. The amount, rate, and timing of water passing Milner Dam are dictated most directly by the operations at American Falls Dam and Reservoir. A shift in the timing of flow augmentation delivery would attempt to provide augmentation water into the May through July timeframe, with the majority being released in May and June.

In very high runoff years, significant spill would occur throughout the entire spring past American Falls Dam, and subsequently Milner Dam (usually in excess of 10,000 cfs, and often lasting through most of June). Flood flows passing Milner Dam in high runoff years would likely preclude augmentation releases prior to late June/early July because of the magnitude of required reservoir releases for flood control. In addition, larger releases in those very wet conditions could exacerbate dissolved gas conditions at lower Snake and Columbia River dams. Once the high flood flows recede, flows from American Falls Reservoir could be held high and near the flood release rate (rather than ramping down to follow the receding inflow), to provide most or all of the annual flow augmentation volume during July. Alternatively, the flow augmentation release rate(s) could be selected to distribute the water into August if desired. In very low runoff years, the combination of low flows past Milner Dam and low volumes of flow augmentation water available would allow delivery of augmentation water in May, or even into April, if desired. Most years (53 of 73 years modeled) will fall in between the "very high runoff" and "very low runoff" year categories.

The spring freshet is spilled past Milner Dam as part of flood control operations; rather than quickly ramping down releases following the spring freshet, augmentation releases would begin at the tail end of the spring freshet, by continuing to release flows past Milner Dam at close to the same rate. For example, if 8,000 cfs were being spilled past Milner Dam, rather than ramping down at the end of the spring freshet, outflows could be held near the 8,000 cfs level for an additional 2 weeks to provide the entire flow augmentation volume from above Milner Dam. The start time each year would depend on flood control (spill) releases past Milner Dam and the volume of augmentation water to be provided, with flow augmentation provided after flood releases. Rates and timing would also rely on conditions in the lower Snake River and input from the Technical Management Team (or equivalent). In all years, American Falls Reservoir could be allowed to reach maximum contents before flow augmentation releases are started, yet still deliver the entire volume by mid-July.

Reclamation's current down-ramping rates at Milner Dam constrain the ability to accommodate an earlier delivery of augmentation water and would need to be relaxed. The 2004 Upper Snake BA proposed action defined augmentation release rates at Milner Dam of 1,200 cfs to 3,000 cfs, beginning after June 20 and continuing through August, with a down-ramping rate of 100 cfs per day. The release rates at Milner Dam required to effectively shift augmentation to earlier in the season will likely need to be in the 3,000 cfs to 8,000 cfs range. These rates cannot be achieved with a ramping rate of 100 cfs per day. For example, flows of 3,000 cfs would take about 50 days with ramp down of 100 cfs per day to deliver augmentation water, which may render the timing shift ineffective. With flows of 8,000 cfs, it is not possible to implement a 100 cfs per day ramp rate without far exceeding the available volume of augmentation water.

Aquatic snails listed under the ESA occur in reaches of the Snake River above and below Milner Dam. Reclamation has initiated discussions with the U.S. Fish and Wildlife Service (USFWS) on this matter and expects to be able to change ramping rates in order to accomplish a shift in delivery timing without affecting the listed snails.

2.3.2.2 Boise River System

Reclamation obtains flow augmentation water in the Boise River system using uncontracted storage, powerhead space in some years, and, on rare occasions, water leased from the Water District 63 Rental Pool when made available by willing lessors (see Table C-1). Because of the relatively small volume of flow augmentation water that is derived from the Boise River system (approximately 41,000 acre-feet maximum), flexibility exists for refining releases to the May and June timeframe. However, flow augmentation releases must be balanced with the needs of ESA-listed bull trout that occur within and downstream of Arrowrock and Anderson Ranch Reservoirs.

In low runoff years with little or no flood control releases, operational flexibility exists to deliver flow augmentation water in May (or even April if desired). In all other water year types when flood control releases are necessary, two possible operating strategies could accomplish earlier delivery of flow augmentation. Flow augmentation releases could occur immediately after flood control operations. Flood control releases typically run several thousand cfs (or more) above irrigation demands. Near the end of flood control operations, rather than ramping down until irrigation demand is met, releases would be held at a higher rate until the entire flow augmentation volume is delivered. For example, an additional 2,060 cfs released for about 10 days would provide 41,000 acre-feet of flow augmentation. In years when the Boise River is near channel capacity, it would not be possible to release flow augmentation water until late June or early July. In most other years, operational flexibility would allow for earlier releases from late May to mid-June.

As an alternative strategy in years with flood control operations, Reclamation would operate to fill the Boise River system to a level less than an amount equivalent to the flow augmentation volume for that year (rather than filling to the maximum). For example, the capacity of the three storage reservoirs on the Boise River is 949,700 acre-feet. If Reclamation determined that 41,000 acre-feet is available for flow augmentation from those reservoirs, it would lower the target "full" volume to 908,700 acre-feet, and only fill to this reduced volume. It is important to recognize that in such an example, some water may be temporarily stored in the top 41,000 acre-feet of reservoir storage, depending on the magnitude and timing of the spring freshet, to safely manage spring flood flows. This water would, however, be evacuated as quickly as practical. The result of this activity would be that the physical peak reservoir storage would be 41,000 acre-feet less than reservoir capacity. This action would be completed by the time the spring freshet ended, which may occur as early as April in dry water years or as late as late June or even early July in wet years. Reservoir accounting would properly identify the flow augmentation volume provided.

2.3.2.3 Payette River System

Reclamation obtains flow augmentation water in the Payette River system using uncontracted storage and water leased from the Water District 65 Rental Pool (see Table C-1). Operational flexibility in the Payette River system to make earlier flow augmentation releases is not as great as for the Snake River above Milner Dam or Boise River systems because of a wide variety of issues that include high flood control releases, impacts to water quality, safety issues, and ESA-listed bull trout that are present within and below some reservoirs. However, there is some flexibility in most years to modify delivery of about 40,000 acre-feet from Cascade Reservoir into the May/June timeframe of the total 95,000 acre-feet of storage Reclamation has made available for flow augmentation in the Payette River system.

Cascade Reservoir is a water quality limited resource and it has been determined that reduced summer water volumes may contribute to failures to meet water quality standards. Therefore, Reclamation has limited ability to shift all Cascade Reservoir releases out of the late July through end of August period. Reclamation could reduce the maximum fill at Cascade Reservoir by 40,000 acre-feet (or 1.5 feet below full pool elevation), except during emergency flood control operations, thus releasing some flow augmentation water by the time the spring freshet is complete. Any water stored in this space during emergency flood control operations would be temporary and evacuated as soon as possible.

In an alternative operational strategy, Reclamation could provide 40,000 acre-feet of augmentation water by maintaining higher releases immediately following the spring freshet, rather than ramping down to follow the inflow recession.

In very low water years, when less than 40,000 acre-feet total augmentation water is available from the Payette system, it is assumed all augmentation water would be provided in May. This water year type occurs in only 3 of the 73 years modeled.

In other low water years, when total augmentation volumes from the Payette system are less than 95,000 acre-feet but greater than 40,000 acre-feet, it is assumed releases would occur in the May through July period, with no August releases available. This occurs in 10 of the 73 years modeled.

In all other years, provision of flow augmentation would continue into the months of July and August. The 40,000 acre-feet of augmentation provided in May and June is essentially shifted from the current July and August delivery timeframe

Deadwood Reservoir flow augmentation releases would continue to be managed to provide delivery by mid-July.

Cascade Reservoir would be drafted to the same September 1 elevation with this operational strategy as with current operations. The reservoir would be 40,000 acre-feet lower than typically occurs for current operations on July 1, and 20,000 acre-feet lower on August 1. However, these elevations are not considered significant differences and are still within the operational ranges described in the 2004 Upper Snake BA.

It is believed that this operation could be achieved without materially impacting water quality and could marginally improve some conditions by allowing for the establishment of vegetative cover along the shoreline. This operation would greatly reduce shoreline erosion that occurs at full pool elevation and also offer an additional flood control buffer against late season rain events.