Chapter 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The following discussions concerning the environmental consequences of implementing the contract renewal or conversion alternatives focus primarily on changes or lack of changes in ways Lucky Peak contractors may use their contracted storage and what that means to river and reservoir operations. The discussions focus on resources that have the potential to be affected by hydrological and operational changes.

3.1 Hydrology and Boise River Reservoir System Operations

3.1.1 Affected Environment

Hydrology

Lower elevations of the Boise River basin consist of wide valleys and are semiarid with warm, dry summers and cold winters. Upper elevations are forested and mountainous. Precipitation at the lower elevations averages approximately 10 inches annually. Precipitation at higher elevations averages up to 40 inches per year with most falling as snow during the winter (Reclamation 1997). Natural river flows are high in the spring and early summer as the snow melts, decline throughout the summer to a minimum, and remain low during the fall and winter.

The Boise River originates as three forks—the North Fork, Middle Fork, and South Fork—to the east and northeast of the city of Boise. Flow of the three forks is generally west and southwest to where they join to form the main stem approximately 20 miles east of the city of Boise. Mores Creek, and its major tributary, Grimes Creek, flow generally south, drain an area to the west of the three forks of the Boise River, and flow into Lucky Peak Reservoir. The Boise River continues west through the city of Boise and past the edge of the city of Caldwell to join the Snake River. Approximately 4,130 square miles, including parts of Ada, Boise, Camas, Canyon, Gem, Elmore, and Payette counties, are drained by the Boise River (Reclamation 1997).

Boise River Reservoir Storage Allocations

There are three onstream storage reservoirs on the Boise River with a total storage capacity of over 1,000,000 acre-feet. Lucky Peak Reservoir was constructed by USACE and Arrowrock and Anderson Ranch Reservoirs were constructed by Reclamation. Table 3-1 shows the storage capacity and use of storage for each of these three reservoirs. Eighty percent of the reservoir system storage is contracted for irrigation.

Fiftytwo percent of the Lucky Peak Reservoir storage is assigned to provide winter flows below Lucky Peak Dam. The 71,018 acre-feet of storage allocated to the 19 water service contracts represents 24 percent of the Lucky Peak storage and about 7 percent of the total Boise River reservoir system storage. The remaining storage is used for salmon flow augmentation (14 pecent) or is inactive (10 percent).

Boise River Reservoir System Operations

The dominant operating functions in the Boise River reservoir system are flood control, irrigation, and recreation, with additional releases for salmon flow augmentation and winter stream flows. Although storage space and the use of water are dedicated to specific purposes, the way water is moved among the reservoirs can provide incidental benefits to other purposes such as recreation, fish and wildlife enhancement, and power generation. Flood control operations of the reservoir system are based on several congressional acts, particularly the Flood Control Act of 1944. Flood control operations at Reclamation reservoirs on the Boise River are coordinated between Reclamation and USACE.

During construction of Lucky Peak Dam, USACE and Reclamation developed a coordinated plan for the operation of the three-dam system in consultation with related downstream diversion and storage facilities. The USACE and Reclamation developed a Memorandum of Agreement, dated November 20, 1953, and a Manual for Flood Control Operation of Boise River Reservoirs. Today, the Boise River reservoir system is operated under a supplement to the Memorandum of Agreement and the 1985 revision to the manual, entitled *Water Control Manual for Boise River Reservoirs, Boise River, Idaho*.

There are three general operating seasons based on climatological pattern, runoff, and irrigation demand: (1) maintenance from November through March, (2) flood control and refill from April through July, and (3) drawdown from August through October. The beginning and ending of the three operating seasons can vary widely with weather conditions and the water supply (Reclamation 1997). Drawdown for flood control, storage release for irrigation demand, and reservoir refill may occur in the same

Table 3-1. Boise River Reservoir System Space

		Active Capacity						
Reservoir	**Total Capacity**	**Active**	**Contracted[1]**	**Formally Assigned to Other Uses**	**Formally Assigned to Flow Augmentation**	**Inactive**	**Flood Surcharge[2]**	**Dead**
Anderson Ranch	493,200	413,100	422,800	0	0	41,000[3]	10,500	29,000
Arrowrock	272,200	272,200	286,600	0	0	0	14,250	0
Lucky Peak	293,100	264,370	71,018	152,420[4]	40,932[5]	28,730[6]	13,905	0
TOTAL	1,072,900	964,070	780,418	152,420	40,932	69,730	38,655	29,000

[1] Except for Lucky Peak, all contracts are spaceholder (share of reservoir capacity) repayment contracts. Lucky Peak contracts are spaceholder Water Service Contracts. Contracted amount does not reflect loss of storage capacity to sedimentation in Arrowrock and Anderson Ranch.
[2] Above the spillway and not storable.
[3] Reserved for power head.
[4] Boise River streamflow maintenance of which 50,000 acre-feet is reserved for IDFG.
[5] Reacquired or acquired as mitigation by Reclamation for salmon augmentation flows.
[6] USACE dead pool for reservoir fishery.

time frame for different reservoirs because of elevation difference and the demand for irrigation at lower elevations.

Reservoir operations can vary greatly from year to year depending on water supply and other factors so that the above schedule is shifted to earlier or later months. For example, flood control operations may begin as early as January in years with high runoff forecasts. During dry years, reservoir drawdown may begin as early as April.

Water rights for irrigation are the primary basis for reservoir releases during the irrigation season, which is considered to be from April 1 to November 1. Irrigation diversions usually begin around April 15 and end by October 15, with the highest demand in July (Reclamation 2001b).

Lucky Peak Dam Operations

Lucky Peak Dam is located on the Boise River approximately 11.4 river miles downstream from Arrowrock Dam. The USACE operates the dam primarily for flood control with storage for irrigation and other purposes. During the irrigation season, USACE continues to operate Lucky Peak Dam and Reservoir; however, operations are coordinated with Reclamation. The Boise River watermaster is responsible for ordering releases for irrigation and water accounting.

Unless drought or flood control conditions are overriding, Lucky Peak Reservoir is generally filled by Memorial Day to provide recreation opportunities. In good water years, Lucky Peak in usually maintained nearly full until Labor Day. It is drafted to meet irrigation demand during the latter part of the irrigation season as natural flows decline, and typically maintained at a low level during the winter months for flood control purposes. In drought years, Lucky Peak is drafted when releases from Arrowrock are insufficient to meet irrigation demand. This could be as early as late June. When irrigation season ends, releases from Lucky Peak are reduced to the winter minimum stream maintenance flow of 240 cfs in good water years or as low as 150 cfs in dry years. Water for winter flows is drawn from the 152,300 acre-feet of storage in Lucky Peak dedicated to this use. Lucky Peak Reservoir storage and outflow depend on many factors such as daily, seasonal, and annual precipitation; air temperature; natural streamflow; and irrigation demand, and as a result are highly variable. Figure 3-1 and Figure 3-2 illustrate typical end of month reservoir content and outflows for good (1983), average (1980), and low (1992) water supplies.

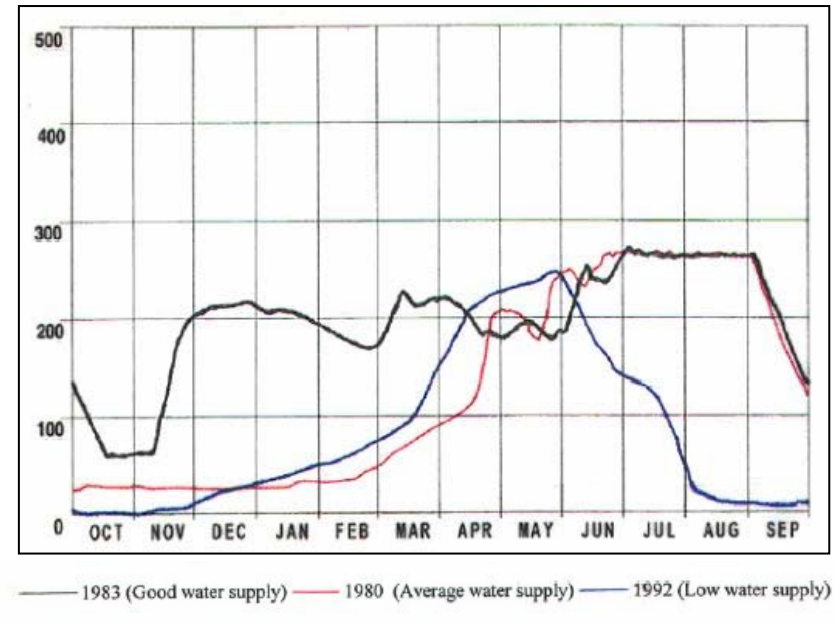

Figure 3-1. Contents of Lucky Peak Reservoir (1,000 acre-feet)

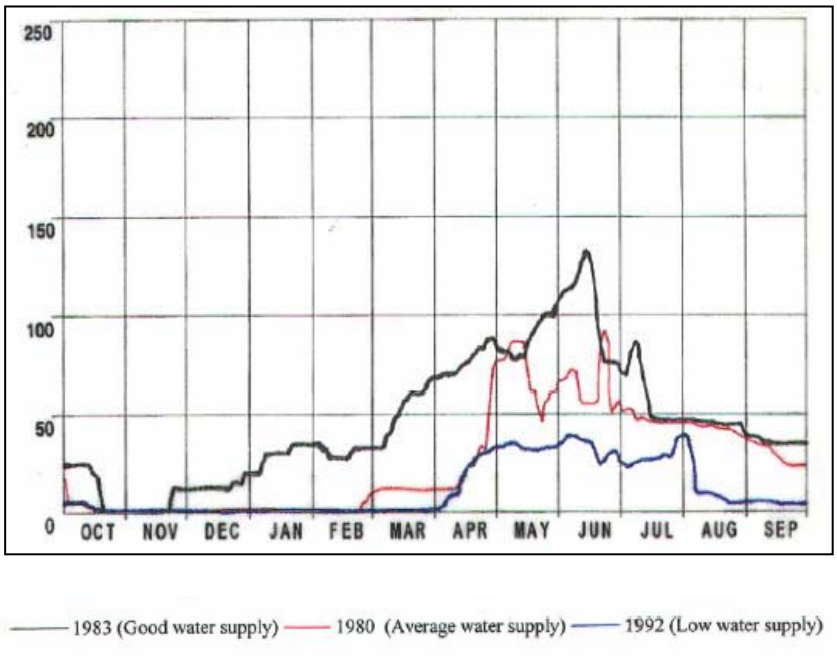

Figure 3-2. Outflow of Lucky Peak Reservoir (100 cfs)

Other Boise River System Dams and Reservoirs

The following overview summarizes the other facilities of the Boise River reservoir system and the operation of those facilities. The reservoirs of the Boise River system are operated as a unified storage system to maximize the storage capability. More detailed accounts of individual facilities and operations can be found in *A Description of Bureau of Reclamation System Operation of the Boise and Payette Rivers* (Reclamation 1997).

The five major dams, including one diversion dam, of the Boise River reservoir system are as follows: Anderson Ranch, Arrowrock, Lucky Peak, Boise River Diversion, and Deer Flat Dams. Regulation of the reservoirs for flood control and refill is based on forecasts of expected runoff volumes from the Boise River watershed. Reclamation and USACE prepare independent runoff forecasts and jointly agree on the operational runoff volume forecast. To the extent possible, water is stored in the uppermost reservoir (Anderson Ranch Reservoir). Water rights accounting is maintained to ensure, regardless of where water is physically stored, the storage and use of water are properly accounted to the appropriate rights and spaceholders. Table 3-1 summarizes reservoir space in the Boise River basin.

Anderson Ranch Dam and Reservoir

Anderson Ranch Dam on the South Fork Boise River and approximately 47.5 river miles upstream from Arrowrock Dam, was completed by Reclamation in 1950 as part of the Boise Project. The dam is a zoned earthfill structure 456 feet high. Anderson Ranch Reservoir is the largest of the three onstream Boise River reservoirs with an active capacity of approximately 413,100 acre-feet and a water surface area of more than 4,700 acres. The original active capacity of 423,200 acre-feet has been reduced due to sedimentation.

Releases from Anderson Ranch are managed conservatively to retain as much carryover as possible and to not exceed the powerplant capacity of approximately 1,600 cfs. Releases, however, of more than 5,000 cfs have been made during the flood control season. A release of 300 cfs is maintained from September 15 through the following March 31 and is increased to 600 cfs from April 1 until irrigation demand or flood control needs dictate higher releases.

Arrowrock Dam and Reservoir

Arrowrock Dam, constructed in 1915, is located on the Boise River at river mile 75.4, approximately 17 river miles upstream from the city of Boise, Idaho. Arrowrock

Reservoir is contained in a moderately deep canyon carved by the Boise River. At full pool, water is backed up past the confluence of the Middle and South Forks, so the reservoir is shaped like the letter Y. Arrowrock Reservoir has an active capacity of 272,200 acre-feet, down from its original capacity of 286,000 acre-feet due to sedimentation, and a water surface area of approximately 3,100 acres.

Most of the runoff during the winter and early spring is held initially in Arrowrock Reservoir, which is the first reservoir in the Boise River system to be drafted to meet irrigation demand. Arrowrock Reservoir is drafted to a pool as low as 19,100 acre-feet (elevation 3078 feet) in very dry years; however, the average end-of-October elevation when the reservoir is near its lowest level is about 50,000 acre-feet.

Boise River Diversion Dam

Boise River Diversion Dam is located approximately 7 miles southeast of Boise, Idaho, on the Boise River and approximately 2 miles downstream from Lucky Peak Dam. The Diversion Dam was completed in 1908 and is the diversion point for the New York Canal which delivers irrigation water to Lake Lowell and lands southwest of Boise and Nampa, and the much smaller Penitentiary Canal which serves northeast Boise.

Once the irrigation season begins in mid-April, water is released from Lucky Peak Dam and diverted at the New York and Penitentiary Canals, with the remaining flow passing over the Diversion Dam spillway to serve downstream irrigation and municipal and industrial use. Flood control releases in excess of irrigation and municipal and industrial use demands pass over the Diversion Dam in spring and early summer of normal to wet years.

Deer Flat Dams

The Deer Flat Dams consist of four earthen embankments that impound Lake Lowell. Lake Lowell, an offstream reservoir located south of Nampa was constructed as part of the Boise Project. Lake Lowell has an active capacity of 159,400 acre-feet.

The normal operation of Lake Lowell is to fill the reservoir between irrigation seasons and release water as needed for irrigation. Filling is accomplished by release of water from Anderson Ranch and Arrowrock Dams. This water is passed through Lucky Peak Dam and diverted at the Boise River Diversion Dam to the New York Canal, which carries the flow to Lake Lowell. Water is diverted to fill Lake Lowell by a target date of April 1.

Boise River Water Rental Pool

Water rental pools are operated for the purpose of renting storage water from willing lessors to other water users for any beneficial purpose recognized by the laws of the state of Idaho. Rental pool refers to the water leasing and rental activities administered by the local committee appointed by the Idaho Water Resources Board (IWRB).

Rental pool procedures provide incentives for those owning reservoir space and having stored water to make such space or water available to other users. Rental pools also allow willing lessors to be paid for this storage water use.

The Boise River rental pool for Water District No. 63 (District) was formed in 1988 pursuant to Idaho Code section 42-1765 (Riggin and Hansen 1992). The general purpose of the Boise River rental pool is to ensure that stored water is maintained and first made available for irrigation use (IDWR 1997). Supplies not rented revert to the lessor after the irrigation season.

Any contracting entity that owns reservoir space in the District may assign any portion of its space to the Boise River rental pool. The amount of space that fills in the spring is the amount of water available for rental. All space assigned to the rental pool is under the control of the watermaster and the committee for the duration of the lease.

Irrigators (lessors) that assign space to the rental pool before July 1 share proportionally in the proceeds from rentals attributable to that space (Riggin and Hansen 1992). Lessors that assign space after July 1 receive proceeds on a first come basis, whereby the first lessor to assign space is paid first. Payments to the lessor are made only if stored water is subsequently rented from the rental pool.

The storage space for water leased to the Boise River rental pool that is rented to users outside the hydrologic basin of the Boise River or below the confluence of the Boise River and the Snake River is the last space to fill in the ensuing year. The rental pool is designed to benefit water users in the basin. Irrigators (lessors) who place water in the Boise River rental pool can designate that their water be leased only within the basin (Sisco 2002).

Prior to June 1, the first priority in renting stored water from the rental pool is given to those irrigators owning contracted space in the District reservoirs. After June 1 and until July 15, priority extends to all other irrigation water users within the District. After July 15, priority is given to all other users within the District who desire to rent water for any beneficial purpose (Riggin and Hansen 1992). Rented water must be used by March 1 of the following year unless the committee grants an extension.

Rental pool rules and leasing prices are determined by the local water rental pool organization and then subsequently approved or denied by the IWRB. The rental price of stored water in the Boise River rental pool for users in the hydrologic basin of the Boise River is currently $6.50/acre-feet, which includes an administrative fee and a 10 percent surcharge paid to IWRB. The rental price of stored water to be used outside of the hydrologic basin of the Boise River is $6.93/acre-feet, which includes an administration fee and a 10 percent surcharge paid to IWRB.

In a normal water year, between 2,000 to 3,000 acre-feet of water is typically leased through the Boise River rental pool, of which approximately two-thirds comes from Lucky Peak Reservoir storage (Sisco 2002). In general, irrigators (lessors) with the most senior priority water rights have the smallest contract entitlements and are less likely to place water in the rental pool (Sisco 2002). Irrigators (lessors) with more junior water rights and larger contract entitlements place water in the rental pool conservatively.

Salmon Flow Augmentation

Since 1991, Reclamation has provided up to 427,000 acre-feet annually from the upper Snake River for flow augmentation in the lower Snake River and Columbia River to aid migrating salmon smolts. Reclamation has acquired most of the water for flow augmentation on a year-to-year basis through water rentals and from uncontracted Reclamation storage in the upper Snake, Boise, and Payette River basins with less than 10 percent coming from the Boise River basin.

Water acquisition from the Boise River for flow augmentation has been primarily from uncontracted storage in Lucky Peak Reservoir and in very dry years from inactive space in Anderson Ranch Reservoir. In 1997 Reclamation acquired 40,932 acre-feet of space in Lucky Peak Reservoir for flow augmentation. Because all of the water used for flow augmentation passes through the Boise River rental pool and is subject to its last-to-fill rule when used outside the Boise River basin, in very dry years, it may not refill. The full 40,932 acre-feet of flow augmentation was provided from this acquired storage in 1998, 1999, and 2000; all fairly good water years. However, in 2001, a very dry year, none of this storage filled, and in 2002 and 2003 only a portion was refilled.

Flow augmentation water is usually released from Lucky Peak Dam in July and August and increases the flow in the river below Lucky Peak Dam by about 400 cfs over irrigation releases.

Contractors' Use of Lucky Peak Storage

Lucky Peak contractors rarely call for delivery of their full Lucky Peak storage entitlement during a single irrigation season for several reasons, and those reasons are unique to each season. In the Boise River basin, storage provides a safety net, much like a savings account or insurance policy, to supplement natural flow water rights as water supplies decline and deliveries of natural flow water rights are curtailed. Natural flow is the flow of water produced by runoff from snow melt that passes through the reservoir system during the irrigation season, whereas storage is water captured and retained in reservoirs during the nonirrigation season.

In average and above-average water years, there is a greater supply of natural flow available for delivery during more of the irrigation season than in below-average water years, so that curtailments of natural flow water rights deliveries come later in the season. With a more plentiful supply of natural flow, the contractors have a decreased need for storage to supplement natural flow deliveries. During average and above average years, the Lucky Peak contractors may collectively use only about 2,000 to 4,000 acre-feet of their 71,000 acre-feet of storage, with the rest remaining in the reservoirs as carryover or a small amount placed in the water rental pool. This is shown in Figure 3-3 for years such as 1993 and 1996-1999.

An example of the amount of storage needed in a dry year to supplement the contractors' natural flow water rights as they are curtailed can be illustrated by examining a very dry year such as 1992. In 1992, when runoff was 41 percent of normal, the amount of storage needed to fully supplement the contractors' natural flow water rights (i.e., replace the lost water supply as the natural flow water rights are curtailed) was 303,712 acre-feet (appendix A). In the aggregate, the 18 contractors have a total of 140,534 acre-feet of storage space in Arrowrock, Anderson Ranch, and Lucky Peak Reservoirs, resulting in an aggregate shortfall during a year such as 1992 of 163,178 acre-feet. None of the contractors have a sufficient amount of storage space to fully supplement their natural flow water rights during such a year. The actual shortfall during a year such as 1992 which followed two previous dry years is greater, because most of the contractors' storage space does not fill.

Over the past century of water delivery, the contractors have seen many cycles of below-normal and drought conditions. As a result of this experience, they understand that a low water year is often followed by more low water years, during which natural flow supplies are reduced and reservoir storage does not fill. For this reason, in low water years, the contractors balance their obligations to meet current water needs against the need to preserve as much storage as possible for use during the following irrigation season. If possible, they avoid withdrawing all remaining storage so that there will be storage

available during the following year. In anticipation of reduced natural flow and storage supplies, irrigators change cropping patterns and prepare to be out of water earlier in the year. As with a savings account, Lucky Peak storage provides security so long as there is water in the account. By carrying over storage, the contractors moderate the effects of successive low water years so that they can continue to supplement their natural flow water rights.

Table 3-2 indicates how during three consecutive dry years some contractors relied on carryover storage for drought protection. Two of the contractors, Fairview Acres and Canyon County Water Company, still had some carryover after three dry years, although it was greatly diminished; while two others, Farmers Union Ditch Company and Ballentyne Ditch Company, had exhausted their supply. Both Table 3-2 and Figure 3-3 show how the lower use of storage during a prolonged dry period is often related to a lack of supply rather than a reduced need. These and other contractors would have used their full supply if it had been available.

Storage use and need are affected by the timing as well as the total quantity of natural flow from snow melt. Atmospheric conditions (air temperatures and solar radiation) affect the rate and timing of runoff from snow melt. Cooler spring and summer temperatures can result in lower natural flows over a longer period of time, whereas warmer temperatures can result in higher natural flows during the early irrigation season and lower flows during the later irrigation season. These effects can be experienced during low, average, and high water years.

Figure 3-3 also shows that overall use of Lucky Peak storage for single dry years in 1977, 1994, and 2001 is very similar. This is an indication that the contractors' need for supplemental irrigation has not been significantly diminished with urbanization of farmland in their service areas and stored water from Lucky Peak continues to be beneficially used.

Another factor affecting available irrigation storage is sedimentation of Arrowrock and Anderson Ranch Reservoirs. Since storage contracts were entered into, Arrowrock has lost approximately 13,800 acre-feet of storage and Anderson Ranch has lost 10,100 acre-feet. The amount of storage under contract has been reduced proportionately for each contractor with storage in these reservoirs.

Water Service Contract Assignment Provisions

The Lucky Peak water service contracts allow for the assignment of all or a portion of the contract entitlements with the approval of Reclamation. Reclamation's approval of assignments is subject to NEPA compliance. To date there have been two assignments of

Lucky Peak contract entitlements approved; three more are pending. These are listed in section 1.3.

Table 3-2. Examples of Lucky Peak Storage Use in Three Consecutive Dry Years (1990-1992)

Lucky Peak Contractor	1990 64% Normal Runoff	1991 55% Normal Runoff	1992 43% Normal Runoff
Fairview Acres (1,500 ac-ft contracted)			
Carryover	934	1,117	616
New fill	466	112	312
Available	1,400	1,229	928
Used	283	614	599
Canyon County Water Co. (6,000 ac-ft contracted)			
Carryover	3,134	3,506	2,324
New fill	1,863	449	1,247
Available	4,997	3,955	3,571
Used	1,489	1,631	1,874
Farmers Union Ditch Co. (10,000 ac-ft contracted)			
Carryover	2,160	653	0
New fill	3,105	748	2,079
Available	5,265	1,400	2,079
Used	4,612	1,400	2,079
Ballentyne Ditch Co. (1,300 ac-ft contracted)			
Carryover	877	956	14
New fill	404	97	270
Available	1,281	1,054	284
Used	325	1,040	284
All Contractors (71,018 ac-ft contracted)			
Carryover	42,020	37,774	11,709
New fill	17,836	5,003	17,133
Available	59,856	42,777	28,842
Used	22,082	31,068	16,991

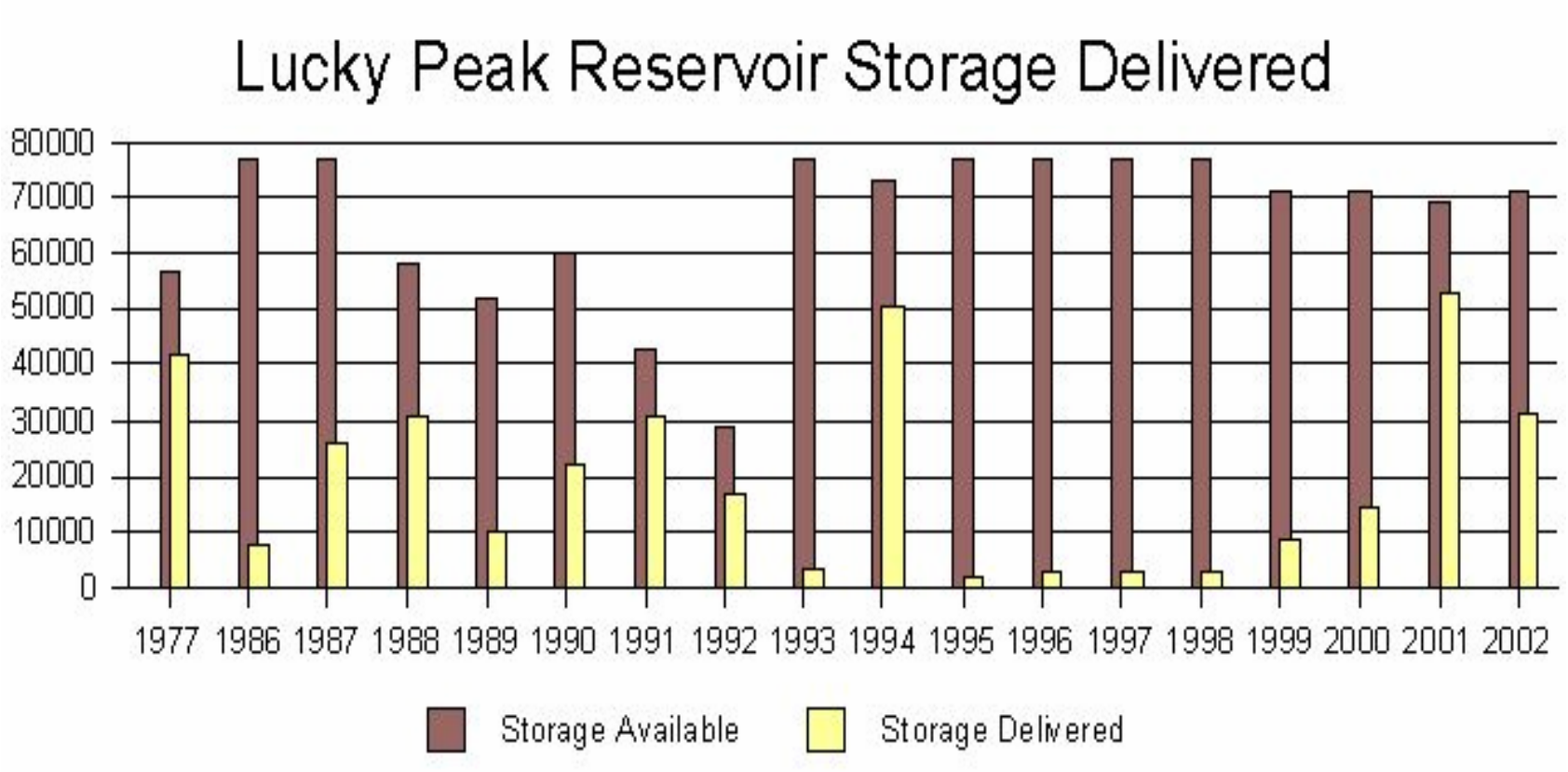

Figure 3-3. Lucky Peak Storage Available and Storage Delivered (source: District 63 Watermaster Annual Reports)

3.1.2 Environmental Consequences

No Action Alternative

Reservoir operations and river flows would be expected to exhibit the annual patterns similar to those of the last 10 to 15 years. Operations would continue to vary depending on annual changes in runoff. Irrigation and flood control would continue to be dominant functions, and releases for instream flows and salmon flow augmentation, and maintaining the Lucky Peak pool for reservoir recreation would continue.

Lucky Peak contractors would continue to use Lucky Peak supplemental storage as they have in the past as described in section 3.1.1. Use would be low and carryover high in wet to normal water years and use high and carryover lower in dry periods.

The contractors would continue to supply water to many areas that are being urbanized within their service area through means such as pressurized irrigation systems in residential subdivisions. Data from the most recent drought year in 2001 indicates the use of Lucky Peak storage is similar to dry years such as 1994 and 1977 (Figure 3-3).

Operation of the Boise River rental pool would remain the same relative to current operations and prevailing climatic conditions. Additional contract assignments may occur in the future as entities such as United Water Idaho seek to improve their water supply through storage acquisitions.

Preferred Alternative

Operations and flows would be the same as for the No Action alternative. Contract conversion from water service to repayment would not alter the pattern of Lucky Peak storage use. Boise River rental pool operations would be similar to the No Action alternative. The new repayment contracts would contain similar assignment provisions to those in the existing contracts.

Alternative 3

Under Alternative 3 there would be approximately 6,405 acre-feet less storage under contract than either the No Action or Preferred Alternative. This is 9 percent of the 71,018 acre-feet Reclamation makes available under the existing Lucky Peak water service contracts and 2.4 percent of the reservoir's active capacity (Table 3-1). The storage not placed under contract would be held in the reservoir as uncontracted storage.

There would be very little effect on reservoir operations under Alternative 3 because the 6,405 acre-feet of uncontracted storage would usually be left as carryover under the No Action alternative as well. The two lowest years of carryover storage since the Lucky Peak contracts were executed occurred in 1991 and 1992. In each year over 11,000 acre-feet of carryover remained at the end of the irrigation season and most of that was in accounts of the 11 contractors who would receive less storage under Alternative 3.

Reducing some of the contractors' supplemental water supplies could reduce or eliminate the amount of water available for lease by willing lessors through the Boise River rental pool.

3.2 Water Quality

3.2.1 Affected Environment

Boise River water quality is managed by the state of Idaho under a framework provided through the CWA. Idaho establishes water quality standards for specific physical and chemical parameters in order to provide suitable conditions to support beneficial uses, including irrigation, public water supply, recreation, and aquatic life (IDEQ 2000a). Section 303(d) of the CWA requires that states develop and implement water quality management plans or Total Maximum Daily Loads (TMDL), including pollutant load allocations for stream segments where water quality is inadequate to fully support designated beneficial uses (IDEQ 2000b).

Designated beneficial uses for the South, Middle, and North Forks of the Boise River, including Arrowrock and Anderson Ranch Reservoirs, Lucky Peak Reservoir, and the Boise River in the lower Boise subbasin are domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, special resource water, aesthetics, wildlife habitat, and industrial water supply. Lake Lowell designated uses include agriculture water supply, industrial water supply, wildlife habitat, aesthetics, warm water aquatic life, primary contact recreation, and special resource water (IDEQ 2000a).

The lower Boise River is the 64-mile reach that flows from Lucky Peak Dam above Boise, Idaho, to the Snake River below Parma, Idaho. A TMDL allocation plan documents the amount of a pollutant a water body can assimilate without exceeding a state's water quality standards, and allocates that amount as loads to point and nonpoint sources. The lower Boise River TMDL defines targets for sediment on three segments and for bacteria on two segments on the lower Boise River (IDEQ 2002).

Table 3-3 summarizes pollutants in Boise River reaches and tributaries downstream of Reclamation facilities and Lucky Peak Reservoir.

Table 3-3. Water Quality Impacted Waterbodies Upstream and Downstream of Reclamation Facilities and Lucky Peak Reservoir

Stream	Reach	Pollutant
South Fork Boise River	Anderson Ranch Reservoir to Arrowrock Reservoir	Sediment
Hydrologic Unit Code 17050114		
Boise River	Lucky Peak to Barber Diversion	Flow alteration
Boise River	Barber Diversion to Star	Sediment, temperature
Boise River	Star to Notus	Nutrients, sediment, temperature, bacteria
Boise River	Notus to Snake River	Bacteria, temperature, nutrients, sediment
Lake Lowell	Reservoir	Dissolved oxygen, nutrients
Mason Creek and Sand Hollow Creek	Headwaters to Boise River	Nutrients, sediment, channel alteration
Willow Creek	Headwaters to Boise River	Unknown
Source: 1998 Idaho 303(d) list and EPA's Additions to the 1998 Idaho 303(d) List		

3.2.2 Environmental Consequences

No Action Alternative

Reservoir levels and outflows would continue to follow the general annual patterns that have occurred in recent years (Figure 3-1 and Figure 3-2). Water quality related to river flows and fluctuations such as in the Lucky Peak to Barber Diversion reach would likely remain the same since flow patterns would remain similar (Table 3-2). Water bodies and stream reaches currently not meeting water quality standards may improve through implementation of TMDL actions that reduce input of pollutants.

Preferred Alternative

The conversion of water service contracts to repayment contracts is not expected to change the pattern of use of Boise River storage compared to the No Action alternative. Impacts to water quality would be similar.

Alternative 3

As with the Preferred Alternative, there is no distinction between this alternative and the No Action alternative. Reservoir operation levels and outflows would continue to follow the annual patterns that have occurred over the past 35 to 40 years (Figure 3-1 and Figure 3-2). Implementation of this alternative would not change water quality relative to existing conditions.

3.3 Vegetation, Wildlife, and Fish

3.3.1 Affected Environment

Vegetation

Reservoirs

The vegetation surrounding Lucky Peak, Arrowrock, and Anderson Ranch Reservoirs is predominantly sagebrush-steppe. There are small pockets of riparian vegetation along the shoreline and in the many intermittent drainages. Riparian vegetation is particularly noticeable where tributaries enter the reservoirs. The draw-down area around the reservoirs is mostly either devoid of vegetation or inhabited by exotic annual grasses and weeds.

Boise River

The entire riparian zone below Lucky Peak Dam has been altered by reservoir operations for flood control and irrigation and by channel alteration primarily near the more developed and populated areas. The upstream reservoirs (1) collect and prevent downstream movement of streambed sediments and (2) decrease peak floodflows that historically scoured side channels and built gravel bars and islands in the river. These bars are necessary to establish new cottonwood communities. The riparian community along the reach downstream from Lucky Peak Dam is limited to a narrow band of black cottonwood forest which lies between developed areas and normal high water line. The cottonwood forest is dominated by relatively mature trees with little understory or recruitment of young trees.

Many nonnative riparian species have become naturalized along the river. These include silver maple, black locust, box elder, Siberian elm, and Russian olive (Sather-Blair and Blair 1983). The exotic shrub false indigo has become widely established in the riparian zone and has displaced many native shrub species along the river. Temporary and

seasonally flooded emergent wetlands are dispersed throughout the riparian communities along the river.

Wildlife

More than 150 species of birds, 37 species of mammals, and a variety of reptiles and amphibians are found along the Boise River (Sather-Blair and Blair 1983). The valley serves as an important breeding and wintering ground for many species of waterfowl. Year-round resident waterfowl include Canada geese and mallards. As many as 60 species of birds are also year-long residents of riparian and wetland habitats along the Boise River. Great blue herons are common year-round residents along the river and heron rookeries have been identified at several locations. Neotropical songbirds include a wide variety of species including warblers, vireos, flycatchers, and others. Some of these species migrate through the valley while others remain to breed in the Boise River valley before migrating south for winter.

Upland game birds such as California quail, chukar, and gray partridge inhabit riparian zones along the reservoirs and river, as well as the steep slopes above the reservoirs.

Mammals associated with the Boise River and the reservoirs include skunk, beaver, river otter, mink, porcupine, and several species of bats. Important wintering and transitional habitat for mule deer and elk surround Arrowrock and Lucky Peak Reservoirs. Winter forage such as bitterbrush occupies the south-facing, snow-free slopes and is very important for the winter survival of mule deer. Deer occasionally drown in the reservoirs when they break through thin ice during crossing attempts.

Amphibians and reptiles found along the river and near the reservoirs include bullfrog, western toad, northern leopard frog, western garter snake, sagebrush lizard, and western fence lizard.

Fish

Boise River Below Lucky Peak Reservoir

Native, nongame fish species present in this reach of the Boise River include northern pikeminnow, chiselmouth, and suckers (Reclamation 2000a). Game fish include brown trout, rainbow trout, and mountain whitefish. Idaho Department of Fish and Game (IDFG) stocks rainbow trout in the Boise River between Barber Park and the town of Star. Some naturally reproducing rainbow and brown trout also are present in this reach. IDFG (2001) reported that from Lucky Peak Dam downstream to Star, mountain

whitefish make up most of the game fish biomass, while hatchery-reared rainbow trout, wild rainbow trout, and brown trout support most of the fishing pressure.

Downstream of Star, warmwater fish species become more common as water temperature increases and water quality declines (IDFG 2001). This reflects a preference by warmwater species for higher water temperatures and their generally higher tolerance of pollution over coldwater species (Zaroban et al. 1999). Warmwater fish species include channel catfish, smallmouth bass, and largemouth bass.

Lucky Peak Reservoir

Two fisheries exist in Lucky Peak Reservoir: a warm, inshore-water fishery supporting smallmouth bass and a cold, mid-water fishery dominated by rainbow trout and kokanee (IDFG 1995). The rainbow and kokanee fisheries are supplemented by IDFG stocking and from entrainment through Arrowrock Dam. Warmwater fish spawn along the shoreline. There are also yellow perch and mountain whitefish in the reservoir, plus several species of nongame fish.

Arrowrock Reservoir

This reservoir supports a mixed fishery consisting of yellow perch, smallmouth bass, mountain whitefish, rainbow trout, and bull trout, which is listed as a threatened, federally protected species under the ESA. The rainbow trout population is primarily supported by IDFG stocking though wild redband trout, considered the rainbow's interior native subspecies, are also present. IDFG stocked approximately 120,000 rainbow trout fingerlings, 15,000 Kamloops/steelhead hybrids, and 8,000 fall chinook salmon fingerlings from 1996 to 1998 (USFWS 1999a). Other reservoir nongame fish species include chiselmouth, northern pikeminnow, redside shiner, bridgelip sucker, and largescale sucker (Flatter 1999).

Arrowrock Reservoir is managed as a general rainbow trout fishery by IDFG. Their management plan calls for seeking a minimum fishery conservation pool through cooperation with Reclamation and annual stocking with fingerling rainbow trout.

Anderson Ranch Reservoir

A variety of game fish, including rainbow trout, bull trout, smallmouth bass, yellow perch, and kokanee, are found in Anderson Ranch Reservoir. Rainbow trout include both wild and hatchery stocks. Hatchery fingerlings and catchable size fish are stocked in the reservoir.

3.3.2 Environmental Consequences

Vegetation

No Action Alternative

Reservoir operations and flows in the lower Boise River would not change relative to existing conditions. Vegetation around Lucky Peak and other reservoirs would remain similar to current conditions. The extent of riparian areas along the river below Lucky Peak Dam would remain similar to current conditions although the lack of flood flows and encroachment of development may continue to degrade these communities over time.

Preferred Alternative

Since reservoir levels and river flows would not change, implementation of the Preferred Alternative would have the same effect on vegetation as that discussed for the No Action alternative.

Alternative 3

Under Alternative 3, the total quantity of water allocated to contract holders annually would be slightly less than the other alternatives. In any given year, however, the difference in the total water released from Lucky Peak Reservoir would be insignificant compared to the No Action alternative. Vegetation around the reservoirs and along the Boise River would not be expected to change from existing conditions. Therefore, effects to vegetation would be the same as that discussed for the No Action and Preferred Alternatives.

Wildlife

No Action Alternative

Reservoir operations and flows in the lower Boise River would not change relative to existing conditions. Habitat around Lucky Peak and the other reservoirs would remain unchanged from current conditions. Habitat along the lower Boise River would remain unchanged. There would be no additional wildlife effects over current conditions.

Preferred Alternative

Implementation of the Preferred Alternative would have the same effect on wildlife as that discussed for the No Action alternative.

Alternative 3

Under Alternative 3, the total quantity of water allocated to contract holders annually would be slightly less than the other alternatives. However, the difference in the total water released from Lucky Peak Reservoir would be insignificant compared to the No Action alternative. Habitat around the reservoirs and along the Boise River would not be expected to change from existing conditions. Therefore, effects to wildlife would be the same as that discussed for the No Action alternative.

Fish

No Action Alternative

Reservoir operations and flows in the lower Boise River would not change relative to existing conditions. Habitat in Lucky Peak and the other reservoirs would remain unchanged from current conditions. Annual and seasonal flows in all forks of the Boise River, Mores Creek and tributaries, and the lower Boise River would be the same as the current climatic and diversion influenced flows. There would be no additional aquatic resources effects over the No Action alternative.

Preferred Alternative

Implementation of the Preferred Alternative would have the same effect on fish and other aquatic resources as the No Action alternative.

Alternative 3

Lower Boise River flows and operation of the reservoirs would be similar to existing conditions under this alternative. Implementation of Alternative 3 would, therefore, have the same effect on fish and other aquatic resources as the No Action alternative.

3.4 Threatened and Endangered Species

The following species listed or proposed by USFWS under ESA for Ada, Canyon, and Boise Counties (SP #1-4-03-SP-842 dated September 15, 2003) may occur in the project area:

- Bull trout (*Salvelinus confluentus*) – threatened
- Bull trout (*Salvelinus confluentus*) critical habitat – proposed
- Bald eagle (*Haliaeetus leucocephalus*) – threatened

- Gray wolf (*Canis lupus*) – experimental/nonessential population
- Canada lynx (*Lynx canadensis*) (Boise County only) – threatened
- Since the gray wolf and Canada lynx, are not associated with reservoir or riparian areas around or downstream of Reclamation reservoirs, and would not be affected by any of the proposed alternatives, they are not discussed further. Slick spot peppergrass (*Lepidium papilliferum*) is no longer proposed for listing under ESA.

Anadromous fish species listed by NOAA Fisheries that have the potential to be affected by the proposed action include the following evolutionarily significant units (ESU):

- Snake River spring/summer chinook salmon (*Onchorynchus tshawytscha*) – threatened
- Snake River fall chinook salmon (*O. tshawytscha*) – threatened
- Snake River steelhead (*O. mykiss*) – threatened
- Snake River sockeye salmon (*O. nerka*) – endangered
- Upper Columbia River spring chinook salmon (*O. tshawytscha*) – endangered
- Upper Columbia River steelhead (*O. mykiss*) – endangered
- Middle Columbia River steelhead (*O. mykiss*) – threatened
- Lower Columbia River chinook salmon (*O. tshawytscha*) – threatened
- Lower Columbia River steelhead (*O. mykiss*) – threatened
- Columbia River chum salmon (*O. keta*) – threatened
- Upper Willamette River chinook salmon (*O. tshawytscha*) – threatened
- Upper Willamette River steelhead (*O. mykiss*) – threatened

3.4.1 Reclamation Consultations Under Section 7 of the ESA

Reclamation submitted a biological assessment (BA) to USFWS and NOAA Fisheries in April 1998 describing the effects to listed species resulting from operation and maintenance of its projects in the Snake River basin above Lower Granite Reservoir (Reclamation 1998). The Boise River reservoir system was included in this consultation. In October 1999, the USFWS issued a biological opinion (BO) on the effects to federally listed species resulting from Reclamation's operation and maintenance of projects within the Snake River basin above Lower Granite Reservoir (USFWS 1999b). Within the Boise River basin, bull trout was the only species identified as being adversely affected.

The USFWS's BO requires Reclamation to implement certain reasonable and prudent measures to minimize adverse effects to bull trout (USFWS 1999b).

NOAA Fisheries also issued a BO, in December 1999 on Reclamation's Snake River basin operations above Lower Granite Reservoir (NMFS 1999). In this BO, NOAA Fisheries determined that Reclamation's operations are consistent with the operations envisioned in NOAA Fisheries' 1995 BO and 1998 BO on the Federal Columbia River Power System (FCRPS) (requesting annual delivery of 427,000 acre-feet of flow augmentation water), and that their continued operation and maintenance would not jeopardize federally listed salmon and steelhead or result in destruction or adverse modification of their habitat.

In April 2001, Reclamation (2001a) provided a supplemental BA to NOAA Fisheries. This BA addresses the 1-year operation (April 2001 through March 2002) of Reclamation's projects in the Snake River basin above Lower Granite Reservoir. It was prepared for three reasons: (1) ten Reclamation projects were not covered in NOAA Fisheries' December 2000 BO for the FCRPS which superceded NOAA Fisheries December 1999 BO, (2) recent Federal listing of Columbia River chum salmon, and (3) pending Snake River Basin Adjudication (SRBA) may affect Reclamation's operations. NOAA Fisheries (NMFS 2001) issued a new BO in May 2001 covering this 1-year period. The intent of this interim BO was to allow for certain SRBA negotiations to conclude, after which Reclamation would reconsult with both NOAA Fisheries and USFWS on long-term operations.

In November 2001, Reclamation provided an amended BA to NOAA Fisheries because NOAA Fisheries, May 2001, BO was due to expire on April 1, 2002 (Reclamation 2001a). The amended BA presents the results of new work and recent analysis by Reclamation and supercedes Reclamation's April 2001 supplemental BA. In their January 2002, supplemental BO, NOAA Fisheries (NMFS 2002) concluded that Reclamation's Preferred Alternative in 2001, an extremely dry year in which the 427,000 acre-feet of flow augmentation water could not be released, conformed with NOAA Fisheries' expectations for the performance of Reclamation's flow augmentation program. NOAA Fisheries (NMFS 2002) extended the period covered by their May 2001 BO to March 31, 2005.

USFWS also reviewed Reclamation's November 2001 amended BA, and in April 2002 concluded that all aspects of the USFWS 1999 BO consultation with Reclamation should remain in effect until December 31, 2004 (USFWS 2002a).

3.4.2 Affected Environment

Bull Trout

Bull trout are a char in the scientific family Salmonidae and are recognized as a separate species from the somewhat similar appearing Dolly Varden (*Salvelinus malma*). The USFWS issued a final rule on June 10, 1998, listing the Columbia River and Klamath River distinct population segments (DPS) of bull trout as a threatened species (Federal Register 63:31647) under ESA. Bull trout in the Boise River basin are members of the Columbia River DPS (Federal Register 67:71235).

The USFWS proposed the designation of critical habitat for the Columbia River DPS on November 29, 2002 (Federal Register 67:71235). Lucky Peak Reservoir is within the boundaries of proposed Critical Habitat Unit 17: Southwest Idaho River Basins, which includes the Boise River basin as well as the Payette and Weiser River basins. The Boise River basin contains three proposed critical habitat subunits (CHSU) (Lucky Peak, Arrowrock, and Anderson Ranch CHSUs). Proposed designated critical habitat in each CHSU consists of the following:

- Lucky Peak CHSU–Lucky Peak Reservoir and its tributaries, principally the Mores Creek watershed
- Arrowrock CHSU–Boise River watersheds upstream of Arrowrock Dam, including the North Fork Boise River, Middle Fork Boise River, and South Fork Boise River downstream from Anderson Ranch Dam
- Anderson Ranch CHSU–South Fork Boise River watershed upstream from Anderson Ranch Dam (Federal Register 67:71235)

The USFWS announced the availability of the *Bull Trout Draft Recovery Plan* for the Columbia River DPS on November 29, 2002. The project area is within the boundaries of the proposed Southwest Idaho Recovery Unit and the Boise River Recovery Subunit. This proposed subunit contains three bull trout core areas (Lucky Peak, Arrowrock, Anderson Ranch) with distinct local bull trout populations present in each. The Boise River downstream from Lucky Peak Dam is within the Boise River Recovery Subunit, but it has not been proposed as a bull trout core area or as critical habitat (USFWS 2002b; Federal Register 67:71235).

Today, distribution of the Columbia River bull trout DPS is more fragmented than in the past, and there are fewer adult migratory fish and fewer and smaller spawning reaches than historically (USFWS 2002c). Bull trout populations within the Columbia River DPS have declined from historic levels and are generally considered to be isolated and

remnant (USFWS 1999b). Strong bull trout populations tend to be associated with cold, mid-sized streams having high channel complexity that are located in forested areas with low road densities and at elevations exceeding 5000 feet. Even in undisturbed habitats, bull trout distribution tends to be patchy (USFWS 2002c).

Bull trout typically only occur upstream of unsuitable habitat and dams (USFWS 2002b). In the Boise River basin, Lucky Peak Dam and Arrowrock Dam on the mainstem Boise River and Anderson Ranch Dam on the South Fork Boise River are impassable barriers to upstream fish movements.

Life History and Habitat Requirements

Bull trout can exhibit resident and migratory life history strategies. Resident fish complete their life history cycle in the same or a nearby stream where they spawn and rear. Migratory fish spawn and rear in a stream for 1 to 4 years before migrating to a lake or reservoir (adfluvial life form), river or larger stream (fluvial life form), or the ocean (anadromous life form) where they grow to sexual maturity, then migrate to natal areas to spawn. Extensive migrations are characteristic of this species. Bull trout become sexually mature between 4 and 7 years and can live up to 12 years (USFWS 2002c).

Bull trout spawn between August and November, usually in cold (39°F to 51°F), low-gradient streams with uniform flow and loose, clean gravel or small cobble. Migratory adults often return downstream in November and December, following spawning (Reclamation 2001a). Bull trout eggs incubate in stream gravels over winter, hatching and emerging as fry the following April through May (depending on water temperature). Spawning and incubation habitat for bull trout is limited and valuable because of this species' narrow habitat requirements.

Migratory bull trout use a variety of habitats, depending on season and life stage, varying from spawning and rearing in tributary streams to maturing, feeding, and overwintering in lower elevation lakes, reservoirs, and rivers (USFWS 2002c). Reclamation (2001a) reported that adfluvial bull trout spend about half the year (generally November to May) associated with a lake or reservoir. While in the reservoir, adfluvial fish probably forage in shallow areas where prey is more abundant. Depending on water conditions, these fish may occupy deeper, cooler reservoir waters with temperatures of approximately 45°F to 54°F, or occur near the reservoir surface when surface water temperature is about 54°F or less (Reclamation 2001a).

Food items of resident and juvenile migratory bull trout include aquatic and terrestrial insects, zooplankton, crayfish, and small fish. Adult migratory bull trout primarily eat other fish, including trout, salmon, whitefish, sculpin, and other available species. Total

lengths of resident adult bull trout typically range from approximately 6 to 12 inches but commonly reach 24 inches for migratory individuals (USFWS 2002c). The Idaho bull trout record is a 32-pound fish taken from Pend Oreille Lake in 1949 (Reclamation 2001a).

Nine categories of limiting factors have been identified as contributing to the decline of bull trout populations in the Boise River Recovery Subunit (USFWS 2002b). These factors include the effects of dams, forest management practices, livestock grazing, agricultural practices, transportation networks, mining, residential development and urbanization, fisheries management, and isolation and habitat fragmentation. Reclamation (2001a) reported that impacts on bull trout generally result from three types of resource management practices (land, water, and fisheries) and noted that catastrophic events, also can limit bull trout.

Environmental Baseline

Lucky Peak Core Area and CHSU

Bull trout present in the Lucky Peak core area include resident fish in the headwaters of Mores Creek (the Mores Creek local population) and migratory fish in Lucky Peak Reservoir. It is unknown whether these migratory fish have all been entrained from Arrowrock Reservoir or whether some originate in the Mores Creek watershed (USFWS 2002c).

Reclamation (2001a) reported that bull trout appear to be lost to Lucky Peak Reservoir each year during normal operations of Arrowrock Dam. Bull trout are entrained from Arrowrock Reservoir into Lucky Peak Reservoir by passing over the spillway and through the dam's ensign valves (Reclamation 2001a). Studies by IDFG during 1997 and 1998 suggest that perhaps approximately 10 to 15 percent of bull trout present in Arrowrock Reservoir are entrained into Lucky Peak Reservoir annually (Reclamation 2001a). Reclamation began trapping and hauling bull trout from Lucky Peak Reservoir to Arrowrock Reservoir in 2000 as part of the *USFWS Biological Opinion Terms and Conditions for Reclamation Operations* (USFWS 1999a).

Scheduled replacement of the lower row of ensign valves with clamshell gates at Arrowrock Dam by 2004 will allow for deeper water releases from the reservoir and is anticipated to result in decreased entrainment rates and beneficial long-term impacts to bull trout (Reclamation 2001b).

Arrowrock Core Area and CHSU

There are 15 local bull trout populations in the Arrowrock core area that utilize habitat in Arrowrock Reservoir and its tributaries. Resident and migratory fish are present in this core area (USFWS 2002b). Arrowrock Reservoir provides overwintering and foraging habitat for a relatively strong adfluvial population of bull trout (Reclamation 2001a). The South, Middle, and North Forks of the Boise River provide foraging, migratory, and overwintering (FMO) habitat for bull trout, while some portions of these drainages and numerous smaller tributaries provide migratory, spawning, and early rearing habitat for bull trout (Federal Register 67:71235). Bull trout have not been documented spawning in the South Fork of the Boise River upstream from Arrowrock Dam, although water temperatures during much of June through October are suitable (50°F to 54°F) for adult bull trout migration (Reclamation 2001a). Proposed critical habitat in the Arrowrock CHSU consists of Boise River watersheds upstream from Arrowrock Dam, including the North Fork Boise River, Middle Fork Boise River, and South Fork Boise River downstream from Anderson Ranch Dam.

Arrowrock Reservoir provides important habitat for adult and subadult bull trout from November through late spring or early summer. In addition, some juvenile bull trout are reported to reside in the reservoir year-round until sexually mature (Reclamation 2001a). Estimated numbers of bull trout approximately 12 inches or longer occurring in the reservoir totaled 471 individuals in 1997 and 354 individuals in 1998 (Federal Register 67:71235). As discussed previously, some of these bull trout are entrained into Lucky Peak Reservoir each year. Some adult bull trout in Arrowrock Reservoir migrate to the North Fork and Middle Fork of the Boise River in May and June where the waters are cooler. They spawn in these upper tributaries in August and September and then, following spawning, return to Arrowrock Reservoir.

Anderson Ranch Core Area and CHSU

There are 15 local bull trout populations in the Anderson Ranch core area that utilize habitat in Anderson Ranch Reservoir and its tributaries. Both resident and migratory fish are present in this core area (USFWS 2002b). Anderson Ranch Reservoir provides overwintering and foraging habitat while the upper South Fork Boise River and its tributaries provide FMO, spawning, and early rearing habitat for bull trout (Federal Register 67:71235). Studies by IDFG showed that bull trout in Anderson Ranch Reservoir exhibit migratory behavior similar to that described for bull trout in Arrowrock Reservoir (Reclamation 2001a). Proposed critical habitat in the Anderson Ranch CHSU consists of the South Fork Boise River watershed upstream from Anderson Ranch Dam (Federal Register 67:71235).

Required Actions from Previous ESA Consultations

The USFWS BO for Reclamation's project operation and maintenance in the Snake River basin upstream from Lower Granite Reservoir (USFWS 1999b) identified reasonable and prudent measures (RPM) that Reclamation is required to implement in order to be exempt from section 9 prohibitions of ESA. USFWS believes the following RPMs are necessary and appropriate to minimize the take of bull trout at Reclamation projects in the Boise River basin:

- Reduce the incidence of bull trout entrainment due to reservoir operations.
- Within existing authorities and voluntary partnerships, work toward ensuring reservoir operations do not result in dewatering of Reclamation reservoirs to the extent that adfluvial bull trout resident there during part of their life history are stressed or killed.
- Investigate methods to provide safe fish passage around Reclamation dams for bull trout.

The operations and maintenance BO (USFWS 1999b) outlined specific terms and conditions to implement for each RPM. These include ongoing research studies and recommendations based on these studies.

RPMs were also required by USFWS in their BO for the replacement of ensign valves at Arrowrock Dam (Salow 2002). These actions include the following:

- Ensure that reservoir operations do not result in dewatering of Arrowrock Reservoir to the extent that adfluvial bull trout present in the reservoir are stressed or killed as a result of the project.
- Investigate methods for safe fish passage upstream around Arrowrock Dam.
- Initiate a capture and transport program in Lucky Peak Reservoir to mitigate for entrainment.
- Complete a water quality monitoring plan for the project.
- Form an advisory group to advise on responsive actions and to aid in analyzing data collected during the project related to the fishery.
- Conduct population estimates for bull trout prior to and following the construction project.

Specific actions to implement these RPMs are either completed or ongoing.

Bald Eagle

Life History and Habitat Requirements

The bald eagle was listed as endangered on March 11, 1967, because of severe population declines resulting from organo-chlorine pesticides and habitat loss. As organo-chloride pesticide use has declined, eagle populations have rebounded in all areas of its range. The population increase resulted in a reclassification from endangered to threatened on July 12, 1995 (Federal Register 60:36000). Critical habitat is not designated for the bald eagle.

Recent threats to the bald eagle throughout its range are primarily from shooting or poisoning; however, these threats have been reduced since the species was federally listed in the 1970s. An additional threat to the species is from disturbance during nesting and fledging which may cause reproduction to fail. Individual birds vary widely in their response to human disturbance at nesting and roosting sites. Losing large trees for nesting and roosting near large water bodies is a moderate threat (USFWS 1986).

The nesting season generally extends from January 1 to mid-August (USFWS 1994). Young fledge in July. The forage base consists of fish, waterfowl, and during the winter, mammalian carrion (USFWS 1994).

Bald eagles are closely associated with lakes and large rivers in open areas, forests, and mountains. They nest near open water in late-successional forests with many perches or nest sites, and generally low levels of human disturbance (McGarigal 1988; Wright and Escano 1986). The nest site is usually within 0.25 mile to 1 mile of open water having less than 5 percent of the shore developed within 1 mile. Perches are generally at the edge of forest stands, near foraging areas, or near the nest tree and have panoramic views of surrounding areas. They need large trees along lake shores and rivers with good visibility, preferably snags; but they also use trees or boulders for perching. Protected deep ravines with large trees are often used as night roosts, especially during the winter. Bald eagles' diet largely consists of fish, especially salmon, waterfowl, seabirds, and carrion.

Important winter habitat is near food sources, such as lakes, rivers, and uplands with big game winter range (carrion source). These sites have adequate perches and sheltered roost sites. Human activity may be a major factor limiting bald eagle distribution on wintering habitats (Steenhof 1976).

Environmental Baseline

The number of occupied bald eagle territories within Idaho has continued to increase over the past decade, and is currently stable (Sallabanks 2003). In 2000, 2001, and 2002 there were 84, 80, and 83 nesting territories, respectively, statewide that fledged young (Beals and Melquist 2001; Sallabanks 2002, 2003).

There are currently no known bald eagle nests at Lucky Peak Reservoir; however, nesting bald eagles are found around Arrowrock and Anderson Ranch Reservoirs. There are three nesting territories at Arrowrock Reservoir, two of which were occupied in 2003; one near the confluence of the South and Middle Fork arms, one near Arrowrock Dam, and another at the upper end of the South Fork arm. Nesting eagles forage for fish and waterfowl in both Arrowrock and Lucky Peak Reservoirs, as well as in the South Fork Boise River. Winter-killed deer and elk may be an important food source in the early part of the nesting season.

The Boise River, upstream and downstream from Lucky Peak and Arrowrock Reservoirs, is also an important area for wintering bald eagles when free of ice. Kaltenecker and Bechard (1995) found up to 50 eagles using Anderson Ranch Reservoir, 2 to 25 eagles using the South Fork Boise River below Anderson Ranch Dam, and up to 15 wintering eagles around Arrowrock and Lucky Peak Reservoirs. Up to 35 eagles have been counted downstream from Lucky Peak Dam (USFWS 1996; Riggin and Hansen 1992). Wintering bald eagles usually arrive along the Boise River in November and leave by early to late March, depending on weather conditions. The Barber Pool area and a drainage near Mores Creek have been documented as important communal night roost areas.

Required Actions from Previous ESA Consultations

Reclamation's consultation on operation and maintenance of its projects evaluated the effects of storing and delivering irrigation water, including Lucky Peak storage (Reclamation 1998). USFWS in its 1999 BO concurred with Reclamation's determination that operating and maintaining the Boise River reservoir system would not adversely effect bald eagles (USFWS 1999b).

Reclamation also completed consultation with USFWS for the Arrowrock Dam outlet works rehabilitation project. The deep drawdown of Arrowrock Reservoir required for this project was determined to adversely affect bald eagles. USFWS (2001) required preparation of nest site management plans and the evaluation of the need for supplemental feeding after construction is complete in their BO for this project.

Management plans are currently being prepared, and it has been determined that supplemental feeding is unnecessary.

Anadromous Fish Species

None of the listed salmon or steelhead ESUs occur above the Hells Canyon Complex on the Snake River. Under NOAA Fisheries' 1995 BO and subsequent BOs, Reclamation, pursuant to state law procedures, seeks to release 427,000 acre-feet of water from the upper Snake River Basin (including the Boise River) to aid juvenile salmon and steelhead outmigration in the mainstem Columbia River. Reclamation has provided this amount annually from 1993 to 2000. Less was provided in 2001, 2002, and 2003 because of drought conditions (see flow augmentation in section 3.1.1.).

However, as noted earlier in this section, NOAA Fisheries (NMFS 2002) concluded in their January 2002 supplemental BO that Reclamation's Preferred Alternative for operating its projects in 2001 conforms with NOAA Fisheries' expectations for the performance of Reclamation's flow augmentation program when NOAA Fisheries reached its no jeopardy conclusion in its 1995 BO. NOAA Fisheries (NMFS 2002) extended the period covered by their May 2001 BO to March 31, 2005.

3.4.3 Environmental Consequences

Bull Trout

No Action Alternative

The delivery of all or part of the 71,000 acre-feet of supplemental storage would not change reservoir operations and flows in the lower Boise River relative to existing conditions. Annual and seasonal flows in all forks of the Boise River, Mores Creek and tributaries, and the lower Boise River would be similar to the current climatic/diversion-influenced flows. The No Action alternative would have no effect on bull trout populations.

The USFWS (Federal Register 67:71235) listed nine physical and biological features essential to the conservation of bull trout that were used in identifying proposed critical habitat areas. These features are known as primary constituent elements (PCE) and were determined from studies of bull trout habitat requirements, life history characteristics, and population biology. USFWS further stated that activities that may destroy or adversely modify critical habitat are those that alter the PCEs to an extent that the value of critical habitat for both the survival and recovery of bull trout is appreciably reduced. Adverse

effects to proposed critical habitat resulting from such activities have been defined by USFWS (Federal Register 67:71235) to include one or more of the following:

- Significant and detrimental alteration of the minimum flow or the natural flow regime
- Alterations that could directly or indirectly cause significant and detrimental actions to bull trout habitat
- Significant and detrimental alteration of the channel morphology
- Significant and detrimental alterations to the water chemistry
- Activities that are likely to result in the introduction, spread, or augmentation of nonnative aquatic species
- Activities that are likely to create significant instream barriers to bull trout movement

Implementation of the No Action alternative would not result in any of the above adverse effects on bull trout proposed critical habitat in Lucky Peak Reservoir, Mores Creek, or upstream in the Arrowrock and Anderson Ranch CHSUs.

Preferred Alternative

The Preferred Alternative would not change reservoir operations and river flows below and above Reclamation facilities on the Boise River compared to the No Action alternative and would not alter the environmental baseline. Like the No Action alternative, the proposed action would have no effect on bull trout.

As in the No Action alternative, the Preferred Alternative would not include any of the adverse effects to bull trout habitat listed above or otherwise alter bull trout PCE to the extent that adverse effects to bull trout critical habitat would occur. Proposed habitat for bull trout would not be adversely modified or destroyed.

Alternative 3

Boise River flows and system operation under Alternative 3 would generally remain the same as operations over the past 10 to 15 years. The 6,405 acre-feet of storage no longer under contract would be held as uncontracted storage and remain in the reservoir system. This storage could provide a relatively minor amount of additional overwintering habitat for bull trout during multiple successive dry years compared to the No Action and Preferred Alternatives. The benefit would be substantially less than the full 6,405 acre-feet; since under the No Action and Preferred Alternatives in most years much of the

water accruing to this storage would be held by the contractors as carryover for additional dry year protection. Because of operational flexibility, the uncontracted storage could be held in any of the three reservoirs.

Bald Eagle

No Action Alternative

There would be no effects on either nesting or wintering bald eagles or their habitat compared to current conditions as a result of implementing the No Action alternative. Boise River flows and reservoir levels would remain similar to operations over the past 10-15 years. Fish populations in the reservoirs and rivers which bald eagles rely on for food would not be affected. Over time, population growth in the area may result in increased recreational use of Lucky Peak and other Boise River reservoirs. This could translate into an increase in direct disturbance to nesting and foraging of bald eagles, but may not necessarily impact bald eagle productivity or habitat use.

Preferred Alternative

As with the No Action alternative, Boise River flows and reservoir operations would remain similar to current practices if the Preferred Alternative is implemented. The bald eagles' primary prey base of fish would likewise be similar to the environmental baseline condition. The Preferred Alternative would have no effect on bald eagles.

Alternative 3

Under Alternative 3, the total quantity of water allocated to contractors annually would be slightly less than the other alternatives. However, in any one year, the difference in the total water released from Lucky Peak Reservoir would probably not change compared to existing conditions. Compared to the No Action alternative, a small amount of additional carryover water may be left in the reservoir system during multiple successive dry years, which may have a slight benefit to fish habitat and the bald eagle food base.

Anadromous Fish

No Action Alternative

Reservoir operations and flows in the lower Boise River would not change relative to existing conditions or to conditions assessed by Reclamation (2001a) in their amended BA. Streamflow conditions below Reclamation's Boise Project during the primary juvenile salmon migration period (April through August) would not change. Storage used for flow augmentation from the Boise River reservoir system would remain the

same. Therefore, effects conclusions reached by Reclamation in their amended BA would still apply with implementation of the No Action alternative. None of the referenced 11 salmon and steelhead ESUs would be affected.

Preferred Alternative

As described previously for bull trout, there would be no hydrologic change under the Preferred Alternative compared to existing operations and the No Action alternative. None of the referenced 11 salmon and steelhead ESUs would be affected.

Alternative 3

As described previously for bull trout, Boise River flows and system operation and Lucky Peak Reservoir water levels under Alternative 3 would remain very similar to operations under the No Action alternative even with 6,405 acre-feet of storage not renewed or converted and remaining as uncontracted storage, since water filling the storage space is normally held in the reservoir as carryover under the current operating situation. It is possible that with a prolonged drought that a portion the 6,405 acre-feet in question might be delivered for irrigation if it were under contract. Therefore, by retaining this stored water in the reservoir as uncontracted storage under Alternative 3, there could be a very minor, probably undetectable, reduction in irrigation deliveries and return flows below the Boise Project during the summer.

3.5 Recreation

3.5.1 Affected Environment

Boise River reservoirs provide accessible, varied recreational opportunities within urban, rural, and wild settings to the largest population center in Idaho. The location of the lower Boise River within Boise, in addition to the Boise River Greenbelt and the adjoining parks along its banks, is a tremendous asset within the city of Boise and Ada County. Water-based recreation opportunities on the river and reservoirs include fishing, boating, inner tube floating, canoeing, and whitewater boating (in certain reaches and water levels). Water-based recreation in the Snake River basin, which includes the Boise River system, contributes more than $180 million per year to the state's economy (Reclamation 2001b). Camping, hiking, hunting, and other land-based recreation also occur along the reservoirs and rivers.

Current river operations for flood control and irrigation water supply directly influence the availability and quality of recreational opportunities on a seasonal basis. Following is

detailed information including site description, facilities and fees, recreation activities, and recreation use for Arrowrock Reservoir, Lucky Peak Reservoir, and the lower Boise River.

Arrowrock Reservoir

Arrowrock Reservoir is formed behind Arrowrock Dam located 17 river miles upstream from the city of Boise (east). It is part of the Boise Project and is managed by USFS as part of the Boise National Forest. The reservoir is an 18-mile-long narrow canyon reservoir and has a surface area of 3,150 acres and 60 miles of shoreline. The steep hillsides on both sides of the reservoir offer very limited potential for recreational development along the shoreline of Arrowrock Reservoir. The reservoir can only be accessed from a dusty, rough, narrow, gravel road that winds along the north shoreline for much of the length of the reservoir. As a result, little development has occurred along the reservoir providing a remote setting with an uncongested recreational experience.

Under an agreement between Reclamation and USACE, stored water at Arrowrock Reservoir is used to maintain a high recreation pool elevation in Lucky Peak Reservoir within the limits of water supply and irrigation demand (Shalkey Walker and Associates Inc. 1995). Low pool elevations at Arrowrock Reservoir are common in the late summer and fall. Full pool elevation is 3216 feet.

Arrowrock Reservoir receives the least recreational use of the three Boise River reservoirs (Beck and Baird 1993). It is mostly visited in the spring, summer, and fall by recreationists and the peak use period is May through August. Winter use is minimized by severe weather conditions and hazardous road conditions. The predominant recreational activity at Arrowrock Reservoir is fishing, with approximately 4,000 visitor-days for fishing (Reclamation 2001b). Fishing season is open year-round and generally peaks in June, July, and August. Winter fishing use has not been determined, but is considered to be low.

Upland bird hunters look for chukar, gray partridge, and California quail on the dry slopes above the reservoir. Big game hunters park along the road to access the slopes above the reservoir during deer and elk season (Beck and Baird 1993). A small number of hunters boat across the reservoir to hunt.

Lucky Peak Reservoir

Lucky Peak Reservoir is the most popular recreation site within the Boise River system due to its proximity (10 miles) to the city of Boise. The reservoir receives approximately 790,000 visits per year and 95 percent of the visitors are from Ada County. Typically,

the number of visitors per year depends on several factors including pool elevation, weather, and access problems due to construction activities. The USACE maintains a counter on Forest Road 286 just east of Spring Shores State Park; an estimated 153,916 visitors passed that point in the one-year period from October 1, 1998, to September 30, 1999. Although Lucky Peak is open to visitors year-round, the recreation season at Lucky Peak generally extends from Memorial Day to Labor Day. The primary recreation activities at Lucky Peak Reservoir include boating, camping, day-use activities (e.g., picnicking), swimming, fishing, volleyball, and waterskiing.

Many of the recreation sites around the reservoir are accessible only by water due to lack of road access and are oriented to boaters. There are 10 major and 10 minor recreation sites along the lake including the sites associated with the popular Lucky Peak State Park. Lucky Peak State Park is composed of three day-use areas: Sandy Point and Discovery Point State Park located just downstream from Lucky Peak Dam and Spring Shores.

Anglers spent an estimated 162,505 hours or roughly 31,250 recreation visits fishing at Lucky Peak Reservoir during the 1990 to 1991 fishing season (Beck and Baird 1993). Fishing season is open year-round; the majority of fishing is from the bank or by boat. Some ice fishing occurs in the winter.

Slopes adjacent to Lucky Peak Reservoir afford upland bird and big game hunting opportunities. Chukar, gray partridge, and California quail live on the steep grassy slopes and are hunted heavily. Deer are also hunted on the lands around Lucky Peak Reservoir, especially during the archery season. Hunting pressure is reported to be high in this area (Beck and Baird 1993).

Wildlife viewing is popular, especially in the winter. Visitors park to observe herds of deer and bald and golden eagles wintering in the area.

Lower Boise River

Approximately 64 miles of Boise River flows between Lucky Peak Dam and the confluence with the Snake River. The land bordering this river reach is predominantly privately owned but also includes some public land (city, county, and state parks). Most recreational use occurs from Barber Park to Glenwood Bridge, a 10-mile river reach through the city. In this protected riparian corridor, the city developed five large urban parks connected by the Greenbelt. These form an extremely popular pedestrian-bike path paralleling the river from Lucky Peak Dam to Eagle Island State Park. In this reach, land-based recreation assumes great importance in contrast to land-based recreation at reservoirs.

The most popular river run extends 4 river miles from Barber Park downstream to Ann Morrison Park (Beck and Baird 1993). Approximately 10,000 river floaters per day launch from Barber Park during the summer months July through September (Ada County 2000).

The mainstem Boise River is open to fishing year-round and provides a popular put-and-take urban fishery which is managed to provide a high percentage return-to-creel. In 1994, fisheries managers estimated 70,000 hours of fishing effort between Barber Park and Glenwood Bridge, up from an estimated 50,000 hours of effort in 1987. During the same interval, the number of fly fishermen increased an estimated 10 percent, to account for 18 percent of fishermen (Reclamation 2001b). In 1999, IDFG stocked approximately 40,000 catchable hatchery rainbow trout between Barber Park and the Glenwood Bridge.

Wildlife viewing is a popular activity occurring along the Greenbelt, in Barber Park, and on the lower Boise River. Numerous songbirds, water birds, and birds of prey are found in the riparian corridor. In the winter, watching bald eagle's foraging on the river is a popular activity.

3.5.2 Environmental Consequences

No Action Alternative

Impacts on recreational use of Boise River reservoirs and the lower Boise River associated with the No Action alternative would be the same as those associated with current conditions. The Boise River reservoir system would be operated to maximize recreation at Lucky Peak and Anderson Ranch Reservoirs; recreational use of Arrowrock Reservoir would continue to be a lower priority. Nonwater-dependent activities such as sightseeing and wildlife viewing occur throughout the year, but may be less appealing during periods of low water levels, thereby reducing year-round use of the reservoirs.

Preferred Alternative

Impacts on recreational use of Boise River reservoirs and lower Boise River associated with conversion of the water services contract would be the same as those described for the No Action alternative. No additional impacts are anticipated.

Alternative 3

Because Boise River flows and Lucky Peak Reservoir levels would remain similar to operations over the past several years under Alternative 3, impacts on recreational use of the Boise River reservoirs and lower Boise River associated with conversion of the water

service contracts at reduced quantities, would be the same as those described for the No Action alternative. No additional impacts are anticipated.

3.6 Economics

3.6.1 Affected Environment

The percentages of the workforce within the various industrial sectors for Ada, Boise, Canyon, and Elmore Counties, collectively, are: services, supporting 28 percent of the workforce; retail trade, supporting 17 percent of the workforce; manufacturing, supporting 13 percent of the work force; and state and local government, supporting 10 percent of the workforce (BEA 2002).

The 2000 employment data indicates that only a small percentage of employment within the state of Idaho is associated with farming. In the four-county area, the percent of farm-related employment within the individual counties ranged from 1 to 8 percent. Only 1 percent of employment within Ada County, which comprises 70 percent of the four-county area work force, is farm related and is likely to slightly lower the percentage of the farm-related workforce within the four-county area. Statistics from the Bureau of Economic Analysis (BEA) generally indicate a decline in farm-related incomes and work force. Although the work force and earned incomes associated with the farming sector in Ada County have consistently stayed less than 1 percent over the last decade, the farming sector in Canyon County shows a sharp drop from 10 to 5 percent for work-related income and a less dramatic decline in the work force related to farming from 8 percent to 6 percent between 1990 and 2000.

Agricultural Economy Information

The current water service contracts supply supplemental irrigation water to approximately 90,000 acres of urban, suburban, and rural lands in Ada and Canyon Counties. Boise and Elmore Counties do not receive irrigation water associated with the current water service contracts and are not included in the following discussion regarding the agricultural economy of the affected environment.

The land within Ada and Canyon Counties is considered highly productive and much of these lands have been irrigated since the early 1900s. Table 3-4 provides 1997 census of agriculture data by county. This information shows that a total of 3,119 farms comprising 586,107 acres of farmland are within Ada and Canyon Counties. The average size for farms is just less than 190 acres for both counties. An estimated 88 percent of the total farms or 51 percent of the farmland within both counties are irrigated.

The total sales reported for the 1997 Census of Agriculture for Ada and Canyon Counties exceeded $405 million, with farms in Ada and Canyon Counties averaging $76,756 and $164,066 per farm, respectively. In Ada County, farms with sales of more than $10,000 account for 89 percent of all farmland, 88 percent of irrigated farmland, and 97 percent of all farm sales. Similarly, farms with sales of more than $10,000 in Canyon County account for 79 percent of all farmland; 94 percent of irrigated farmland; and 99 percent of all farm sales.

Table 3-4. Summary of 1997 Census of Agriculture Data by County

	Ada County		Canyon County		
	County Total	Farms with sales over $10,000	County Total	Farms with sales over $10,000	Two-County Total
Farms (number)	1,221	413	1,898	979	3,119
Land in farms (acres)	231,188	207,791	354,919	280,492	586,107
Average size of farm (acres)	189	489	187	287	376
Irrigated land (farms)	1,060	375	1,684	915	2,744
Irrigated land (acres)	78,112	68,872	221,051	208,525	299,163
Market value of agricultural products sold	$93,719,000	$91,413,000	$311,397,000	$308,493,000	$405,116,000
Market value of agricultural products sold-average per farm	$76,756	$221,338	$164,066	$315,111	$129,887
Note: Data from the 2000 Census of Agriculture is not currently available for comparison.					

3.6.2 Environmental Consequences

No Action Alternative

Renewal of the existing contract terms implies there would not be a substantial increase in costs to irrigators or changes to current water flows, storage practices, and operation and maintenance. Annual payments would still be based on the amount of storage released in a given year. The rate of payment would continue to be calculated to cover

costs attributable to constructing, operating, and maintaining the portion of the project that is dedicated to irrigation purposes. Eventually construction costs allocated to irrigation would be repaid, after which annual costs to contractors would only be for operation and maintenance, thereby reducing costs and economic burden to irrigators in the long term. Under the current contracts, the construction charge is $1.71 per acre-foot.

Preferred Alternative

Conversion of the existing water service contracts to repayment contracts would not change current water flows, storage practices, or operation and maintenance. Conversion would require annual payments for the contractors' allocated costs for construction, and operation, and maintenance of Lucky Peak Dam regardless of the quantity of storage the contractor actually uses, as opposed to annual payments related to amount of storage water released under the No Action alternative. The annual costs are not expected to be substantially different between alternatives during the estimated 40-year repayment period. Once the construction costs have been repaid, the contractors would be assessed only the cost of operating and maintaining the dam, resulting in savings to the contractors in the long term, similar to the No Action alternative.

Reclamation has determined that the total construction costs to be repaid by the contractors is $72.21 per acre-foot. After subtracting the construction costs paid to date under the original water service contracts, the remaining unpaid construction costs by contractor range from $56.00 to $71.00 per acre-foot. The remaining unpaid costs for each contractor would be repaid in equal annual payments over a 40-year repayment period, along with annual operation and maintenance charges.

Alternative 3

During dry years, reducing the supplemental supply of irrigation water provided under the Lucky Peak contracts could diminish the economic productivitiy of lands served by the contractors through conversion to less profitable crops, lower yield, and even crop failure, resulting in economic losses to those irrigators. The repayment obligation would be similar to the Preferred Alternative except for contractors receiving less storage, whose repayment obligation would be proportionately less.

3.7 Cultural Resources

3.7.1 Affected Environment

In southwestern Idaho, prehistoric human use of the Snake River region and its tributaries was one of increasing complexity in settlement and subsistence through time. Lifestyles of past inhabitants ranged from highly nomadic groups of big-game hunters during the Paleo-Indian Period to small groups of foragers operating from semi-permanent villages by the Late Archaic Period into historic times. At the time of European incursion into southwest Idaho, the Snake River Shoshone (represented by the Shoshone and Bannock peoples) and Northern Paiute groups occupied the Boise River and the Payette River basins. The Shoshone populations resided within the lower Snake River area, while the Northern Paiute resided exclusively throughout the middle and upper drainages. In addition to the resident populations of the Shoshone and Paiute, southwestern Idaho also attracted numerous visitors from elsewhere across the regions including Shoshonean parties from the Fort Hall and Lemhi areas, and the White Knife Shoshone from northern Nevada, the northern Paiute from eastern Oregon, as well as the Nez Perce, the Cayuse, the Umatilla, the Flathead, and the Blackfeet.

Several French explorers may have visited the project area in the late 1700s, but the first long-term non-Indian occupants in southwest Idaho were fur traders. The Pacific Fur Company expedition led by Wilson Price Hunt was the first recorded visit to the project area in 1811. By 1813, a trading post was established near the mouth of the Boise River, however within less than 30 years the fur trade had essentially ended. Permanent Euro-American settlement of southwestern Idaho began with the discovery of gold. This spurred the need for supplies and in 1863, groups began to settle along the Boise River to raise produce and hay to sell to miners. Settlers soon occupied all lands located on the river bottoms or on portions of the first bench that could be watered by simple gravity-flow irrigation ditches. By the 1880s, the Boise Valley was having difficulty meeting existing water supply demands and was unable to provide for new commercial enterprises. By 1900, private irrigation companies or cooperatives were providing water service to about 148,000 acres between Boise and Nampa.

On March 27, 1905, Congress authorized the United States Reclamation Service (USRS), now known as the Bureau of Reclamation, to construct the Payette-Boise Project (now called the Boise Project). Between 1905 and 1909, USRS constructed the Boise Diversion Dam, the Deer Flat Embankments (Lake Lowell), twice enlarged and extended the New York Canal, and began to construct canals to deliver water stored in Lake Lowell to lands south and west of Nampa. Construction of Arrowrock Dam began in 1911 and was completed in 1915. In 1912, the powerplant was constructed at the Boise

Diversion Dam to generate hydroelectric power needed for the construction of Arrowrock Dam. Arrowrock Reservoir was the initial water storage system in the area designed to provide water storage to promote irrigation expansion in the Boise Valley. Once construction of Arrowrock Dam was complete, the electrical power generated by the Boise Diversion Dam Powerplant, which consisted of three 500-kW (at 80 percent power factor) generator units, was marketed by the Bonneville Power Administration (BPA). The Boise Diversion Dam Powerplant operated until 1982 when it was retired due to age and increasing maintenance costs.

Historic Sites

There are several prehistoric archaeological sites in the general area of Lucky Peak Reservoir and Arrowrock Reservoir. Most of the banks and basin of Lucky Peak Reservoir were surveyed for cultural resources. Archaeological surveys conducted in the Arrowrock Reservoir vicinity were predominantly located along the river downstream from Arrowrock Dam near the shores of Lucky Peak Reservoir. Prehistoric sites were found to be relatively rare and usually lacking dateable material. Generally, site types include: talus burials, isolated debris, lithic scatters, hunting blinds, a prehistoric quartz quarry, and rock cairns. A cave site (Site 10AA99) located above the Boise River (within 0.5 mile of the Boise River Diversion Dam), has yielded a remarkable array of artifacts, including cordage, basketry, dried fish, harpoon points, and small maize cobs. Excavations at the Lydle Gulch site (Site 10AA72), a stratified campsite below Lucky Peak Dam, indicates the area was intermittently occupied during the past 4,500 years. One additional area of notable mention (Site 10BO300) was identified within the reservoir pool and may be exposed during periods of extreme low-water. It is an 1860s temporary reservation encampment site that was inhabited by several hundred people for several years and may have particular historical value to the Shoshone-Paiute and Shoshone-Bannock Tribes. At the present time, no prehistoric archaeological sites are recorded near the high water mark of the reservoir.

The cultural resource surveys that have occurred in the project area reported a number of historic sites and associated cultural materials mostly dating from the late 1840s to the early 20th century. These include remnants of the Oregon Trail; an unnamed wagon road; structures and features associated with placer mining sites; ditches, utensils, and a wooden flume; sheepherder camps; the archaeological remnants of the Mary Hallock Foote House; and a refuse dump containing a very complete assemblage of late 19th and early 20th century domestic artifacts, cisterns, and homestead and foundation remains.

Several historical sites in the National Register of Historic Places (National Register) were identified within the project area. Irrigation systems older than 50 years and associated with events or processes important in the history of the area may be eligible

for the National Register of Historic Places. In 1972, the Arrowrock Dam and Power Plant (built between 1910 and 1915) was listed in the National Register for its significance in engineering technological development and contribution to regional agricultural economic growth. The 1915 truss bridge at Arrowrock Dam is also eligible for the National Register but is not yet listed. In 1976, the unique character of the Boise Diversion Dam and Powerplant was recognized when the facility was listed on the National Register of Historic Places. Lucky Peak Dam, constructed in 1957, is less than 50 years old and is currently ineligible for the National Register. The Barber Diversion Dam and lumber mill, which parented Barber, one of the last mill towns built in Idaho, was included in the National Register in 1978.

The potential for locating unrecorded sites within the Boise River corridor and associated reservoirs is variable, depending on location, proximity to the Boise River or other drainages, topography, and urban development. The Lydle Gulch site and several other prehistoric sites located in this area are indicative of a moderate potential for unrecorded prehistoric sites. There is, however, little potential for intact, unrecorded cultural resources in the immediate vicinity of Arrowrock Dam. This is due to extensive surface and subsurface ground disturbance during dam construction, subsequent dam modifications, and severe erosion from operation of both Arrowrock and Lucky Peak Reservoirs. The Oregon Trail follows the Boise River throughout most of the corridor indicating a significant potential for unrecorded sites associated with this historic trail.

Indian Sacred Sites and Traditional Cultural Properties

Executive Order (EO) 13007, Indian Sacred Sites, directs agencies to avoid adverse impacts to Indian sacred sites. The EO defines a sacred site as a "specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion." The tribe or representative of an Indian religion is responsible for informing the agency of the existence of such a site.

Traditional Cultural Properties (TCP) are locations or resources identified by an Indian tribe or other group as being important in the survival and continuation of traditional cultural practices. These can include natural resources used for traditional crafts, ceremony, or religion, or locations with unique characteristics for the practice of traditional activities, including Indian sacred sites.

The Shoshone-Bannock and Shoshone-Paiute Tribes indicated that there are places along the Snake River that still retain sufficient integrity to enable tribal members to conduct traditional ceremonial practices. Representatives from the Tribes have specifically

indicated ancestral graves and sites of historical or traditional cultural value exist beneath the Lucky Peak Reservoir including Site 10BO300. In addition, various natural and physical features on the landscape such as mountains, foothills, springs, lakes, etc., hold spiritual or religious significance to the aboriginal Snake River Tribes. All of the known and unknown sacred sites and TCPs continue to be of traditional cultural importance to both of these Tribes, although the locations and nature of these sacred places has not been disclosed. If these sites do exist, it is not known if they are currently being utilized by tribal members for ceremonial purposes.

3.7.2 Environmental Consequences

No Action Alternative

Arrowrock Reservoir has been operating for almost 90 years and Lucky Peak Reservoir for almost 50 years, causing erosion and redeposition of sediment in the reservoir pools. Therefore, many of the adverse impacts to cultural resource properties, including traditional cultural properties that can result from reservoir operations have already occurred. If existing maintenance and operation of the reservoirs continues, these effects would continue, but would not expand to impact additional undisturbed shoreline. During periods of drawdown there is the potential for cultural resources to be exposed and become vulnerable to vandalism, unintentional damage by users, and surface erosion. Damage by users or vandals, however, is unlikely due to the limited accessibility and boat launching ability as well as the decreased numbers of visitors during the late season of the drawdown. No additional impacts are anticipated for the renewal of the current contract conditions.

Preferred Alternative

The impacts to cultural resources associated with conversion to a repayment contract would be the same as those described for the No Action alternative. No additional impacts are anticipated.

Alternative 3

The impacts to cultural resources associated with conversion to a repayment contract for reduced quantities would be the same as those described for the No Action alternative. No additional impacts are anticipated.

3.8 Indian Trust Assets

3.8.1 Affected Environment

Indian Trust Assets (ITA) are legal interests in property held in trust by the United States for Indian tribes or individuals, or property, which the United States is charged by law to protect for Indian tribes or individuals (U.S. Department of Interior 2000). Examples of ITAs include lands, minerals, hunting and fishing rights, and water rights. While most ITAs are on-reservation, they may also be found off-reservation. The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or Indian individuals by treaties, statues, and executive orders. These are sometimes further interpreted through court decisions and regulations.

The Shoshone-Bannock Tribes are a federally recognized tribe located at the Fort Hall Indian Reservation in southeastern Idaho. They have both on- and off-reservation trust assets as documented by the Fort Bridger Treaty, which was signed and agreed to by the Bannock and Shoshone headman on July 3, 1868. The treaty states in article 4, that members of the Shoshone-Bannock Tribe "…shall have the right to hunt on the unoccupied lands of the United States…" Unoccupied lands are defined as unoccupied federal lands. The Tribes also believe their rights include the right to fish, which was affirmed by the Idaho Supreme Court in *State of Idaho v. Tinno*.

The Nez Perce Tribes are a federally recognized tribe located at the Nez Perce Reservation in northern Idaho. The United States and the Tribes entered into three treaties and one agreement, treaties of 1855, 1863, and 1868 as well as an agreement of 1893. The rights of the Nez Perce Tribes include the right to hunt, gather, and graze livestock on open and unclaimed lands, and the right to fish in all usual and accustomed places.

No other federally recognized tribes have off-reservation rights in southwestern Idaho outside their executive order reservations.

The Shoshone-Paiute Tribes are a federally recognized tribe located at the Duck Valley Reservation in southern Idaho and northern Nevada. The reservation was established by executive orders dating from April 16, 1877; May 4, 1886; and July 1, 1910.

According to the Shoshone-Paiute Tribes, the interests of the Tribes are also reflected in the Bruneau, Boise, Fort Bridger, Box Elder, Ruby Valley, and other treaties and executive orders which the Tribes' ancestors agreed to with the United States and which the Tribes continue to observe in good faith, despite the fact that some of them were not ratified by the Federal Government. Therefore, the Tribes assert they have aboriginal

title and rights to those areas. All such treaties and executive orders recognize the need for the Tribes to continue having access to off-reservation resources because most of the reservations established were and continue to be incapable of sustaining their tribal populations. This need continues and has not diminished from the time of the first treaties and executive orders that established the Duck Valley Reservation.

3.8.2 Environmental Consequences

No Action Alternative

Under the No Action alternative, Indian Tribes and individual's right to fish, hunt, or gather and the resources associated with these activities are not anticipated to be impacted by the renewal of the Lucky Peak water service contracts under the current contract terms. Any adverse or beneficial impacts presently associated with the current river flow fluctuations, water diversion, and water service contracts would remain the same.

Preferred Alternative

Under the Preferred Alternative, Indian Tribes and individual's right to fish, hunt, or gather and the resources associated with these activities are not anticipated to be impacted by the conversion of the Lucky Peak water service contracts. Any adverse or beneficial impacts presently associated with the current river flow fluctuations, water diversion, and water service contracts would remain the same.

Alternative 3

The impacts to Indian Trust Assets associated with conversion to a repayment plan for reduced quantities would be the same as those described for the Preferred Alternative. No additional impacts are anticipated.

3.9 Environmental Justice

3.9.1 Affected Environment

Executive Order 12898 requires federal agencies to make environmental and human health conditions in minority and low-income populations a priority in their policies, programs, and activities. No minority or low-income populations were identified within the area affected by the project.

3.9.2 Environmental Consequences

No Action Alternative

No minority or low-income populations were identified within the area affected by the project; therefore, there are no anticipated impacts to these communities associated with the No Action alternative.

Preferred Alternative

No minority or low-income populations were identified within the area affected by the project; therefore, there are no anticipated impacts to these communities associated with the Preferred Alternative.

Alternative 3

No minority or low-income populations were identified within the area affected by the project; therefore, there are no anticipated impacts to these communities associated with Alternative 3.

3.10 Cumulative Impacts

Cumulative impacts are those environmental effects resulting from the incremental consequences of a proposed action when added to other past, present, and reasonably foreseeable future actions regardless of who undertakes these actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

The proposed contract conversions would result in virtually no changes in Boise River Reservoir operations under the Preferred Alternative, and very minor operational changes under Alternative 3. Cumulative effects analysis is, therefore, applicable only for Alternative 3.

Reclamation has completed three previous contract actions in recent years involving storage in the Boise River reservoirs. Separate NEPA compliance in the form of an EA and FONSI was completed for each of these actions. These actions are discussed in section 1.3 and listed below:

- Reclamation's purchase of 35,000 acre-feet of Lucky Peak Reservoir storage from Nampa & Meridian Irrigation District for salmon flow augmentation (1996)

- Contract actions with Simplot/Micron for storage in Anderson Ranch and Lucky Peak Reservoirs (1997)
- Assignment of contract entitlements to Provide 800 acre-feet of storage in Lucky Peak Reservoir to United Water Idaho, Inc.

In addition to the above completed actions, there are pending contract assignments of Lucky Peak storage totaling 800 acre-feet to Wilderness Ranch and Osprey subdivisions and United Water Idaho Inc, also discussed in section 1.3 of this EA.

Multi-agency planning studies as well as scoping comments for this project indicate that in the future municipal water providers will have to rely increasingly on surface water to meet demands in the rapidly growing Boise Valley. Existing contract holders will be able to meet some of this demand through expansion of current practices such as providing pressurized irrigation to subdivisions and commercial properties. However, municipal suppliers may also acquire surface water by free market acquisition or transfer of natural flow water rights and storage entitlements.

It is not possible to accurately estimate the quantity of natural flow rights or storage that may be acquired or transferred for future municipal use. However, analysis in previous NEPA documents for similar acquisitions and transfers of storage entitlements in the past totaling over 42,000 acre-feet indicate these actions, even when added to known future transfers (Wilderness Ranch and Osprey subdivisions), would have very little cumulative effect on reservoir operations and river flows or other environmental resources. Water demand and deliveries from reservoirs would continue to be highest in the summer, as it currently. Furthermore, the amount of storage required to meet the expanding needs of municipal providers is a small portion of the more than 1 million acre-feet in the Boise River reservoir system.

Considered altogether, the hydrologic and corresponding impacts to other aspects of the human environment from these past present and future actions are minor in the context of the normal yearly and seasonal changes in Boise River hydrology.