

Draft Environmental Assessment

**Deer Flat Dam Upper Embankment
Safety of Dams Project**

**Boise Project
Bureau of Reclamation
Snake River Area Office**

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Draft Environmental Assessment

Deer Flat Dam – Upper Embankment Safety of Dams Project

Chapter 1

1.1 Purpose and Need for Action

The Bureau of Reclamation (Reclamation) proposes to correct safety deficiencies in the Deer Flat Dam Upper Embankment, located southwest of Nampa, Idaho. The purpose of the proposed project is to prevent failure of the embankment which would lead to extensive property damage, potential loss of life, and loss of project benefits.

Corrective action is needed due to internal erosion of the embankment material that is occurring along the Caldwell Canal outlet conduit and has a high potential to occur on the Nampa Canal outlet conduit, both located within the Upper Embankment. This erosion could lead to failure of the dam.

1.2 Background

Deer Flat Dams, which impound Lake Lowell, were constructed by Reclamation as part of the Boise Project, Arrowrock Division from 1906 to 1911. The four zoned-earthfill embankments collectively referred to as Deer Flat Dams include the Upper, Middle, and Lower Embankments and the East Dike. The Upper and Lower Embankments are the main embankments at the facility with structural heights of 73 feet and 49 feet, respectively.

Lake Lowell is an off-stream reservoir, formed in a natural depression between the Snake and Boise Rivers. Water diverted from the Boise River at the Boise River Diversion Dam flows through the 40-mile-long New York Canal and into Lake Lowell. The total capacity of Lake Lowell is 173,100 acre-feet at full pool elevation 2531.2 feet. Irrigation water is released from Lake Lowell through four canal outlets. The Caldwell and Nampa Canal outlets are located in the Upper Embankment while the Lowline and North Canals are located in the Lower Embankment (Figure1). Lake Lowell is operated by the Boise Project Board of Control.

Deer Flat National Wildlife Refuge (Refuge), established in 1909 and managed by the U.S. Fish and Wildlife Service, (USFWS) surrounds and includes Lake Lowell. Large numbers of wintering waterfowl and nesting Canada geese use the Refuge. The reservoir and surrounding area support excellent warm water fishing, upland game bird and waterfowl hunting, boating, picnicking, wildlife viewing, swimming, and sightseeing. Lake Lowell receives an estimated 100,000 recreation visits annually.

1.3 Safety of Dams Investigations

The Upper and Lower Embankments were modified under the Safety of Dams Program between 1990 and 1991 to reduce the risks associated with piping and liquefaction of the

foundations and embankments (Reclamation 1989). The modifications included the installation of drainage features and a stabilizing berm along the downstream toe of each embankment. Drainage features extended beyond the Low Line and North Canals at the Lower Embankment, but did not include the Caldwell and Nampa Canals at the Upper Embankment.

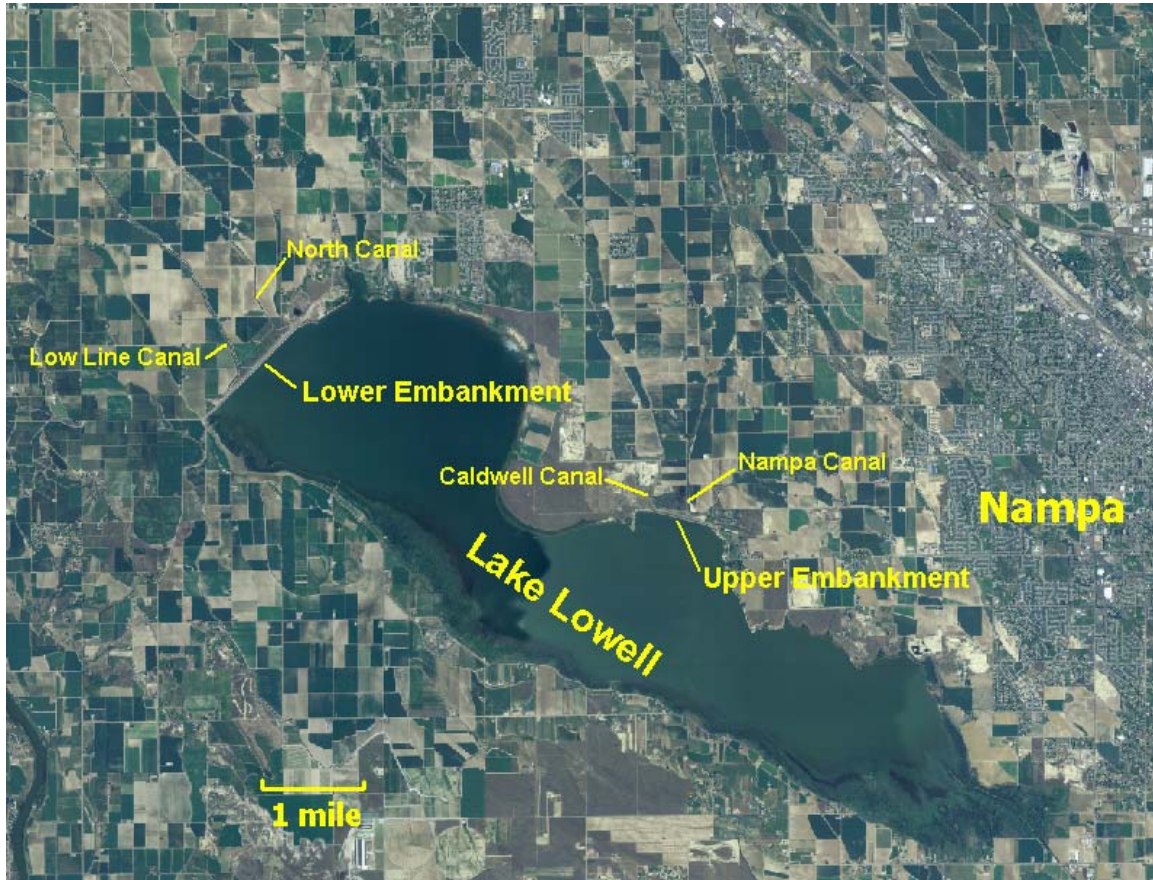


Figure 1 - Major features of Lake Lowell and Deer Flat Dams

In 2001, investigation of the Caldwell Canal outlet revealed new cracks within the concrete outlet conduit and seepage and sediment within the conduit. Further inspection of the Caldwell Canal outlet in 2004 showed that seepage and sediment was occurring in another crack in the conduit which indicated that piping (the movement of foundation material) was progressing downstream along the conduit and that the potential for voids in the embankment foundation along the conduit was high. The presence of voids in the conduit was confirmed by ground penetrating radar and subsequent drilling through the conduit.

A risk analysis determined the risk of failure due to piping to be high and warranted corrective actions. In May 2005 an emergency condition was declared for the Upper Embankment, Caldwell Canal conduit. To protect the embankment from failure, an emergency earthen berm was placed around the intake tower and over the upstream conduit in June 2005 (Figure 2). Pumps were installed to allow irrigation releases to be

made and to maintain capacity to evacuate the lake. A temporary maximum reservoir restriction to elevation 2526.0' (5.2 feet below full pool) was also instituted.



Figure 2 - View to the north showing the earthen emergency berm surrounding the Caldwell Canal gate control tower. Pumps are visible in the foreground. Area proposed for temporary stockpile of excavated material is to the left of the canal.

1.4 Issues and Concerns

During the initial safety of dams work on the Deer Flat Embankments between 1990 and 1991, considerable public and agency scoping was conducted to understand issues and concerns related to construction activities and reservoir drawdown for that project (Reclamation 1989). Since the proposed project is similar to the 1990-1991 work in many regards, many of the issues still apply. Reclamation has met several times with staff from the Refuge and to identify their concerns. A scoping letter was mailed to the USFWS and Idaho Department of Fish and Game (IDFG) soliciting their concerns and comments. Neither agency provided a written response.

Major issues and concerns for the proposed work that have been identified are:

- Reduction/degradation of fish and wildlife habitat if a severe reservoir drawdown is required for construction

- Impacts to nesting or wintering bald eagles, a Federally listed threatened species
- Direct impacts to embankment structures that may be historically significant
- Road closures, traffic disruptions, and noise from construction equipment
- Impacts to water quality from excavation work below the water line and from dewatering activities
- Disruption of fishing or waterfowl hunting

1.5 Related Actions and Activities

1.5.1 Previous Deer Flat Safety of Dams Project

In September 1989 Reclamation issued a final Environmental Assessment and Finding of No Significant Impact (FONSI) for Deer Flat Dams Safety of Dams project (Reclamation 1989). Studies had found that corrective action was needed to control internal erosion of the embankments and their foundations and to prevent further erosion of the upstream face on the Lower Embankment. The project involved constructing filter/drain systems and counterbalance fills along the downstream toe of both the Upper and Lower Embankments and replacing riprap on the upstream side of the Lower Embankment with soil cement. In order to accomplish the work, the reservoir was drafted quite low (elevation 2510-2514) during fall and winter to allow for construction access.

Chapter 2 Alternatives

2.1 Alternatives Considered But Eliminated From Detailed Analysis

A range of structural and nonstructural alternatives were developed to address the safety concerns at Deer Flat Dam Upper Embankment. Possible alternatives were first screened for constructability, cost, potential environmental impacts and level of risk reduction to the public (Reclamation 2006). The screening analysis resulted in two structural alternatives for the Caldwell Canal that were deemed reasonable and feasible and carried forward for more detailed analysis. Other structural alternatives were rejected early due to excessive cost, significant environmental impact, or because they did not adequately address the safety concerns. A single alternative was developed for modification of the Nampa Canal outlet. This alternative was further revised during a Value Engineering exercise.

The two structural alternatives studied in more detail included a complete replacement of the Caldwell Canal outlet conduit and a modification of the Caldwell Canal outlet in place with partial replacement (Modify in Place Alternative). Detailed risk reduction analysis of both alternatives ultimately concluded that there was insufficient risk reduction for the Modify in Place Alternative, and it did not meet the purpose of the project. It was therefore eliminated from further study.

Two non-structural alternatives were examined but were eliminated since they would severely reduce the reservoir's irrigation benefits and therefore did not meet the purpose and need for the project. These are described below:

2.1.1 Reservoir Restriction Alternative

The potential failure mode for the Deer Flat Dam Upper Embankment is a piping failure along or into one of the outlet works conduits. Because of this, the only acceptable safe operating level would be below the outlet conduits. This level would not allow release of water through the outlet works and loss of the irrigation water storage benefits the reservoir provides. Furthermore there would be severe impacts to fish and wildlife from maintaining the reservoir at this low elevation with a reservoir pool of less than 7,900 acre-feet.

2.1.2 Dam Removal or Abandonment

Dam abandonment was also considered, but like the reservoir restriction, this option would not meet one of the primary purposes of the project – to continue irrigation storage benefits

2.2 Alternatives Analyzed in Detail

2.2.1 Caldwell Canal Outlet Works Complete Replacement and Nampa Canal Outlet Filter (Proposed Action)

Caldwell Canal - This alternative would involve the complete replacement of the Caldwell Canal outlet works structure including the intake tower, access catwalk, gates, operators, and the entire length of conduit. Construction of a new Caldwell Canal outlet works would repair all existing voids and seepage paths along and into the conduit and provide a sand filter along the conduit to prevent future piping of embankment material. The new conduit would consist of steel-lined reinforced concrete with an inside diameter of 54 inches. At the downstream end, the new conduit drainage system would be integrated with the existing embankment toe drain, and a new baffled stilling basin would be constructed. A new intake tower would be built approximately 35 feet upstream from the existing tower to eliminate the need for an upstream intake conduit. The elevation of the intake would remain the same as the existing inlet conduit (2501). Major construction and excavation features are shown in Figures 3 and 4.

Construction of the new Caldwell Canal outlet works would require excavation of the Upper Embankment over the entire length of the conduit. Excavation would likely be by tracked excavator. The existing concrete outlet structure and gate tower would be removed and replaced. The earthen emergency berm would also be excavated to gain access to the conduit. The perimeter of the berm would be left in place to function as a cofferdam. Impervious material, either a silt/sand mantle, geomembrane with riprap protection, or sheet pile would be place on the outside (Figure 3).

Material excavated from the Upper Embankment and emergency berm would either be reused in the reconstruction or wasted. Reused material would be temporarily stockpiled adjacent to the canal, and wasted material would be hauled along the canal road to an abandoned gravel pit on Refuge property to the north. The construction staging area would be located in the boat ramp parking area on the west end of the Upper Embankment.

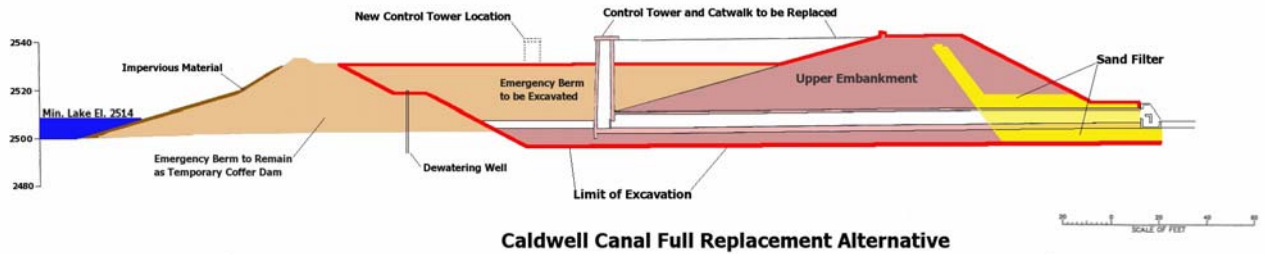


Figure 3 - Cross section of proposed excavation for replacement of the Caldwell Canal Conduit

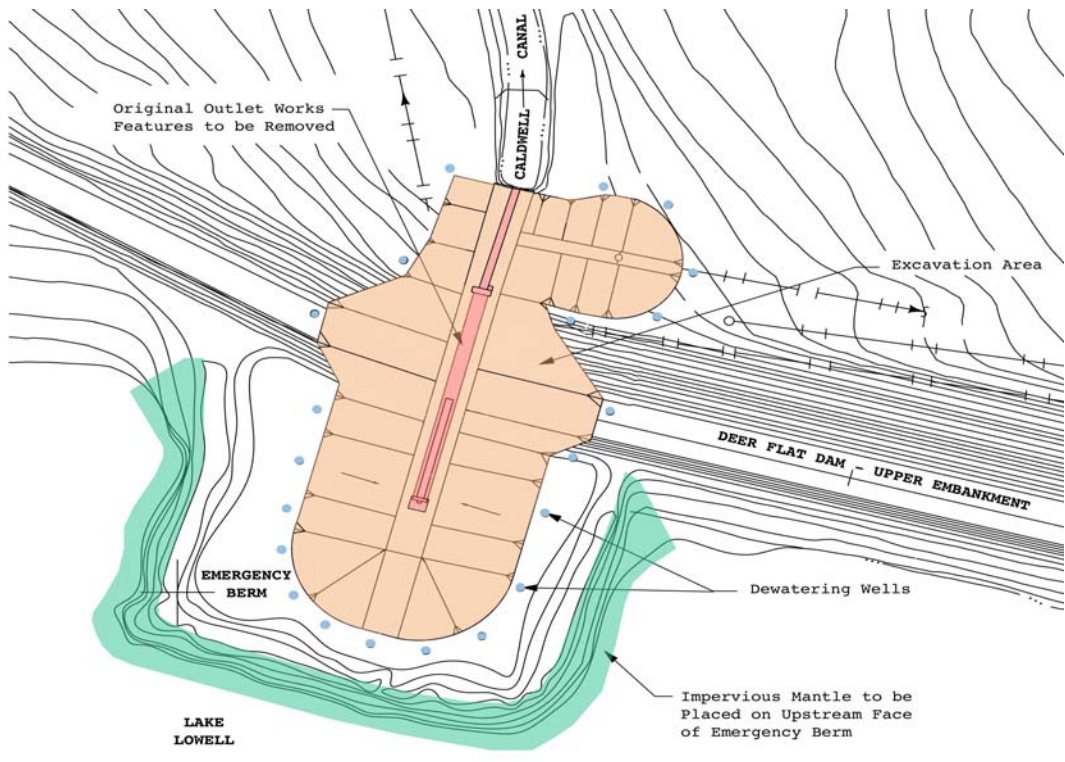


Figure 4 – Plan view of proposed Caldwell Canal conduit replacement

A dewatering system consisting of a series of wells placed inside the cofferdam and pumps in the excavated areas would be required to complete construction in the dry. These wells and pumps would discharge into Lake Lowell after allowing suspended material, if any, to settle out.

The Upper Embankment would be replaced with suitable compacted fill after the outlet works structures are completed. Fill material would be from reuse of the excavated embankment and emergency berm material and from local commercial sources. At the conclusion of the outlet works and embankment construction, the cofferdam would be removed by excavator and material hauled to either an abandoned gravel pit on Refuge property north of the headquarters or to a commercial gravel pit.

Nampa Canal

At the Nampa Canal outlet works the downstream portion of the upper embankment would be excavated to expose the downstream portion of the conduit (Figure 5). A 20-foot section of the conduit would be removed to allow placement of a sand filter around the conduit, after which a new section of conduit would be placed. The sand filter would extend along the toe and would be tied to the existing toe drain of the embankment. This would require excavation along the embankment toe as well. Excavated material would be hauled to the same location as material from the Caldwell Canal.

Since the upstream face of the embankment would remain intact near the Nampa canal, no cofferdam would be required

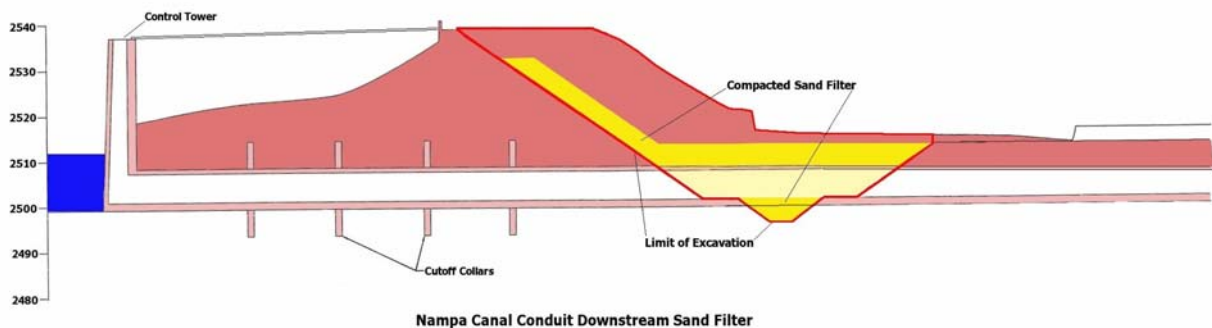


Figure 5 - Cross section of proposed excavation and downstream sand filter for Nampa Canal outlet

Refuge Access Road - Construction would involve major excavations through the Upper Embankment for a period of up to 7 months from approximately the end of September to the beginning of May. During this time access to the Refuge headquarters would be cut off since the current road runs across the Upper Embankment. To provide access during construction a new road would be constructed from the corner of Roosevelt and Indiana Avenues southeast to the Refuge headquarters and the boat ramp on the west end of the Upper Embankment (Figure 6). The new road would be a paved road approximately .6 miles long and 30 feet wide. The Refuge has indicated that a road in this location would suit their needs better than the road across the Upper Embankment, and they propose to assist in the construction and paving of the road so that it provides permanent access.

Upon completion of the safety of dams work, the Upper Embankment would remain close to public vehicular access, but would remain open to non-motorized uses.

Construction Sequencing – Construction, under this alternative, including the new access road is expected to last from early July 2007 through May 1, 2008. The various construction phases are described in more detail below.

- Mobilization – Equipment and materials would be delivered to the site beginning in early July and stored in staging areas located at the west end boat ramp parking area.
- Access Road Construction – Construction of the Refuge Headquarters access road would begin in July and be completed by September 15. Construction of the access road must be completed prior to excavation of the upper Embankment when access will be cut off.



Figure 6 - Proposed Refuge headquarters access road location and other project features

- Reservoir Drawdown for Embankment Work – In order to maintain a dry work area behind the existing emergency berm/cofferdam on the Caldwell Canal, Lake Lowell would need to be drafted to elevation 2515' by September 30 when an impervious sand/silt mantle, geomembrane or sheet pile would be installed and 2514' by October 15 when excavation of the upstream portion of the conduit would occur. The lake would be allowed to refill to a target elevation of at least

2518” by November 1 and held to 2518 or slightly higher until the beginning of March, when refill of the lake usually begins, assuming water in the reservoir system is available. These levels are similar to operations during a moderately dry year and can be accomplished through normal irrigation and late winter /early spring New York Canal deliveries.

- *Excavation* - Beginning in early October, impervious material - either a silt sand mantle, geotextile fabric with riprap protection, or sheet pile - would be placed on the upstream side of the Caldwell Canal outlet emergency berm to assist in dewatering the construction area. The Upper Embankment and emergency berm would be excavated along the entire reach of the canal conduit. The perimeter of the emergency berm would be left in place to form a U-shaped cofferdam to dewater the construction zone (Figures 3 and 4).

Concurrent with the excavation of the Caldwell Canal outlet works, excavation of the downstream portion of the Nampa Canal outlet conduit would occur. Since only the downstream portion of the Nampa Canal outlet would be excavated, no cofferdam is required.

- *Outlet Works Replacement and Embankment Reconstruction* - Construction of the Caldwell Canal outlet works features would occur from mid-October to mid-March. The replacement of the Nampa downstream conduit and placement of filter material would begin earlier since there is less excavation involved. Embankment reconstruction is expected to be completed in late April for the Caldwell Canal outlet and in late December for the Nampa Canal outlet.

2.2.2 No Action Alternative

The no action alternative is required under National Environmental Policy Act regulations as a basis for comparing impacts. For this project, no action is considered to be leaving the existing emergency berm in place and continuing the operating restriction at Lake Lowell to no higher than elevation 2526’ (5.2 feet below full pool). Reclamation considers this scenario to be unacceptable in the long term for dam safety reasons. The only long-term nonstructural alternative that provides adequate safety would be an operating level described in section 2.1.1 above.

Chapter 3 Affected Environment and Environmental Consequences

3.1 Lake Operation and Hydrology

3.1.1 Affected Environment

Water for Lake Lowell is diverted at Boise River Diversion Dam into the New York Canal where it is conveyed to Lake Lowell. Filling of the lake occurs primarily from natural flow diversion rights on the Boise River during the non-irrigation season (February to mid-April). The maximum inflow to the lake is approximately 1000 cubic

feet per second (cfs). Irrigation releases from Lake Lowell are made through the Low Line, and North canals on the Lower Embankment and the Caldwell and Nampa canals on the Upper Embankment. The combined capacity of the four canals is 1480 cfs.

Summer irrigation releases are greater than inflow so that in most years the water level of the lake falls through the summer until about the middle of September. At this point, as irrigation demands decrease, the lake level begins to rise a small amount depending on availability of water, until November. In dry years the lake may continue to be drafted to the end of the irrigation season in mid October. The lake is held at a level generally between elevation 2515' (60,000 acre feet) and elevation 2522' (111,000 acre feet) through the winter depending on the previous water year. Refill usually begins in late January or February once maintenance work on the New York Canal is completed and icing conditions allow. The lake is usually filled by the end of May in good water years. In poor water years the lake may not fill completely.

Reclamation has produced a predictive model for future operations for its projects including Lake Lowell. The model can predict “exceedance values” or the percentage of years a certain parameter such as lake elevation would be exceeded. Table 1 displays the end of month Lake Lowell water elevation, contents and surface area that would be exceeded 50 percent of water years. Conversely water levels and contents would be at or below these values in 50 percent of water years. The table shows the typical minor amount of refilling at the end of the irrigation season in October and the relatively constant elevation maintained in the early winter.

Table 1 Predicted Lake Lowell End of Month Elevation @ 50% Exceedance					
	August	September	October	November	December
Lake Elevation	2515'	2514'	2517'	2517'	2518'
Lake Contents (acre feet)	42,081	36,853	53,396	53,396	59,453
Lake Surface Area (acres)	5367	5089	5948	5948	6166

3.1.2 Environmental Consequences

No Action Alternative

Under the No Action alternative there would be no structural repair to the safety deficiencies of the Deer Flat Dam Upper Embankment. The earthen emergency berm at the Caldwell Canal outlet would be left in place and the current lake elevation restriction of 2526' would remain in effect indefinitely. Left in this condition over the long term there would still be substantial risk of failure of the embankment.

The lake restriction would reduce the amount of storage available for irrigation by about 44,000 acre feet compared to full pool elevation of 2531.2'. Because there would be less water stored in the lake, it would be drafted to a lower level during the irrigation season. The winter pool would be 6-8 feet lower in elevation than historically, and during dry years could be drafted to its inactive capacity of only 14,000 acre feet.

Proposed Action

Under the proposed action the lake would be drafted to elevation 2515' by end of September and 2514' by October 15 to accommodate the installation of the mantle over the outside of the emergency berm and excavation of the upstream end of the Caldwell Conduit. By late October after irrigation releases end, the lake level would be allowed to rise normally if sufficient water is available. This increase in elevation would be to at least elevation 2518' and would result in a winter minimum pool of at least 60,000 acre feet and 6,200 surface acres. These elevations are similar to the 50 percent exceedance values shown in Table 1. In late winter and early spring some additional refill may occur. Full refill would occur after construction is completed on May 1 if sufficient runoff is available.

Figure 7 compares lake elevations during construction with elevation over a series of wet, dry and average water years from 2000 to 2004. As shown in the table, water levels required for construction would be similar to those encountered in fall and winter of 2002-2003, following a moderately dry water year in 2001-2002. These levels are still higher than those in fall and winter of 2001-2002 following a severely dry water year in 2000-2001.

Lake Lowell Elevation

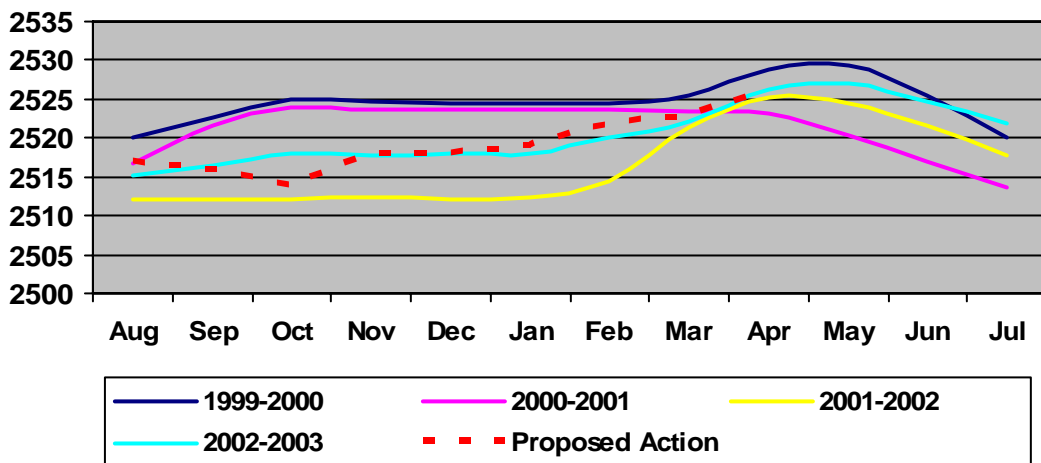


Figure 7 - Comparison of Lake Lowell water surface elevation from 2000 – 2003 with the Proposed Action

Upon completion of construction at the end of April 2008, the lake would be operated normally without any lake restriction. Water levels would tend to be higher year round compared to those under No Action with a reservoir restriction in place.

3.2 Cultural Resources

3.2.1 Affected Environment

The Deer Flat Embankments were listed on the National Register of Historic Places in 1976, in conjunction with the Boise Diversion Dam, as being important in the historic development of the Boise Basin. The Deer Flat Embankments, which impound Lake Lowell, are significant as the first large storage feature built by the U.S. Reclamation Service on the Boise Project, one of the largest of the early projects undertaken by the Federal government following passage of the Reclamation Act in 1902. The Deer Flat Embankments are earth fill structures which represent conventional embankment design and construction methods of the early 20th century.

Inadequate resistance to the erosive action of waves on the lake has caused repeated deterioration of the upstream faces of the embankments, leading to significant construction activity by the Civilian Conservation Corps (CCC) in the 1930's. From 1935 to 1939, the CCC hand-placed riprap on the upstream embankment faces and constructed rock masonry parapet walls. The riprap face and parapet wall on the Upper Embankment maintained their integrity. However, at the Lower Embankment, large segments of the riprap have been destroyed by wave-induced erosion and portions of the parapet wall have either collapsed or have been removed. In 1990, as a result of severe erosion of the upstream faces of the embankments, Reclamation reconstructed the northernmost portion of the upstream face of the Lower Embankment. As a component of the reconstruction, the parapet was removed and replaced with a pre-formed concrete wall (Jersey barrier).

3.2.2 Environmental Consequences

No Action

If no modifications are made to correct the present structural deficiencies, there will be no immediate effects to the historic integrity of the Deer Flat Embankments. However, if no action is taken to correct the structural deficiencies, internal erosion of the embankment material along the conduits, as well as active and progressive piping failure on the conduits, would continue. That could lead to failure of the Upper Embankment at some future time, with concomitant impacts to the parapet walls, hand-placed riprap, access bridge, gates and operators, and other associated historic features.

Proposed Action

This alternative completely replaces the Caldwell Canal outlet works structure, including the intake tower and access bridge (catwalk), gates and operators, and the entire length of

conduit, with a downstream filter. Earth removal includes total excavation of an approximately 200-foot section of the embankment that includes original CCC parapet walls, cobblestone pillars and two courses of cut stone steps at the walkway entrance. In addition, excavation of the embankment will require removal of approximately 150 feet of CCC hand-placed basalt riprap on the south facing slope of the embankment.

This alternative also includes removal and replacement of the downstream section of the Nampa Canal outlet works conduit with a new section of conduit incorporating a downstream filter around the downstream section of the conduit that would be tied into the existing toe drain system. The work would require excavation embankment in order to tie the new conduit filter into the existing toe drain system. Construction on the downstream side of the embankment would obliterate a standing stone retaining wall that parallels the embankment, as well as a series of stone steps leading up to the embankment (both the wall and stairs are of an unknown date). Upstream portions of the embankment would remain unaltered during construction, thus preserving the existing parapet wall and other associated historic features of the outlet works.

Removal and replacement of portions of the historic outlet structures at the Caldwell Canal (and Nampa Canal to a lesser extent), and associated earth removal and excavation, will alter those characteristics of the Upper Embankment that qualify it for inclusion in the National Register - - characteristics that relate to the property's original design, workmanship, feeling, and association. Those alterations will diminish the integrity of the Deer Flat Upper Embankment and have an adverse effect upon this National Register property.

Mitigation

Consultations pursuant to 36 CFR 800 regulations have been initiated with the Idaho State Historic Preservation Officer (SHPO). Reclamation and the SHPO concur that the structural modifications being proposed at the Deer Flat Upper Embankment constitute an adverse effect under the 36 CFR 800 regulations, requiring specific action by Reclamation to mitigate those effects. The SHPO and Reclamation cultural staff have developed a list of recommended mitigation based on discussions from a joint Reclamation and SHPO field visit in January 2006, to the Upper Embankment. The mitigation measures enumerated below have been formalized in a July 12, 2006 memorandum of agreement (MOA) between Reclamation and the SHPO.

Reclamation agrees to perform the following actions to mitigate the adverse effects of the proposed project to the Upper Embankment: **1)** Large-format photography (4 x 5) contact prints, archivally processed, of pre-selected features of the Caldwell and Nampa Canal Upper Embankment; **2)** 35mm slides and digital format photographs (high resolution of before and after) aspects of the project; **3)** saw/cut and remove the pillars at the walkway entrance of the Caldwell Canal structure, replacing them in the same context after the project; **4)** reconstruct the portions of the parapet wall that will be demolished, using the distinctive characteristics of the original CCC work; **5)** reconstruct the tower at the Caldwell Canal outlet works utilizing materials, design, and colors that match the exterior

construction of the original tower as closely as possible; 6) salvage and utilize as replacement riprap after construction, any hand-placed basalt riprap that will be removed in particular locations (the replacement riprap will resemble the layout and appearance of the original riprap as much as possible).

3.3 Water Quality

3.3.1 Affected Environment

Lake Lowell has experienced recurring water quality problems, and the lake is on the Idaho 303d list of water quality-impaired water bodies. Water quality problems are primarily related to nutrient (phosphorus) loading and water exchange rates (Reclamation 2001). High nutrient loads in the lake have result in dense algae blooms and low dissolved oxygen in late summer and fall, which degrade fish and wildlife habitat and recreational values. Bacterial loading has at times caused bacterial counts that exceed Idaho Water Quality Standards for primary contact recreation waters during the summer. To address these problems, the Idaho Department of Environmental Quality is preparing a Total Maximum Daily Load (TMDL) management plan for the lake. The TMDL is expected to be complete in 2006.

Various pollutant sources contribute to Lake Lowell's water quality problems. Pollutant sources include urban runoff, domestic wastewater, agricultural drainage, and natural causes. Reclamation (2001) determined that the New York Canal is the single largest contributor to phosphorus loads, with irrigation drains and waterfowl also contributing significant amounts.

A slight thermal gradient exists in Lake Lowell from June through September (Reclamation 2001), although wind frequently breaks up the stratification of the water column resulting in short time periods with nearly uniform temperatures. Where wind mixing does not reach the deeper water areas, oxygen depletion may occur.

In 1998, Reclamation and the USFWS cooperated on a study to analyze and evaluate alternatives to improve water quality at Lake Lowell (Burch and King 2000). Water, sediment, and fish tissue were analyzed in this study for a variety of organic and inorganic contaminants. The study detected DDT and its metabolites, in sediments. Total DDT was detected at several sites in concentrations that fall into the "level of concern" category, which could potentially cause contamination in fish.

Mercury concentrations above the chronic freshwater criteria in water samples were found in some sampling sites within the lake water during one of two sampling periods (August 10-12, 1998). It was theorized that mercury present in the water column during this sampling period may have been detected due to an algae bloom ongoing at that time. Mercury was not detected in the water of any of the drains and canals that flow into the lake nor was it detected in the lake sediments.

3.2.2 Environmental Consequences

No Action

Under the No Action alternative water quality at Lake Lowell would likely remain similar to the current situation. The major inputs of phosphorus (New York Canal, agricultural drains and waterfowl) would continue and water exchange rate would remain similar to the present.

The continuation of the lake level restriction may increase water temperatures in late summer and exacerbate algae blooms, especially in low water years. However, shallower water would tend to mix with wind and wave action more readily which would limit stratification and areas of low dissolved oxygen.

Proposed Action

Nutrient loading and water exchange rates, the primary causes of water quality problems in Lake Lowell would not be greatly different than current conditions and the no action alternative. The lower lake level required from the end of August through the end of September for construction is not a major change from normal operation and has occurred during moderately dry periods in the recent past (Figure 6). The shallower lake would tend to have higher water temperatures in late summer which may lead to more severe algae blooms. However the shallower water would tend to mix more readily during wind events and increased wave activity which would help eliminate oxygen-poor areas near the lake bottom.

There would be a short term localized increase in turbidity while placing the silt/sand mantle over the emergency berm to reduce seepage and dewatering requirements. The excavation of the Caldwell Canal conduit would take place behind the cofferdam formed by the remaining emergency berm and this would contain turbidity. After the new conduit is constructed and backfilled, the cofferdam would be removed. This would also likely cause some localized increase in turbidity, but given the sandy composition of the emergency berm, suspended solids would settle quickly and turbidity would not be widespread.

Mitigation

Prior to any construction activity Reclamation or its contractor would obtain a National Pollution Discharge Elimination System Construction Stormwater Permit from the Environmental Protection Agency. In order to obtain the permit Reclamation or its contractor would develop a construction stormwater pollution prevention plan employing best management practices to minimize pollutants from entering Lake Lowell from stormwater runoff and dewatering activities.

3.4 Vegetation

3.4.1 Affected Environment

Vegetation surrounding Lake Lowell within the Refuge ranges from mature cottonwood/willow forests, emergent wetlands and smartweed beds around the lake fringes to sagebrush steppe on the higher dry sites. The immediate area of the Upper Embankment is either devoid of vegetation or is sparsely vegetated with perennial shrubs such as rabbitbrush and weedy annual forbs and grasses the most prominent plants.

The upland area to the north of the Refuge headquarters along the proposed access road alignment was formerly sagebrush steppe plant community that was burned in summer of 2003. After the fire, the Refuge reseeded the area with a variety of native perennial grass and shrub species. Currently the vegetation growing is dominated by a mix of perennial grasses that were seeded such as Snake River and thickspike wheatgrass, and weedy invasive annuals such as kochia and cheatgrass.

The abandoned gravel pit to the north of the burned area is mostly devoid of vegetation except for weedy species.

3.4.2 Environmental Consequences

No Action

Under the no action alternative the lake restriction the riparian areas and wetlands along the lake fringe would gradually die off as the maximum water level would be at least 5 feet below normal full pool. Similar vegetation would likely re-establish along the new high water line at a lower elevation over time since a seed source is available, but it would take many years for the mature riparian forest to return.

Vegetation in the burned area north of the Refuge headquarters may never return to the sagebrush steppe community that was present before the fire. Kochia, cheatgrass and other nonnative weedy species may tend to dominate unless seeded bunchgrasses and sagebrush are able to out-compete them.

Proposed Action

Under the proposed action very little direct impact to vegetation would occur through the excavation of the embankment and embankment toe at the Caldwell and Nampa Canal conduits as these areas are relatively bare. The total amount of area disturbed would be approximately 3 acres of sparse, mostly weedy vegetation.

The proposed new access road to the Refuge headquarters would be approximately .6 miles long and 30 feet wide. Approximately 2.5 acres of the vegetation community in the revegetated burn area would be lost to the construction of the new road.

Some vegetation impacts would occur in the area west of the Caldwell Canal used for temporary storage of excavated material to be reused in reconstructing the embankment. Although not part of the burn, this area was part of an old landfill and is somewhat disturbed (Figure 2). Approximately 2 to 4 acres of vegetation in this area would be impacted.

Mitigation

At the conclusion of construction, areas used for storage of excavated material or otherwise disturbed, would be reseeded with a seed mixture similar to that used for the fire rehabilitation to the north of the Refuge headquarters or as otherwise recommended by the Refuge. Embankment areas and the interior of the abandoned gravel quarry would not be revegetated.

3.5 Fish and Wildlife

3.5.1 Affected Environment

The sport fishery at Lake Lowell consists primarily of largemouth bass, smallmouth bass, yellow perch, black crappie, bullhead, bluegill, and channel catfish (IDFG 2001). Suckers and carp are also plentiful in the lake. Lake Lowell is regarded as one of the best largemouth bass fisheries in the state. The Bass Federation's Western Divisional Championship was held at the lake in May 2006.

Seasonally flooded riparian forest and emergent wetlands usually provide good cover for largemouth bass and other fish in late spring and early summer when the lake is relatively high. During dry years when these areas are not inundated fish are forced to use the relatively barren bottom of the lake and can become concentrated as the pool shrinks in late summer. Spawning areas may also be limited if water levels are low in the spring.

The Refuge was primarily established to provide sanctuary for migratory and wintering waterfowl. Currently the Refuge averages about 100,000 ducks and 12,000 geese with birds beginning to congregate in late summer and reaching peak numbers at the end of December and end of November, respectively (Johnson, Refuge Mgr. pers. com.). Smartweed, found in the shallow fringes of the lake is an important food source for migrating waterfowl in the fall and winter. The Refuge also plants grains in fields to the north of the Upper Embankment for wildlife food.

The cottonwood and willow forests around much of the lake provide valuable habitat for songbirds, and mudflats exposed during drawdown of the lake support numerous shorebirds.

3.5.2 Environmental Consequences

No Action

Under the no action alternative, the reservoir restriction would reduce the amount of flooded riparian areas and emergent wetlands and important cover and spawning areas for fish such as largemouth bass and crappie. These species would be adversely affected until these vegetation types gradually recolonize the lake's fringes at lower elevations.

There would likely be some changes in wildlife habitat if the reservoir operating restriction is left in place. Emergent wetlands and cottonwood willow forests may die out, but would gradually recolonize at lower elevations around the lake's fringes.

Proposed Action

Fish and wildlife would be largely unaffected directly by construction activities. The area around the Upper Embankment is not particularly valuable fish or wildlife habitat compared to other areas of the Refuge. Some minor disturbance of wildlife feeding in the grain field to the north of the Upper Embankment may occur from truck traffic hauling excavated material along the east side of the Caldwell Canal to the gravel pit. It is likely the disturbance would be limited to the western fringe of the field nearest the canal road.

The drafting of Lake Lowell in the fall and through the winter to accommodate construction should not have any major effects to fish as it would be within normal operating ranges in a moderately dry year. Some spawning habitat may be unavailable in spring since refill may be delayed compared to normal operations, but the proposed action would not affect the probability of refill and flooding of emergent and riparian areas important to warmwater fish.

Under the proposed action, the lowest water levels would occur early in the fall waterfowl migration season. At the lowest water levels in October, there would be sufficient open water for resting and sanctuary, however the smartweed beds, an important food source for ducks would not be inundated and would be unavailable. Smartweed is generally flooded and available to waterfowl at elevation 2518' and above. By early November, water levels would rise to 2518' or slightly higher and smartweed would be available when waterfowl are most abundant in November and December.

The deeper drawdown in the fall would also provide abundant foraging areas for migrating shorebirds.

Upon completion of the project, the lake elevation restriction would be removed and the lake would be allowed to fill normally to its full operational pool when sufficient water is available. This would benefit fish populations and riparian and wetland vegetation compared to no action, as the vegetation along the fringes of the lake would be inundated.

3.6 Threatened and Endangered Species

3.6.1 Affected Environment

The U.S. Fish and Wildlife Service (USFWS) indicates there are three species listed under the Endangered Species Act that may occur in Canyon County Idaho: bald eagle, gray wolf, and Idaho springsnail (USFWS 2006). Of these species, only the bald eagle inhabits the area around Lake Lowell.

Lake Lowell is an important area for bald eagles. The lake has abundant prey (fish and waterfowl), suitable nesting and perching trees, and is relatively free of human disturbance for much of the year.

Bald eagles nest and winter at Lake Lowell. There are two bald eagle nesting territories located along the south and southeast shorelines that have been documented for several years. These territories have been relatively unsuccessful recently with no young being produced from 2002 to 2004 and one produced in 2005 (Reclamation 2004, Sallabanks 2005, 2006). The reasons for the poor success are unknown. A new bald eagle nest was discovered in 2006 approximately one half mile west of the Refuge headquarters (E. Johnson, Refuge Manager, pers. com.). It is unknown whether this is a relocation of an existing nest or a third nesting territory.

Wintering bald eagles begin arriving at Lake Lowell in late October; numbers have averaged about 25 birds in recent years (E. Johnson Refuge manager pers. com.). The number of birds using Lake Lowell in the winter largely depends on ice conditions. Taylor and Bechard (1991) studied habitat use by bald eagles during a previous safety of dams project at Lake Lowell in the winter of 1990-1991. They found wintering eagles roosting in the southeastern end of the lake and east of the Lower Embankment prior to ice formation. Eagles perched in cottonwood trees and on mudflats in several concentrated areas around the reservoir. The closest of these to the construction area was a point south of the Refuge headquarters approximately 1000 feet from the Caldwell canal emergency berm. After ice forms on the lake, usually in December, eagle numbers decreased overall and the only area used heavily was the mudflats near the New York Canal inlet, more than 2 miles from the construction area. After ice breakup in early spring, eagle distribution was similar to early winter.

Wintering eagles at Lake Lowell primarily prey on waterfowl with the remainder of their prey coming from fish (Taylor and Bechard 1991). Deteriorating water quality from agricultural return flows and other causes may also limit some kinds of fish in the lake. This can impair the lake's warmwater gamefish populations, but other nongame species such as carp persist in high numbers. Taylor and Bechard (1991) observed resident adult and newly fledged eagles in August feeding mostly on carp and waterfowl.

Taylor and Bechard (1991) noted that construction activity had little effect on the distribution of wintering bald eagles. Bald eagles did not appear to avoid the construction site at the Upper Embankment nor did they move less disturbed areas.

3.6.2 Environmental Consequences

No Action

Under the no action alternative bald eagle nesting and winter use of Lake Lowell would probably remain similar as it is currently and possibly increase as eagle numbers continue to improve regionally. The reservoir restriction may adversely impact gamefish spawning, however nongame fish and waterfowl would continue to provide ample prey for bald eagles.

Proposed Action

Under the proposed action, construction activities and reservoir operational changes at Lake Lowell would occur primarily during the period wintering bald eagles are using the lake, although the early phase of the breeding period would occur towards the end of construction.

During the construction period when the lake is ice-free (September through December), the pool size would range from approximately 5100 to 6100 acres. This would provide ample habitat for bald eagle prey such as waterfowl and fish. Mudflats and cottonwoods would be available for roosting and perching. The water level in Lake Lowell required for construction would be similar to a moderately dry year, and well within the lake's operating range. There would be no appreciable short- or long-term effect to bald eagle prey abundance from lake operations.

Disturbance of wintering bald eagles from construction activities is likely to be minor. Construction would be confined to the immediate area of the Upper Embankment, proposed new access road, and nearby stockpiles of excavated material. While bald eagles do perch in cottonwoods near the Refuge headquarters, this area is approximately 800 feet from the closest construction location near the Caldwell Canal emergency berm, and eagles likely would be tolerant at this distance. There are no known roosting areas heavily used by eagles in the immediate vicinity of the Upper Embankment. Bechard (1991) found wintering eagles roosting in the southeastern end of the lake and east of the Lower Embankment prior to ice formation.

Bechard (1991) noted that construction activity at the Upper Embankment did not appear to influence bald eagle distribution. Bald eagles used the area near the Refuge headquarters both before and during construction activities on the Upper Embankment. The latter portion of the construction process would occur during the early breeding season for bald eagles when eagles are very sensitive to human disturbance. Bald eagle nests range from 3 miles to 3000 feet from the construction zone. The closest nest, newly discovered in 2006, would also be visually buffered from construction activity by a low hill and vegetation. This distance easily exceeds buffer zones recommended and adopted for other bald eagle territories in Idaho (USFWS 2001, 2006b; Kimball and Bechard

2002). At these distances, disturbances to nesting bald eagles from construction activities are unlikely to occur.

Based on the analysis above, Reclamation has determined that the proposed action may affect, but is not likely to adversely affect wintering and breeding bald eagles.

3.7 Transportation and Access

3.7.1 Affected Environment

The area around Lake Lowell is primarily agricultural, with small subdivisions and commercial operations, primarily sand and gravel, nearby. Traffic is a mix of agricultural, commercial trucks, residential commuting, and recreation-related. The main roads near the construction area are shown in Figure 6.

Currently access to the Refuge headquarters is across the Deer Flat Upper Embankment. The placement of the emergency berm has closed access to the public boat ramp on the west end of the embankment, although the park and boat ramp on the east end remains open. The stretch of road between the end of the embankment and the Refuge headquarters parking lot traverses an old landfill and the road surface is undulating and in relatively poor condition.

3.7.2 Environmental Consequences

No Action

Under no action there would be no changes to transportation and access in the project area. If appropriate security and safety measures are taken around the emergency berm, the boat ramp on the west end of the Upper Embankment may be reopened in the future.

Proposed Action

Under the proposed action road closures would be made on Lake Avenue, Lake Lowell Avenue and Iowa Avenue to allow for excavation of the downstream portion of the Nampa Canal (Figure 6). The roads would likely be impassable from October 1 to March 1.

These road closures would require a detour for residents of approximately 30 homes located off of Lake Avenue and Iowa Avenue near Lake Lowell when accessing or departing their residences from or to the west. Instead of using Lake Avenue south of Roosevelt Avenue, they would have to use Midway Road and access their residences from the east (Figure 6). At most, this would require approximately 1.5 miles of extra travel. Commercial trucks from nearby gravel operations would also have a similar detour.

Access across the Upper Embankment would be closed during construction; however the new access road to the Refuge headquarters and nearby boat ramp would be operational prior to closure of the Upper Embankment road. After construction is finished, the Upper Embankment road would be permanently closed to motor vehicle access.

3.8 Noise

3.8.1 Affected Environment

The area surrounding Lake Lowell is mostly agricultural with some small subdivisions to the north and east of the Upper Embankment and active gravel pits to the east, northwest and southeast. Noise levels are normally low in the immediate area. Farming activities such as tractors working in fields and trucks hauling farm products or gravel regularly make occasional noise that may be noticeable to nearby residents and visitors to Lake Lowell. Background noise at the lake itself is low and mostly natural sound from birdlife with some powerboat and vehicle noise noticeable. Overall, human-generated noise is less during winter months than summer.

3.8.2 Environmental Consequences

No Action

Noise levels would not be expected to appreciably change from current conditions under the no action alternative.

Proposed Action

Under the proposed action noise levels generated by heavy equipment use in the immediate area of the Upper Embankment would increase for the duration of construction activities (August-April). The most bothersome source of construction noise would occur during the driving of sheet pile if it is used as part of the Caldwell Canal coffer dam. This noise would be noticeable by the three residences approximately 2,000 feet to the north of the work area and to a lesser degree by the 20 or so residences about a half mile to the east. The pile driving noise would most likely occur during daylight hours for 7 to 10 days in early October.

Truck traffic and associated noise on Lake Lowell Avenue, Lake Avenue, Iowa Avenue and Roosevelt Avenue would also increase, depending on which sand and gravel source is used by the contractor. The three residences to the north near the gravel pit would also notice truck traffic hauling waste material to the gravel pit.

There would be temporary increase in noise most noticed by the 20 or so residences located immediately to the east of the Upper Embankment. Homes in this area range between 300 and 1,600 feet of the Nampa Canal construction site. Much of the construction period is in the winter months when residents spend less time outside and windows are closed, and this would tend to lessen noise impacts.

3.9 Recreation

3.9.1 Affected Environment

Lake Lowell and the Refuge support excellent warm water fishing, upland game bird and waterfowl hunting, boating, picnicking, wildlife viewing, swimming, and sightseeing. Lake Lowell receives about 100,000 recreation visits annually. Table 1 shows visitor use numbers provided by the Refuge.

Activity	Visitor Use	Recreation Values	Total Net Benefits (April 2006 \$)
Boating	16,797	\$54.18	\$910,000
Fishing	11,898	\$49.66	591,000
Hunting	4,730	\$49.01	232,000
Picnicking	31,011	\$28.54	885,000
Sightseeing *	20,990	\$23.80	500,000
Swimming	11,197	\$29.82	334,000
Wildlife Viewing	2,630	\$37.59	99,000
Total	99,253		\$3,551,000

The Refuge zoned to allow certain recreation activities in designated areas. For instance during waterfowl hunting season, the Upper and Lower Embankment areas are the only areas of the lake open to fishing. Some areas are closed to entry year round.

There are four boat ramps on the lake, two on either end of the Upper Embankment, one on the north end of the Lower Embankment, and one on the southeast side of the lake. The ramp and parking area on the west end of the Upper Embankment has been closed since the emergency berm was constructed on the Caldwell Canal in 2005 due to its proximity to the berm and to discourage use of the berm and pumping facilities.

3.9.2 Environmental Consequences

No Action

Under the no action alternative the lake water level restriction would be left in place, and habitat for warmwater gamefish would be degraded until vegetative cover is established at the new operating level, which would probably take several years. Fishing would likely be adversely affected over this period of time. Waterfowl numbers and flooded vegetation that hunters use to hide in would also be reduced during this same period and waterfowl hunting is likely to be more difficult. Upland bird hunting opportunities would remain similar to present conditions.

Recreational boating and swimming would be adversely affected with a smaller pool, especially late in summer as the lake is drawn down. The boat ramp at the west end of the Upper Embankment may be reopened if adequate security and safety measures can be implemented around the emergency berm and irrigation pumps.

Proposed Action

Under the proposed action, direct effects to recreation from construction activities would be minimal. The area around the Upper Embankment and Refuge headquarters is closed to hunting. Fishing from the Upper Embankment during fall and winter of the construction season would be curtailed, but the area does not receive significant use during that time of year. At the conclusion of the project, the boat ramp and fishing dock at the west end of the Upper Embankment would be reopened to the public and could be accessed from then north using the new Refuge headquarters access road.

The drawdown of the lake to accommodate construction would have some temporary adverse effects to recreation activities. The lake elevation of 2514 – 2518 during the construction season would severely reduce hiding cover for waterfowl hunters, making hunting difficult. Waterfowl numbers may also be diminished with the smaller pool. These impacts would only occur for one season under the proposed action compared to several years under the no action alternative with a reservoir elevation restriction.

Boating and fishing would be adversely affected during the early fall as the drawdown to elevation 2514' is reached, however significant boating use does not occur during this period.

Upland bird hunting would not be impacted by the project.

3.10 Indian Trust Assets

3.10.1 Affected Environment

Indian Trust Assets (ITA's) are legal interests in property held in trust by the United States for Indian Tribes or individuals. The Secretary of the Interior, acting as the trustee, holds many assets in trust for Indian Tribes or Indian individuals. Examples of things that may be trust assets are lands, minerals, hunting and fishing rights and water rights. While most ITA's 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, statutes, and executive orders. These are sometimes further interpreted through court decisions and regulations.

The Deer Flat Reservoir was located in an area historically used by many Tribes. The Shoshone-Bannock Tribes, a federally recognized Tribe, located at the Fort Hall Indian Reservation in southeastern Idaho have trust assets both on-reservation and off-

reservation. The Fort Bridger Treaty 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...“ This has been interpreted to mean unoccupied Federal lands.

The Tribes believe their right extends to the right to fish. The Fort Bridger Treaty for the Shoshone-Bannock has been interpreted in the case of State of Idaho v. Tinno, an off-reservation fishing case in Idaho. The Idaho Supreme Court determined that the Shoshone word for “hunt” also included to “fish.” Under Tinno, the Court affirmed that the Tribal Members’ right to take fish off-reservation pursuant to the Fort Bridger Treaty (Shoshone-Bannock Tribes 1994).

The Nez Perce Tribe is a federally recognized Tribe of the Nez Perce Reservation in northern Idaho The United States and the Tribes entered into three treaties (Treaty of 1855, Treaty of 1863, and Treaty of 1868) and one agreement (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 (Nez Perce Tribe 1995).

The Northwestern Band of the Shoshone Indians, a federally recognized Tribe, without a reservation possess treaty protected hunting and fishing rights which may be exercised on unoccupied lands within the area acquired by the United States pursuant to the 1868 Treaty of Fort Bridger. No opinion is expressed as to which areas maybe regarded as “unoccupied lands”

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 dated 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, Ft. 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 Federal Government failed to ratify some of them 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. (Shoshone-Paiute Tribes 2004)

3.10.2 Environmental Consequences

There is no universally accepted understanding as to any specific Tribal off-reservation treaty rights to hunt and fish in the vicinity of the Deer Flat Dam. Thus the ITA's considered are tribal hunting and fishing rights that may exist.

No Action

Under the No Action alternative there would be no impacts to any of the Tribes' rights to hunt and fish that may exist.

Proposed Action

The Proposed Action would not impact any rights to hunt or fish that may exist. Impacts to resources associated with the rights are discussed under water quality, fish, vegetation and wildlife sections of this document.

3.11 Cumulative Impacts

NEPA regulations define cumulative impacts as impacts that result from *“the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or nonfederal) or person undertakes such actions.”*

There are no present or reasonably foreseeable future actions at Lake Lowell or the Refuge that would have additive or interactive impacts on the environmental parameters affected by the proposed action. Residential development is occurring rapidly in the surrounding area and may affect noise, transportation, and even wildlife that use the Refuge, but the scope, timing, and details of development and severity of impacts are unknown and unquantifiable. These actions are therefore not reasonably foreseeable.

The safety of dams modification at Deer Flat Dams in 1990-1991 resulted in extensive modification to the Lower Embankment and resulted in an adverse effect to a property listed on the National Register of Historic Places. Mitigation measures were developed and agreed to through a Memorandum of Agreement with the SHPO and Advisory Council on Historic Preservation.

The proposed action would likewise result in an adverse affect to certain components of the Upper Embankment and diminish its historic integrity. However, mitigation measures developed in consultation with the SHPO, and formalized in an MOA would be implemented that would avoid impacts to the extent feasible, and rebuild and replace historic features using distinctive characteristics of the original structure.

Chapter 4 Consultation and Coordination

Reclamation has coordinated closely with the Refuge during the emergency repair work in 2005 and the development of plans for corrective action for the safety deficiencies in the Upper Embankment. The Refuge has provided considerable input through several meetings and informal contacts on the proposed access road and issues and concerns related to Refuge operations, recreation, fish, and wildlife.

On May 18, 2006 Reclamation sent letters to IDFG and USFWS, Snake River Fish and Wildlife Office soliciting their concerns. Neither agency provided a written response; however the project was discussed with IDFG via telephone.

Consultations pursuant to 36 CFR 800 regulations regarding protection of historic properties under Section 106 of the National Historic Preservation Act have been ongoing with the Idaho SHPO. The SHPO and Reclamation developed a list of recommended mitigation based on discussions from a joint Reclamation and SHPO field visit in January 2006, to the Upper Embankment. The SHPO, in a May 30, 2006 letter, concurred with Reclamation's finding that the proposed action would constitute an adverse effect to properties listed on the National Register (Section 3.2.2 above) and Reclamation's proposed mitigation measures. Reclamation and the SHPO will jointly develop a memorandum of agreement to formalize mitigation measures listed in Section 3.2.2.

Distribution List

A copy of this draft EA was mailed to the following agencies, tribes, organizations and individuals:

Federal Agencies

USFWS Deer Flat National Wildlife Refuge
USFWS Snake River Fish and Wildlife Office
EPA Idaho Operations Office
BIA Fort Hall Agency
BIA Eastern Nevada Agency
BIA Northern Idaho Agency

State and Local Agencies and Officials

Idaho Department of Fish and Game
Idaho Department of Environmental Quality
Idaho Department of Water Resources
Idaho State Historic Preservation Office
Idaho Department of Lands
Mayor, City of Caldwell
Mayor, City of Nampa
Canyon County Commissioners

Canyon County Highway District No. 4

Tribes

Shoshone Bannock Tribes
Shoshone Paiute Tribes
Nez Perce Tribe

Organizations and Individuals

Boise Project Board of Control
New York Irrigation District
Boise-Kuna Irrigation District
Nampa & Meridian Irrigation District
Wilder Irrigation District
Big Bend Irrigation District
Idaho Conservation League
Idaho Rivers United
Idaho Wildlife Federation
Trout Unlimited
Golden eagle Audubon Society
Idaho BASS Federation
Albert P. Barker
nearby residents

Chapter 5 References

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