RECLAMATION
Managing Water in the West

Preliminary Draft Environmental Assessment

Lewiston Orchards Water Exchange and Title Transfer Project

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

August 2016

U. S. DEPARTMENT OF THE INTERIOR

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Acronyms and Abbreviations

°F	degree Fahrenheit
2014 Agreement	2014 Term Sheet Agreement
ac-ft	acre foot
ACHP	Advisory Council on Historic Preservation
APE	area of potential effects
APLIC	Avian Power Lines Interaction Committee
APUD	Asotin Public Utility District
ATV	all-terrain vehicle
B.P.	before present
BIA	Bureau of Indian Affairs
BiOp	biological opinion
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CGP	Construction General Permit
CMP	corrugated metal pipe
Congress	U.S. Congress
COSD	Central Orchards Sewer District
CRBG	Columbia River Basalt Group
CWA	Clean Water Act
DPS	Distinct Population Segment
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order

EPA	Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Findings of No Significant Impact
cfs	cubic feet per second
FWCA	Fish and Wildlife Coordination Act
gal/d	gallon per day
GHG	greenhouse gas
gpm	gallon per minute
gpm/ft	gallon per minute per foot
GWMA	Ground Water Management Area
HDPE	high density polyethylene
hp	horsepower
HUC	Hydrologic Unit Code
HUD	Department of Housing and Urban Development
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDoL	Idaho Department of Labor
IDWR	Idaho Department of Water Resources
IFWIS	Idaho Fish and Wildlife Information System
ITA	Indian Trust Assets
LCEP	Lower Clearwater Exchange Project
LOID	Lewiston Orchards Irrigation District
LOP	Lewiston Orchards Project
LOWETTP	Lewiston Orchards Water Exchange and Title Transfer Project

MBTA	Migratory Bird Treaty Act
MOA	memorandum of agreement
MOU	memorandum of understanding
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NOAA Fisheries	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System
NPSWCD	Nez Perce Soil and Water Conservation District
NPT	Nez Perce Tribe
NRHP	National Register of Historical Places
NWI	National Wetlands Inventory
O&M	operations and maintenance
PEM	palustrine emergent wetlands
PFO-PSS	palustrine forested-scrub-shrub
PRPA	Paleontological Resources Preservation Act
Pump Plant	Clearwater River Pumping Plant
Reclamation	Bureau of Reclamation
ROD	record of decision
RWSP	Rural Water Supply Program
SHPO	State Historic Preservation Office
SOD	Safety of Dams
SPCC	Spill Prevention Control and Countermeasures
SRBA	Snake River Basin Adjudication

SWPPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered (species)
TCP	traditional cultural property
USCB	U.S. Census Bureau
USDOE	U.S. Department of Energy
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Services

Lewiston Orchards Project Water Exchange Project and Proposed Title Transfer

Chapter 1 Purpose and Need

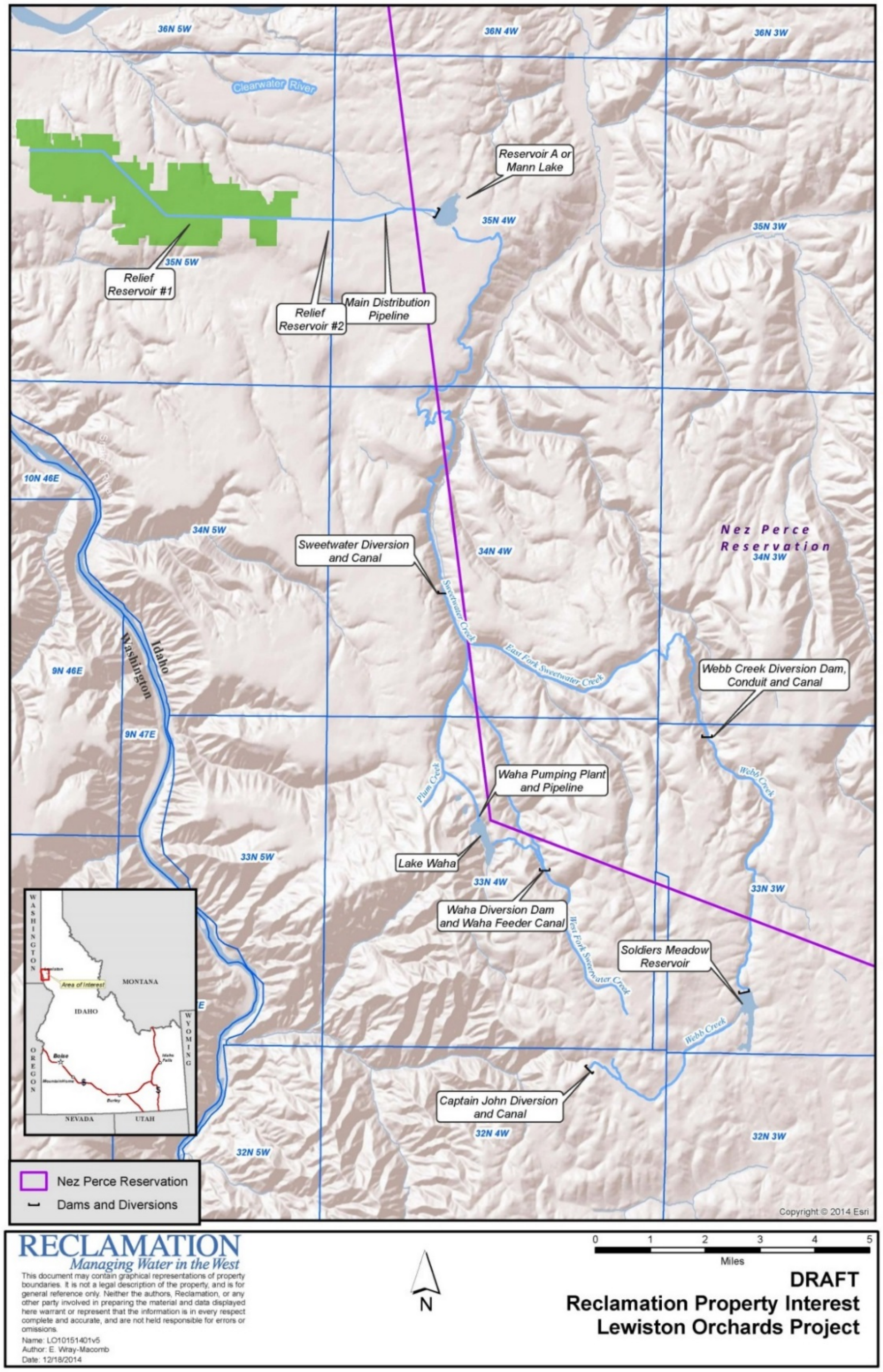
1.1 Introduction

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) for the proposed Lewiston Orchards Water Exchange and Title Transfer Project. This EA analyzes the potential environmental impacts that could result from the implementation of the water exchange and title transfer alternatives. The U.S. Department of the Interior Bureau of Indian Affairs (BIA) is a cooperating agency in the completion of this EA. Should a determination be made that implementation of the water exchange and title transfer alternatives would not result in significant environmental impacts, a Finding of No Significant Impact (FONSI) would be prepared to document that determination and provide a rationale for approving the selected alternative.

1.2 Background

Early settlers to the confluence of the Clearwater and Snake Rivers made their living by dryland farming, mining, and lumbering. Many of the settlers found the climate at the lower elevation provided for comfortable living with a good growing season for crops and orchards. In 1906, the Lewiston Land and Water Company of Portland, Oregon initiated irrigation in the area with the construction of the Sweetwater Creek Canal and Reservoir A Dam to deliver irrigation and domestic water to the dry bench above Lewiston, Idaho (Figure 1-1). To accomplish this, the company condemned Indian trust allotments on the Nez Perce Reservation owned by the U.S. in trust for individual Indians in a state court proceeding in Lewiston. The company failed to notify or include the U.S. as a party and its condemnation of U.S. trust allotments, then used for reservoirs and canals, occurred without lawful jurisdiction and remains of disputed validity to this day.

Figure 1-1. Map showing the Lewiston Orchards Irrigation District (LOID) Collection and Conveyance Features along with the Associated Service Area



In 1906, construction of the Sweetwater Creek Canal and Reservoir A Dam began. In 1915, irrigation supply was augmented by pumping water from Lake Waha. In

1922, the Lewiston Orchards Irrigation District (LOID) was formed and purchased the water system from the Lewiston Land and Water Company and constructed the following improvements:

- Increased the capacity of Mann Lake from 2,000 to 3,000 acre-feet (ac-ft)
- Constructed Soldiers Meadow Dam
- Constructed Webb Creek Diversion Dam and the necessary conveyance systems to move water from Webb Creek drainage to Sweetwater Creek drainage

In 1934, LOID further supplemented its water supply by constructing the Captain John Creek Diversion Dam. By the 1940s, the LOID facilities were in disrepair and LOID requested assistance from the Federal government to make improvements to its infrastructure.

On May 31, 1946, the Acting Secretary of the Interior found that incorporating the LOID facilities into a Reclamation project was viable, pursuant to the Reclamation Project Act of August 4, 1939. The Act of July 31, 1946 (60 Stat. 717, Public Law 79-569) specifically authorized that incorporating the LOID facilities into a Reclamation project was viable, as described in the Acting Secretary's report dated December 3, 1945 (Reclamation, 1945). This report to the U.S. Congress (Congress) regarding the proposed federal acquisition of the project did not recognize any tribal interests or the location of the project on and relative to the Nez Perce Reservation boundaries. Reclamation's authority was, and remains to this day, to construct and operate the Lewiston Orchards Project (LOP) for purposes limited to irrigation and municipal and industrial water supply. Under this authority, Reclamation modified some of the pre-existing LOID irrigation works and domestic water facilities on a reimbursable basis according to the terms of a September 10, 1947, repayment contract with LOID (Reclamation, 1947).

The LOP is located primarily within the Lapwai Creek watershed, tributary to the Clearwater River, predominantly on and adjacent to the Nez Perce Reservation, and is operated and maintained by LOID. The LOP currently provides water to approximately 22,000 patrons in a 3,629-acre service area primarily for residential irrigation purposes. The LOP collects drainage from the Craig Mountain area and alters the stream hydrology in Captain John Creek, Webb Creek, Sweetwater Creek, and Lapwai Creek. These streams run though the Nez Perce Reservation (except for Captain John Creek) and are among the treaty-reserved fishing areas of the Nez Perce Tribe (NPT).

The Snake River steelhead is a species listed as threatened under the Endangered Species Act (ESA) and is found within the Lapwai Basin, along with its ESA-designated critical habitat. Steelhead and steelhead critical habitat is directly impacted by annual LOP operations. The NPT does not receive LOP water and the NPT's position is that the LOP impacts tribal natural, cultural and spiritual resources.

In 2006, the National Oceanic and Atmospheric Administration, Division of Fisheries (NOAA) completed a biological opinion (BiOp) (NOAA, 2006) for operation and maintenance of the LOP. The 2006 BiOp recommended certain operations, including minimum flows in Sweetwater Creek. The NPT challenged the validity of the 2006 BiOp and filed suit against both NOAA and Reclamation. In 2008, the U.S. District Court for Idaho ruled in favor of the NPT. The court found the 2006 BiOp deficient, particularly as to effects of the LOP on ESA-designated critical habitat for listed Snake River steelhead. The NPT, Reclamation, and NOAA then participated in a court-ordered mediation. A new BiOp was to be written under a collaborative remand process, and the parties were ordered to simultaneously explore long-term LOP resolutions through mediation.

Concurrent with the mediation process, NOAA completed the final 2010 BiOp (NOAA, 2010). Within the 2010 BiOp, NOAA summarized a proposed action for operation and maintenance of the LOP and established minimum stream flows in the watershed, including Sweetwater and Webb Creeks.

The NPT challenged the validity of the 2010 BiOp and, in August 2010, filed suit under the ESA in the U.S. District Court of Idaho against NOAA and Reclamation relating to the 2010 BiOp issued by NOAA to Reclamation for the continued operation and maintenance of the LOP. On January 28, 2011, the NPT, Reclamation, and NOAA filed an agreement and a joint stipulated motion to stay proceedings for a period of three years. The parties' stay motion was granted and a 2011 Term Sheet Agreement approved. The agreement addressed 2011 to 2013 mediation and operations, and included a commitment to advance the study and investigation of the Lower Clearwater Exchange Project (LCEP) as a potential comprehensive solution to the LOP issues, at the suggestion of then Reclamation Commissioner Michael Connor.

The LCEP began in 2008 as a separate process from the ESA and the ongoing litigation. LOID and the NPT began meeting on a regular basis with lower Clearwater River Basin region stakeholders during a series of meetings, organized by Jerry Klemm of the Lewiston Chamber of Commerce, to discuss long-term resolution of LOP issues. Discussion during these meetings culminated with a memorandum of understanding (MOU) concerning the LOP. The MOU was executed in July 2009 by LOID, the NPT, the City of Lewiston, Lewiston Chamber of Commerce (now known as Lewis Clark Valley Chamber), and Nez Perce County. The MOU set forth the direction and fundamental concepts of the LCEP partners to solve water issues, including water quality, quantity, reliability, and other issues associated with the LOP, and its present location on the Nez Perce Reservation, ESA, watershed, and habitat impacts. The three core project objectives of the MOU were:

- Creation of a reliable, quality water supply for LOID
- Permanent resolution of the ESA issues surrounding the LOP
- Permanent resolution of federal-tribal trust issues surrounding the LOP

Beginning in October 2010, a series of meetings were held over the year to complete an application for a Reclamation Rural Water Supply Program (RWSP) Appraisal Study. The LCEP group received the grant and completed their RWSP Appraisal Study in September 2011 to evaluate if there was an alternative that met the objective of the group. Reclamation prepared an appraisal report and sent it to Reclamation's Policy Group in Denver for review and approval, with the conclusion that there were several viable alternatives.

Based on one of the three final alternatives from the RWSP study, Reclamation developed the LOP Water Exchange/Title Transfer concept, which involves incrementally exchanging the existing surface water system with an off-reservation groundwater-pumped system consisting of multiple wells. This concept uses the Fish and Wildlife Coordination Act (FWCA) authority to allow for the construction to be conducted in phases as funding becomes available. Individual wells would be constructed and incorporated into the LOID water distribution system as funding becomes available. Each well would be connected to the LOP system in exchange for relinquishment of an incremental amount of surface water for instream flow use as an ESA Section 7.A.1 voluntary action. Once the full LOP surface water supply is exchanged, title transfer of LOP facilities to the BIA in trust for the NPT and to LOID could be pursued. Since Federal Reclamation projects are expressly authorized by Congress and since Section 106 of the Reclamation Act of 1902 stipulates that projects are owned by the U.S., an Act of Congress is required to transfer title to non-Federal ownership.

The effort is now proceeding pursuant to a new 2014 Term Sheet Agreement (2014 Agreement) between the NPT, Reclamation, and NOAA effective April 29, 2014. The 2014 Agreement provides for the stay of the case *Nez Perce Tribe v. NOAA Fisheries and the Bureau of Reclamation*, Civ. No. 10-286-BLW (D. Idaho). This stay continues through January 31, 2020, to allow for the potential comprehensive resolution of this water exchange proposal, unless the stay is terminated earlier by any party, subject to the dispute resolution provisions of that Agreement. If the water exchange proposal were discontinued at any point prior to January 31, 2020, it is assumed that the federal litigation would be revived.

The primary focus of the 2014 Agreement is to continue efforts to complete a LOP Water Exchange Project as a comprehensive solution to LOP system issues. To this end, in August, 2014, Reclamation and LOID initiated a Pilot Well Project to test the groundwater capability and determine if the aquifer is capable of supporting the long-term operation of a well field. Initial testing indicates the aquifer is suitable to support a well field. Therefore, Reclamation is entering the environmental compliance phase of the project.

1.3 Purpose and Need

Currently, the LOP uses water for irrigation by diverting surface water from within the Lapwai Creek Basin, which is primarily located within the Nez Perce

Reservation, along with a small amount from the Captain John Creek Basin, which is outside the reservation and a tributary to the Snake River. The annual water availability is often insufficient to meet LOID system demands and contractual obligations resulting in use restrictions for District patrons. Many features and facilities associated with the LOP also are in need of substantial repair, maintenance, and in many cases, total replacement. All these activities come at great cost to the U.S. and LOID. In addition, the LOP facilities and operations are in conflict with tribal cultural and natural resource interests. LOP surface diversions seasonally reduce water availability and connectivity within the Lapwai Creek watershed, resulting in impacts to the ESA-listed steelhead using the watershed. Litigation between the federal government and NPT over the effects of the LOP has been stayed while comprehensive resolution of NPT's legal issues is pursued

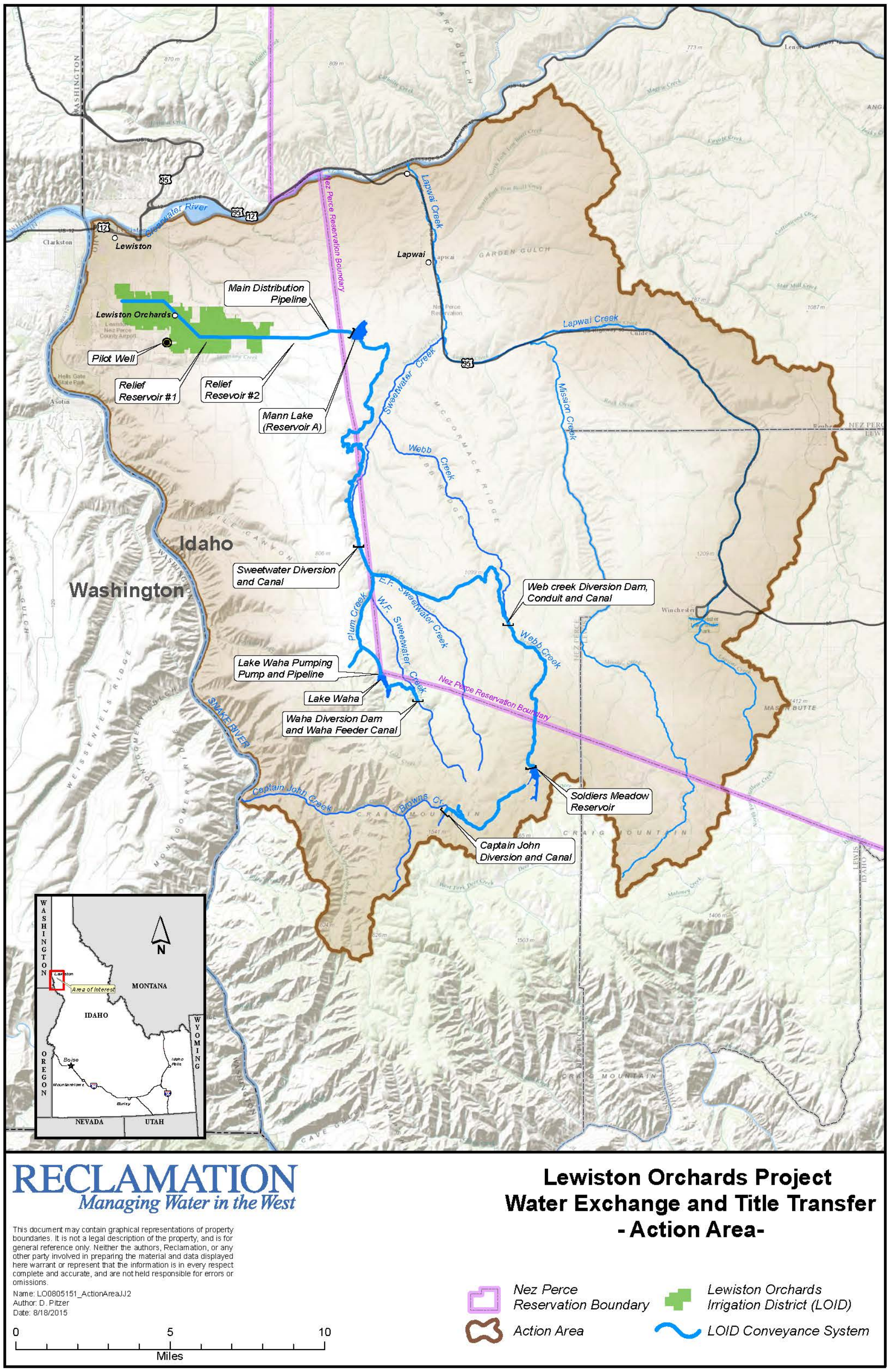
The National Performance Review goal of a federal government that works better and costs less seeks opportunities to develop partnerships and advance opportunities that reduce costs. Reclamation's title transfer initiative implements this performance review goal by divesting all or portions of Reclamation's interest in authorized projects to local governing boards.

The purpose of the proposed action is for Reclamation to authorize, implement, and fund through cost share a water transfer exchange, decommissioning of portions of the surface distribution system, and recommend to Congress title transfer the non-decommissioned facilities. The proposed action would benefit tribal cultural and natural resources, avoid future litigation associated with federal-tribal trust and property disputes and impacts to ESA-listed steelhead and critical habitat, and increase water reliability for LOID patrons. In addition, this project would reduce system rehabilitation costs to Reclamation and LOID, and reduce costs to the federal government.

1.4 Location and Action Area

Reclamation defines the action area as all areas effected directly or indirectly by the federal action; in this case, areas impacted by operation and maintenance of the LOP. LOP facilities and features lie predominantly within the Lapwai Creek watershed (a tributary to the Clearwater River) on and adjacent to the Nez Perce Reservation; the small Captain John Diversion and Canal are within the Snake River Basin. The action area affected by the Federal action includes reservoirs, conveyances, and stream reaches used by the LOP to divert, store, and deliver water; as well as other elements of the human and natural environment directly or indirectly impacted by current operations of the LOP within the LOID service area. Alternatives considered in this document are specific to this area (Figure 1-2).

Figure 1-2. Map Showing the Action Area



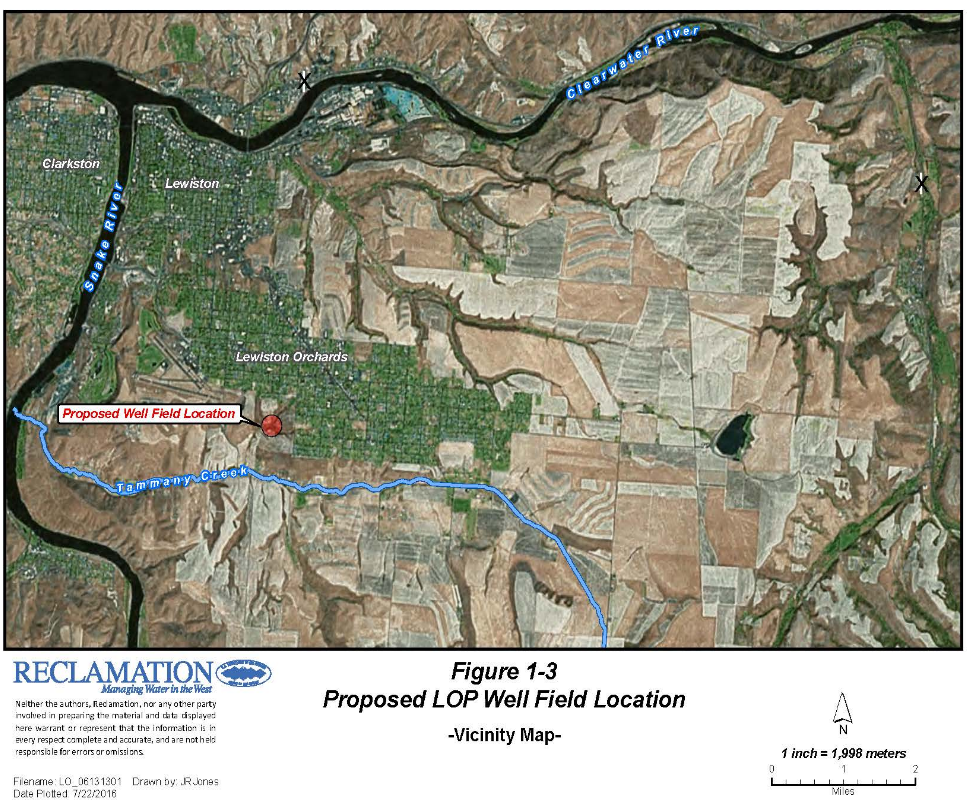
The action area is located on the north face of Craig Mountain, with elevations ranging from approximately 1,500 to 4,600 feet. The area consists of timbered ridges, mountain plateaus, deep canyons, and fertile benches. On the mountain plateaus, coniferous forest is more contiguous, although interrupted by a mosaic of dry and wet meadows. The plateaus break into steep-sided canyons where coniferous forest is found primarily on north-facing slopes, typically at elevations of more than 2,000 feet. The rest of the canyon is dominated by a canyon-grassland or shrub-field cover type. The lower portions of the area give way to fertile benches where dry-land farming occurs. The farm ground eventually gives way to municipal development near and within Lewiston.

The Lapwai Creek system, including both Sweetwater and Webb Creeks, supports a reproducing population of ESA-listed Snake River A-run steelhead. In the spring, steelhead move from the Clearwater River into the Lapwai system to spawn. Most juvenile steelhead will reside in the system until that fall or the following spring, at which point they begin the downstream migration to the ocean while others continue to rear in the watershed until the following year. Also, the Lapwai Creek watershed contains designated critical habitat for ESA-listed Snake River A-run steelhead.

The effects of the operations on Captain John Creek are evaluated to its confluence with Snake River, and the effects of all other operations and potential impacts are evaluated within the Lapwai Creek watershed to the confluence of Lapwai Creek and Clearwater River.

The action area also includes the proposed well field location. It is located to the south of the City of Lewiston near Tammany Creek. Figure 1-3 shows the proposed well field.

Figure 1-3. Proposed Well Field Action Area



1.5 Legal Authorities and Constraints

On May 31, 1946, the Acting Secretary of the Interior found the LOP feasible pursuant to the Reclamation Project Act of 1939. Before the Secretary's report was submitted to Congress, the act of July 31, 1946 (60 Stat. 717) specifically authorized construction of the project. Federal Water Project Recreation Act of 1965, issued on July 9, 1965, as amended by Reclamation Recreation Management Act of 1992, Title XXVIII of P.L. 102-575; P.L. 93-205, Endangered Species Act of 1973, December 28, 1973, as amended; P.L. 97-293, Reclamation Reform Act of 1982, as amended; P.L. 85-624, Fish and Wildlife Coordination Act of 1958, 72 Stat. 563; P.L. 89-72, 79 Stat. 216, July 9, 1965; and Idaho Code section 43-1830

1.6 Regulatory Compliance

The following section contains a summary of the major laws, executive orders, and secretarial orders that apply to the proposed action.

1.6.1 Federal Laws

National Environmental Policy Act

NEPA requires an agency to fully disclose potential effects/impacts of its proposed action on the environment and possible mitigation measures. This evaluation is documented and presented to the public. This is being done as an EA for this project. If, following public scoping and alternative evaluation, no significant impacts to the human environment are identified, then a Finding of No Significant Impact (FONSI) will be prepared and signed. However, if significant impacts that cannot be mitigated or eliminated are identified through the EA process, Reclamation will prepare a notice of intent (NOI) to prepare an environmental impact statement (EIS) for the project. A record of decision (ROD) would be issued following completion of a Final EIS.

Endangered Species Act ESA requires all federal agencies to ensure that their actions do not jeopardize the continued existence of ESA-listed species or destroy, or adversely modify, their critical habitat. As part of the ESA's Section 7 consultation process, an agency must request a list of species from the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NOAA) that identifies threatened and endangered species within or near the action area. The agency must then evaluate impacts to those species. If it is determined the action may adversely affect any ESA-listed species or their habitat, the agency must consult with USFWS and/or NOAA.

Fish and Wildlife Coordination Act FWCA provides for equal consideration of wildlife conservation in coordination with other features of water resource development programs. The FWCA requires that any plans to impound, divert, control, or modify any stream or other body of water must be coordinated with the

USFWS and state wildlife agency through consultation directed toward prevention of fish and wildlife losses and development or enhancement of these resources.

National Historic Preservation Act The National Historic Preservation Act (NHPA) of 1966, as amended, requires that federal agencies consider the effects that their projects have on properties eligible for or on the National Register of Historic Places. The 36 CFR 800 regulations provide procedures that federal agencies must follow to comply with the NHPA. For any undertaking, federal agencies must determine if there are properties of National Register quality in the project area, the effects of the project on those properties, and the appropriate mitigation for adverse effects. In making these determinations, federal agencies are required to consult with the State Historic Preservation Office (SHPO), Native American tribes with a traditional or culturally-significant religious interest in the study area, the interested public, and the Advisory Council on Historic reservation (in certain cases).

1.6.2 Executive and Secretarial Orders

Executive Order 11990 Wetlands

Executive Order (EO) 11990 dated May 24, 1977, directs federal agencies to take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial value of wetlands in carrying out programs affecting land use. Wetlands provide great natural productivity, hydrological utility, environmental diversity, natural flood control, improved water quality, recharge of aquifers, flow stabilization of streams and rivers, and habitat for fish and wildlife resources.

Executive Order 13007 Indian Sacred Sites

EO 13007, dated May 24, 1996, instructs federal agencies to promote accommodation of access to, and protect the physical integrity of, Native American sacred sites. A sacred site is a specific, discrete, and narrowly delineated location on federal land. A Native American tribe or a Native American individual determined to be an appropriately authoritative representative of a Native American religion must identify a site as sacred by virtue of its established religious significance to, or ceremonial use by, a Native American religion. However, this is provided that the tribe or authoritative representative has informed the agency of the existence of such a site.

Executive Order 12898 Environmental Justice

EO 12898, dated February 11, 1994, instructs federal agencies, to the greatest extent practicable and permitted by law, to make achieving environmental justice part of their mission by addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low income populations. Environmental justice means the fair treatment of people of all races, income, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative environmental impacts resulting from the execution of environmental programs.

Executive Order 13175 Consultation and Coordination with Tribal Governments

EO 13175 instructs federal agencies to consult, to the greatest extent practicable and to the extent permitted by law, with tribal governments prior to taking actions that affect federally recognized tribes. Each agency shall assess the impact of federal government plans, projects, programs, and activities on tribal trust resources, and assure that government rights and concerns are considered during the development of such plans, projects, programs, and activities.

Secretarial Order 3175 Department Responsibilities for Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in property held in trust by the U.S. (with the Secretary of the Interior acting as trustee) for Native American tribes or Native American individuals. Examples of ITAs are lands; minerals; hunting and fishing rights; and water rights. In many cases, ITAs are on-reservation; however, they may also be found off-reservation. The U.S. has a Native American trust responsibility to protect and maintain rights reserved by or granted to Native American tribes or Native American individuals by treaties, statutes, and EOs. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that officials from federal agencies, including Reclamation, take all actions reasonably necessary to protect ITAs when administering programs under their control.

1.7 Scoping Summary

The scoping process for the draft EA provided an opportunity for the public, governmental agencies, and tribes to identify their concerns or other issues and assure a full range of potential alternatives were identified that address meeting the purpose and need stated in this document. To accomplish this, Reclamation (1) provided information to the public through local media, (2) met with potentially affected tribes, (3) met with local, state and federal agencies, (4) conducted stakeholder meetings, (5) solicited oral and written comments from the public, and (6) held public and agency scoping meetings. Details regarding the public and agency scoping are found in Chapter 4.

1.8 Document Organization

This EA closely follows the format recommended by the Council on Environmental Quality (CEQ).

Chapter 1 identifies the purpose and the need for action; provides background information; and summarizes public involvement activities, and applicable laws and regulations.

Chapter 2 presents discussion on the No Action Alternative and the action alternatives, and summarizes the process of formulating the proposed action alternatives. A table presenting a summary comparison of the alternatives is also included.

Chapter 3 presents the affected environment and relevant resource components that make up the baseline environment and evaluates the alternatives to determine if they have environmental effects and mitigation measures to those effects.

Chapter 4 summarizes consultation and coordination activities, including public involvement efforts relevant to the EA.

In addition, the following have been included:

- Acronyms
- Bibliography
- List of Preparers
- Glossary
- Index
- Contact and Distribution List
- Appendices A –E

Chapter 2 Description of Alternatives

2.1 Alternative Formulation

Reclamation began an alternative formulation process in 2010 with the LCEP stakeholders through the RWSP grant to address impacts to the ESA-listed steelhead, tribal cultural and natural resources, and avoid future litigation associated with surface diversions within the LOP. The process involved conducting an appraisal investigation of the LCEP concept. The final report, issued in 2011, evaluated water supply alternatives that would meet the needs of the LOID patrons; resolve natural and cultural resource disputes; and avoid future litigation.

The study process involved identification of all practicable options to provide water to LOID. This allowed for a comprehensive alternative-identification process to ensure a full range of alternatives were identified. Through this process, a total of 32 alternatives were identified that would address water supply issues associated with LOID. The appraisal process also involved the development of a set of criteria to screen the alternatives based on requirements identified by the LCEP stakeholders. This process reviewed each alternative against the screening criteria, resulting in three final alternatives being carried forward for technical analysis. The three final action alternatives identified in the final LCEP report were:

- Tammany Creek Well Field, attenuated system using Mann Lake
- Snake River Pumping Plant, attenuated system using Mann Lake
- Clearwater River Pumping Plant, attenuated system using Mann Lake

Consistent with the LCEP concept, the three selected alternatives focused on identifying an alternate water source for the LOID. The intent was to identify a water source that would provide sufficient quantity and annual supply reliability, and eliminate conflict associated with the current surface-diversion and conveyance system located on and adjacent to the Nez Perce Reservation. Therefore, the final three alternatives did not consider expansion of the existing system. Rather, the alternatives sought to identify a water source completely independent from the Lapwai Creek and Captain John Creek systems.

Although the final three alternatives, relative to other alternatives identified in the study, were determined to have a generally reasonable capital cost, each alternative had substantial upfront capital costs.

Following receipt of the final LCEP study report, Reclamation developed the incremental well field development approach at the Tammany Creek site. The approach would allow for a well field to be developed as funding becomes available on a per-well basis, thus substantially reducing initial capital costs for alternative implementation. This incremental approach led to the development of the proposed action. Alternatives that were considered but eliminated from evaluation in this EA are discussed in Section 2.5.

2.2 Alternative A – No Action

2.2.1 Summary of No Action Alternative

The No Action Alternative presents continuation of current conditions associated with the existing water supply and conveyance system operated and maintained by LOID. This alternative would consist of current system management and would not include a comprehensive water transfer. Further, Reclamation would not transfer the title to BIA and LOID. The U.S. would retain all rights and interest to the property and LOID facilities conveyed to it in the 1948 deed, their relationship with Reclamation, and Reclamation's oversight of LOID would remain the same in the future. The No Action Alternative would not require congressional action.

2.2.2 Future Maintenance

Under the No Action Alternative, the LOP would continue to be operated on an annual basis consistent with past operations. Due to the age and annual use of the diversion and conveyance system, many system features are in a state of extensive deterioration. Annual maintenance activities have been conducted by LOID to ensure continued operation of the system. However, multiple features are in need of either significant rehabilitation or total replacement. Annual maintenance to this point has largely consisted of small, localized actions designed to address specific, small-scale performance issues. Continued successful and reliable operation of the current system will require extensive rehabilitation in the near future at great cost to LOID. Additionally, due to the nature of the diversion and conveyance structures, rehabilitation and/or replacement will have to be conducted in a short period of time so as not to interrupt annual water-delivery operations. This narrow construction window will result in additional costs.

To date, annual maintenance operations have kept the system functioning at minimum standards while trying to provide reliable storage and delivery of water to LOID patrons, and also complying with environmental commitments made in the BiOp and 2014 Agreement OID's ability to maintain reliable delivery while balancing system needs will become increasingly difficult as the system ages. The Captain John Creek Diversion and Canal; Sweetwater Canal, Sweetwater Diversion Dam; Webb Creek Diversion Dam; West Fork of Sweetwater Diversion Dam, Canal, and flume; and elements of Soldiers Meadow Dam, and Reservoir A Dam are in need of substantial rehabilitation, with total costs estimated to be $33 million. Currently, LOID does not have the financial capacity to address these large-scale rehabilitation and replacement costs. As LOP features continue to deteriorate, LOID will be forced to procure additional revenue to plan, design and execute multiple large-scale projects in an effort to ensure uninterrupted delivery of water to LOID patrons. Revenue generation will likely occur through multiple rate increases. Rate increases would be incremental, but will have to be adequate to address system rehabilitation needs and project timing. This has the potential to result in a near two-fold increase to current assessed rates.

2.2.3 System Operations

General system descriptions are provided for each feature of the LOP in Appendix A. General system operations are described below for each LOP feature. Operations of the LOP will continue into the future consistent with past operations. LOID will continue to divert and manage water in such a way to maximize system storage prior to the onset of irrigation season. Water will be delivered based on system demands, with the exception of low water years. During low water years, use restrictions will continue to be implemented on an as-needed basis. The purpose of use restrictions is to limit water use to a level necessary to ensure (1) water availability is provided to LOID patrons through the duration of the irrigation season, and (2) ensure adequate water supply exists to meet required minimum instream flows below both the Sweetwater Creek and Webb Creek diversions.

Captain John Diversion Dam

The Captain John Diversion Dam is operated year round but only diverts water when it is available, which typically only occurs in early spring through late April or early May. Without abundant spring rainfall, this diversion typically provides water for only a few weeks. It seldom operates at its full capacity.

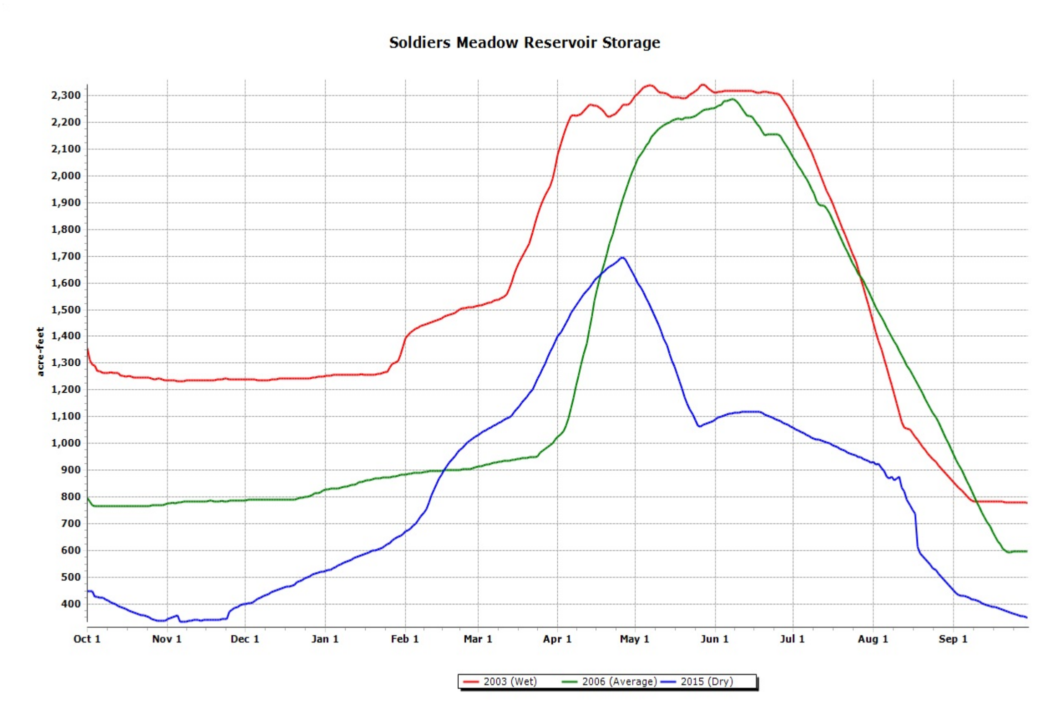
Soldiers Meadow Dam

Typically, the Soldiers Meadow Dam outlet works gates are closed between mid-September and mid-October of each year, and remain closed to store water until the start of the irrigation season. Inflows to the reservoir occur mainly during the January to June period and vary considerably from year to year. Due to the small size and relatively low elevation of the watershed, inflows are significantly impacted by spring rains. In most years, the total flow into Soldiers Meadow Reservoir is substantially less than the reservoir capacity. Because of this variability, carryover storage from previous years is essential to assuring a reliable supply of water.

The reservoir typically reaches its maximum levels in late May or early June. In wet years, water may be released from the reservoir in April or May as a flood control measure, as was the case in 2011. In most years, LOID begins releases from Soldiers Meadow Reservoir in June or July for irrigation water, with the highest rates of release occurring in July and August. In dry years, releases for irrigation use may begin as early as late April. Over the 2000 through 2015 period of record, releases from the reservoir averaged 2.7 ft3/s in April, 4.7 ft3/s in May, 4.4 ft3/s in June, 6.9 ft3/s in July, 8.1 ft3/s in August, 4.6 ft3/s in September, and 0.7 ft3/s in October. Discharge from the reservoir less than 1 ft3/s is related primarily to normal seepage and not part of active operations.

Operating procedures limit active capacity to 2,370 ac-ft plus a surcharge of 1,139 ac-ft (to be used only during a flood that exceeds outlet capacity). In the event of a spring flood, the outlet works are fully opened to limit the reservoir elevation to 4526.0 (3.0 feet below the crest of the dam) if possible. Figure 2-1 shows Soldiers Meadow storage volume for water years representative of low, good, and average water supplies conditions and under historic project operations.

Figure 2-1. Soldiers Meadow Storage Volume



Webb Creek Diversion Dam and Canal

Currently, LOID begins diverting natural flow from Webb Creek (from the watershed downstream of Soldiers Meadow Dam) in February or early March of each year. During irrigation season, both instream flows and releases from Soldiers Meadow (as needed) are diverted from Webb Creek via the Webb Canal to Sweetwater Creek and to Mann Lake via the Sweetwater Diversion Dam and Canal. Table 2-1 shows the average monthly diversion rates in the Webb Canal for the 2010 through 2015 period of record.

Table 2-1. Average Monthly Diversion Rate, Webb Creek Canal (cubic feet per second [cfs]).

Month	Flow (cfs)
January	0
February	0.7
March	3.9
April	6.7
May	5.9
June	5.8
July	3.9
August	6.7
September	3.7
October	0.8
November	0
December	0

West Fork Diversion Dam and Waha Feeder Canal

The West Fork Diversion Dam and Waha Feeder Canal divert water when available. The diversion is a passive feature and has no gate automation. Diversions occur primarily in March through June, with the highest average rate in April and the lowest average rate in June. There is wide variability in local hydrologic conditions; for example, diversions can occur as early as January and last as late as July. To further illustrate this, in 2006, water was diverted during warm, rainy weather in November and December.

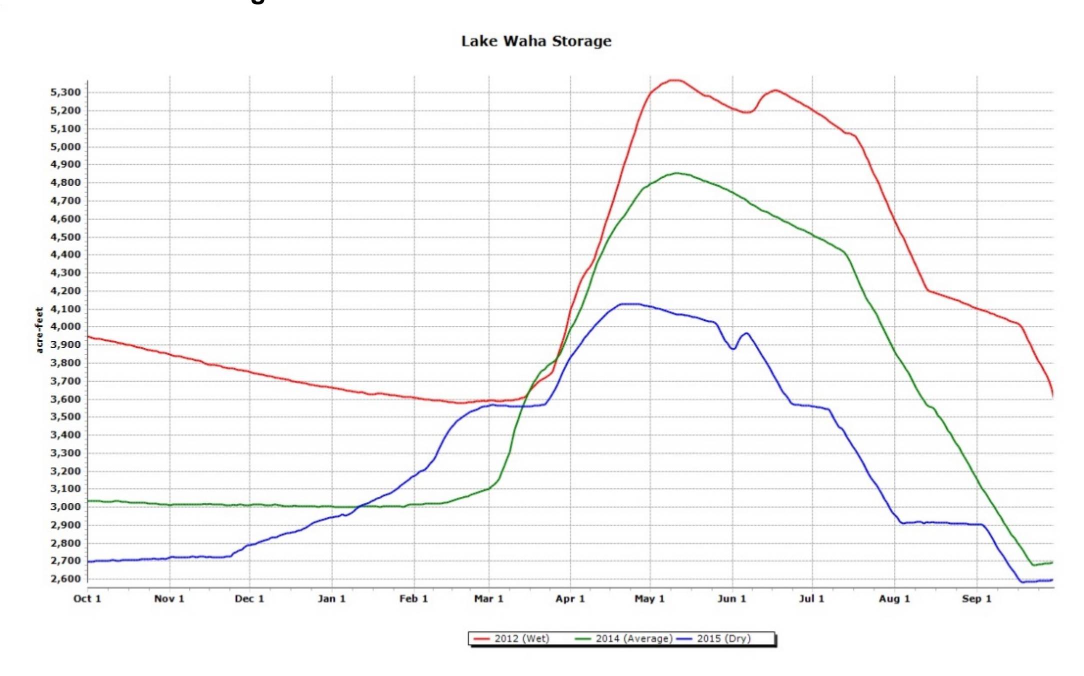
Lake Waha and Waha Pump

LOID pumps water from Lake Waha as an important supplement to surface water supplies from Webb and Sweetwater Creeks. Water from this facility is used to finish the irrigation season, generally when supply from Soldiers Meadow Reservoir is insufficient to meet system demands or is exhausted. Historically, this has translated into pumping beginning in June or July and lasting through September.

LOID tries to minimize the drawdown of Lake Waha as much as possible. The reasons for this center on concerns related to refill and long-term storage, managing pumping costs, and avoiding damage to the pumping plant. In the first regard, because of insufficient inflows, it is more difficult to refill once it is drawn down to low levels. As the lake's water elevation drops, pumping lift increases and the output of the pumping plant is reduced, which increases pumping cost. Finally, as the intake of the floating pump gets closer to the bottom of the lake, there is an increased risk of pump damage due to intake of sediment and rocks.

Historic annual project withdrawals from Lake Waha average approximately 720 ac-ft, but have ranged from 0 to 2,500 ac-ft. There are no diversions from the lake from November to April and, normally, not in October, May, or June. Figure 2-2 illustrates Lake Waha storage volume for water years representative of low, good, and average water supplies conditions under historic inflow and project operations conditions.

Figure 2-2. Lake Waha Storage Volume



Sweetwater Creek Diversion Dam and Sweetwater Canal

Diversions from Sweetwater Creek into Sweetwater Canal generally begin in March; however, hydrologic and climatic conditions have warranted diversions in February of some years. Peak rates of diversion occur in June, July, and August, with highest averages typically occurring in late July. Table 2-2 shows the average monthly diversion rates in the Sweetwater Canal for the 2010 through 2015 period of record.

Table 2-2. Average Monthly Diversion Rate (cfs), Sweetwater Canal (2010 through 2015).

Month	Flow (cfs)
January	0
February	1.4
March	9.7
April	16.9
May	16.2
June	11.7
July	13.1
August	14.9
September	9.2
October	1.4
November	0
December	0

Reservoir A Dam

Mann Lake, also known as Reservoir A, is located off-channel from Sweetwater Creek on the plateau near the upper reaches of the Lindsay Creek drainage. The drainage area upstream from Reservoir A Dam is 0.98 square miles; therefore, there is no appreciable natural inflow into the reservoir. The outlet gates of Reservoir A Dam are kept fully open year round, and reservoir releases are controlled by water-user demands from an independent closed pressure-type irrigation and fire system.

The LOID irrigation season is from April 10 to October 20, with peak irrigation demand extending from about July 1 to August 30. During non-irrigation season, the system providing this service must remain pressurized to provide fire protection through the distribution system. Stock water is also released during the non-irrigation season.

The maximum reservoir water surface elevation to date is 1,810.3 feet. A reservoir restriction of 1,800 feet (1,960 ac-ft of storage) was implemented in 1991. This restriction was modified to 1,804 feet (2,440 ac-ft) in September 2009.

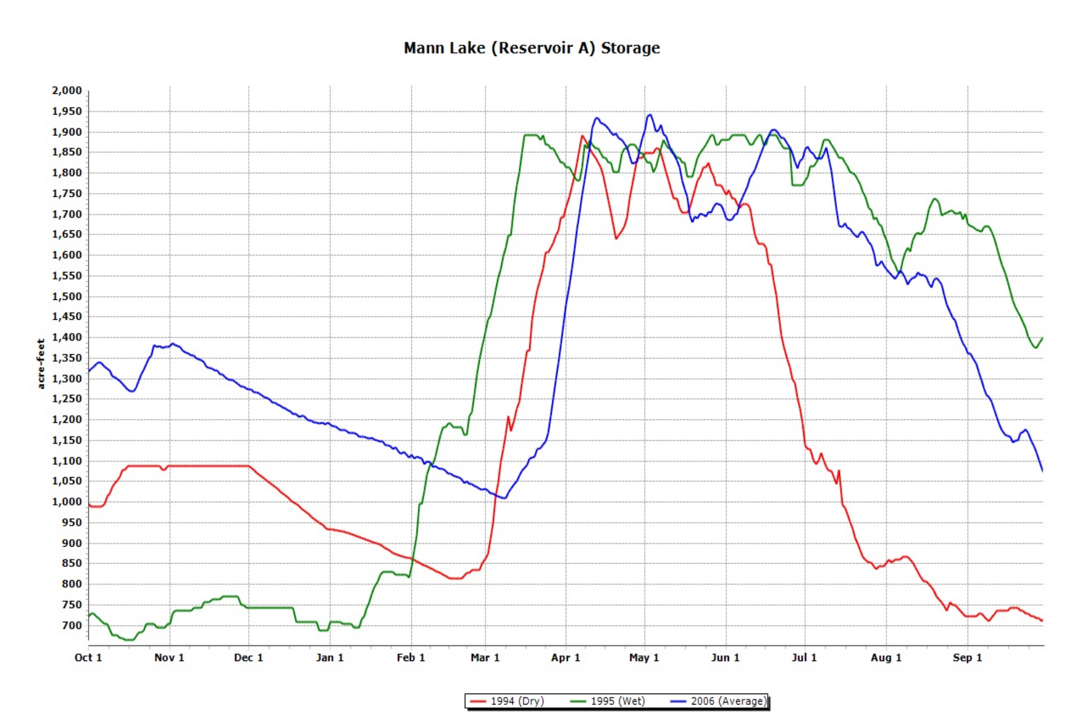
The maximum historic outlet works release and associated date are unknown. There are no records of spillway discharge. The maximum safe downstream channel capacity of Lindsay Creek is estimated by LOID personnel as 50 ft3/s.

The LOID generally begins filling the reservoir in the spring, when high stream flows are available. The reservoir usually fills in May or June and generally stays nearly full into mid-June. In some dry years, when irrigation demand starts early in the year, the reservoir begins to drop in April or May. Once stream flows decline, stored water is moved down from Soldiers Meadow Reservoir and Lake Waha. Mann Lake is drafted through the summer as irrigation demands exceed inflows to the reservoir. Since the timing and amount of precipitation in the Sweetwater Basin can vary significantly from year to year, it is important for LOID to carry over as much stored water as possible in Mann Lake, Soldiers Meadow, and Lake Waha Reservoirs to help insure adequate supply in the subsequent irrigation season.

Mann Lake also supplies water for livestock water during the winter, requiring some drafting during the non-irrigation season, and provides water for fire protection for the city of Lewiston within the LOID service area. In the latter regard, by contract between the City of Lewiston and the LOID, 500 ac-ft of water are required to be kept in the reservoir at all times (minimum surface elevation of 1782.8).

Figure 2-3 illustrates the operations of Mann Lake during 3 water years that can be characterized as having a low water supply (1994), a good water supply (1995), and an average water supply (2006). In years of abundant supply with sustained stream flows, the reservoir levels can be filled and maintained near full well into the summer. In average years when the stream flows drop off earlier, Mann Lake is sustained with releases of stored water from Soldiers Meadow Dam and Lake Waha. Mann Lake is allowed to draft significantly in July and August to maintain as much storage higher in the system as possible. In dry, hot years, the reservoir may start drafting in late May or June to meet early season irrigation demand; however, in extreme years this can begin as early as mid-April, as occurred in 2015.

Figure 2-3. Reservoir A (Mann Lake) Operations



2.2.4 Water Reliability

Regional climatic variability and subsequent precipitation patterns have resulted in impacts within the Craig Mountain watershed. This has, to date, primarily been evident through changes in annual snowpack depth, water content and timing, and changes in surface-runoff patterns and timing. Essentially, warmer winter conditions have recently resulted in a higher frequency of rain events, as opposed to precipitation in the form of snow. This change in precipitation has resulted in less water available for storage within the system, which translates to an insufficient volume of water supply to the LOID. Water stored within the watershed in the form of snow can typically be slowly captured by the system and either stored or diverted for use within the LOID. In contrast, rain events are shorter in duration and, in many cases, largely pass the system. The canals that convey water through the LOP are generally undersized and do not allow for the dynamics of capturing all the rain from events that occur within the watershed.

Minimum stream flow requirements within Sweetwater and Webb Creeks, established in the 2010 BiOp, add an additional demand on an already insufficient supply. This flow requirement further serves to reduce water available to LOID for annual use. During many water years, sufficient water is available to satisfy instream flow requirements as well as meet LOID system demands. However, during low-water years, instream flow requirements have the potential to further reduce water available to LOID to meet system demands.

Lastly, multiple system physical constraints complicate LOID's ability to store and deliver water. For example, the Sweetwater Canal has portions of its capacity that cannot handle the full water right which results in a bottleneck within the system. Several such constriction points exist within the LOP conveyance system. Likewise, reservoir storage limitations on Mann Lake associated with the Safety of Dams Act, reduces reservoir storage capacity from 3,000 ac-ft to 1,960 ac-ft (1800 feet of elevation). This reduction in storage capacity results in a loss to an already constrained system, and it is the rough equivalent of one month of irrigation supply for LOID. In 2010, Reclamation raised this restriction for an operational monitoring period to allow 2,440 ac-ft (1804 feet of elevation) for evaluation purposes.

With a supply that is insufficient, new and increased system demands, and additional physical and operational constraints, the patrons of the LOID face a future of greater irrigation restrictions to ensure water supplies persist through the irrigation season and meets the needs of the patrons.

2.2.5 Pilot Well

In response to the 2014 Agreement, Reclamation and LOID initiated a Pilot Well Project in August 2014 to test groundwater capabilities in the vicinity of Tammany Creek, consistent with the Tammany Creek groundwater alternative identified in the final LCEP report. To accomplish this, LOID pursued land acquisition opportunities within the vicinity of Tammany Creek Road. Due to the confined nature of the proposed well field location, land acquisition opportunities were very limited, resulting in LOID identifying only one opportunity. This location is identified on FIGURE 1-3 in Chapter 1.

To test the well field concept, Reclamation and LOID jointly conducted a study to evaluate site suitability for well placement, subsurface conditions supporting deep (approximately 2,000 feet) drilling, suitable water availability, and aquifer response. This study involved the drilling of a pilot well on the parcel of land acquired by LOID. The study indicated the site does indeed support surface access for the well field and subsurface conditions support drilling to the target depth of approximately 2,000 feet. Further, pump and flow tests indicate the local aquifer is likely suitable to support the full well field within the boundaries of lands that could be obtained with reasonable certainty. The well field has the potential to provide sufficient water to meet LOID system demands. The well is 1,900 feet deep, extending into the target aquifer 1,090 feet and maintains a production rate of approximately 2,000 gallons per minute.

Figure 2-4. Photo of the Pilot Well Being Drilled in Upper Portions of Tammany Creek

Under the No Action Alternative, the pilot well would be incorporated into the LOP. LOID would operate and maintain the pilot well as part of the current system. For present understanding of the exchange of water for the pilot well, a quantity of water would be protected instream for fish improvements in the Sweetwater Creek watershed in accordance with the Memorandum of Agreement (MOA) between Reclamation and LOID. Under the MOA, which applies to the pilot well only, the exchange would be based on two points: (1) the well's full productive capacity (not how it is discretionarily operated by LOID), which is (2) applied during the time the LOP is diverting surface water from the Sweetwater or Webb Diversions. Environmental compliance was conducted on this aquifer study. The final report and test results for the pilot well are located in Appendix B.

2.3 Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

2.3.1 Summary of Alternative

Alternative B, Well Field Construction, Full Groundwater Exchange, and Title Transfer, is a modification of the Tammany Creek Road Well Field Alternative identified and evaluated in the 2011 LCEP Appraisal Report. The Tammany Creek Road Well Field concept was developed because it provides a potential water supply that is closer to the LOID service area. Application of this concept would: reduce the amount of ground disturbance for the piping; eliminate in-river work; eliminate the need for intake screens; and avoid culturally and/or biologically sensitive areas along both the Clearwater and Snake Rivers. Well sites along Tammany Creek Road were selected because of the proximity to the LOID area and potential to penetrate the Lewiston Basin Regional Aquifer. The vicinity is also located at lower elevation, which provides shallower static water levels, reduced well depths, and more pump options. Although the well field concept met all criteria identified by the LCEP stakeholder group, projected construction costs exceed that of the other alternatives evaluated (i.e., Snake River and Clearwater River pump stations).

Following receipt of the report, Reclamation proposed incremental construction of the well field, thereby reducing upfront construction costs. This concept involves constructing wells as funding becomes available. As each well is constructed, connected to the LOP delivery system and brought on-line for production, an equal amount of water corresponding to the respective well's sustainable production rate would be left instream. This would effectively result in an alternative that could be incrementally constructed over time and allow for immediate benefits to Sweetwater and Webb Creeks as well as LOID.

The well field would connect to the existing distribution system and provide a new water supply near the center of the distribution system. Water from the wells would discharge into a common manifold and pump to the distribution system from the well sites. When pumping exceeds irrigation demand, water would flow to Mann Lake. Reservoir A Dam will remain in place as Mann Lake will be needed for LOID operations in support of the well field. Mann Lake would function as a balancing reservoir in support of the well field.

A hydrologic review of the groundwater source was completed by Ralston Hydrologic Services in March, 2011. The report, *Evaluation of Groundwater Development Potential for LOID Irrigation Water from the Regional Aquifer in the Lewiston Basin, Idaho*, is provided in Appendix C. The report identified that current groundwater use in the basin is well below historical groundwater use levels, and that existing static groundwater levels suggest the regional aquifer is hydraulically connected to the Snake and possibly Clearwater River. Conjunctive management of groundwater and surface water is required if the sources are found to be hydraulically connected. The aquifer should be capable of meeting LOID's water needs with limited water level decline.

Once the well field is completed and connected to the LOID distribution system for use, the current surface diversion system would no longer be needed to meet LOID water-supply needs. Idaho Code 43-1830 requires LOID to hold an election seeking approval from the majority of its patrons to authorize the title transfer interest in the LOP storage rights. A new water permit application would be submitted to IDWR by LOID. As ground water wells come online, diversion of surface water from the LOP would be reduced in an amount equal to an agreed upon in-lieu water exchange quantity, to be left instream through the Idaho State Water Bank for instream flows. As part of this transfer, at project completion LOP water rights would be transferred from Reclamation to BIA in trust for NPT. At this point, Reclamation would pursue a title transfer where title to Reclamation property interests would be transferred to either BIA, to be held in trust for the NPT, or to LOID. Since Federal reclamation projects are expressly authorized by Congress and since Section 106 of the Reclamation Act of 1902 stipulates that projects are owned by the U.S., an Act of Congress will be required to transfer title out of Federal ownership. Likewise, the transfer of lands in trust to the BIA for the NPT will require federal legislation.

Reclamation proposes to transfer all property interests of the LOP upstream of, and including, Reservoir A Dam to BIA and all property interests of LOP downstream of Reservoir A Dam to LOID, thus releasing Reclamation of all administrative authority, regulatory obligations, and liability associated with the LOP. As part of this transfer, at project completion LOP water rights would be transferred from Reclamation to BIA in trust for NPT.

BIA and the NPT intend to maintain all LOP structures, facilities, and easements in place consistent with the current configuration. However, post transfer operations would be conducted in a manner designed to maximize benefits to natural resources and designated critical habitat within the Sweetwater and Webb Creek drainages. This would involve operating Soldiers Meadow Reservoir and Lake Waha at elevations to maximize designated critical habitat in Webb Creek and Sweetwater Creek, and Lake Waha elevations to restore Sweetwater Springs to more natural conditions. In general, if BIA and the NPT determine various features of the LOP are not necessary for maintaining reservoir elevations and stream flows sufficient to benefit natural resources within the Lapwai Basin, the BIA would dispose of the asset. This may include structure retirement, removal, and (in some cases) site restoration. All site restoration activities would be conducted in a manner consistent with Lapwai Basin restoration objectives currently maintained by the NPT. As these activities are neither fully defined nor funded, they are not reasonably certain to occur at this time. However, when the projects are planned and funding is in place, the appropriate regulatory compliance would be conducted.

LOID would manage all facilities located below Reservoir A Dam consistent with current system operations, maintenance, and overall management. The following sections further describe specific features of the LOP and their disposition, as well as the water exchange, associated with Alternative B.

2.3.2 Captain John Diversion

The facilities may be required to augment storage in Soldiers Meadow Reservoir to be released downstream to maximize designated critical habitat in Sweetwater Creek and Webb Creek. Periods of use will typically be from March through early May.

Following title transfer, real property interests would transfer to BIA in trust for the NPT and any unneeded easements would be relinquished. There would be no change with regards to public access. Public access opportunities following title transfer would be consistent with current and past opportunities.

2.3.3 Soldiers Meadow Dam

Soldiers Meadow Dam is an embankment dam located on the headwaters of Webb Creek, approximately 26 miles southeast of Lewiston, Idaho, and 2 miles south of the Nez Perce Reservation. Operations and maintenance of Soldiers Meadow Reservoir would be accomplished by the BIA.

Soldiers Meadow Reservoir water levels would be maintained for restore flows to designated critical habitat in Sweetwater Creek. Water may be released from Soldiers Meadow Reservoir to augment flows in either Webb or Sweetwater Creek, using the existing Webb Creek diversion infrastructure.

Following title transfer, real property interests would transfer to BIA in trust for the NPT and any unneeded easements would be relinquished. Public access following title transfer would be consistent with current opportunities. Current Idaho Department of Fish and Game (IDFG) fishing seasons and rules would continue to apply to non-tribal fishers at Soldiers Meadow Reservoir. The BIA and the NPT would pursue a cooperative fisheries management agreement with IDFG. No time table has been established to complete this agreement.

2.3.4 Webb Creek Diversion Dam and Pipeline

The Webb Creek Diversion Dam is located on the Nez Perce Reservation approximately 15 miles southeast of Lewiston, Idaho, and 6 miles downstream of Soldiers Meadow Dam. The Webb Creek Diversion Dam will remain in place and may be required to use water stored in Soldiers Meadow Reservoir to be released downstream to Webb Creek and/or Sweetwater Creek. Water may be transferred from the Webb Creek drainage to the Sweetwater Creek to maximize designated critical habitat of drought to increase stream flow in Sweetwater Creek.

Following title transfer, real property interests would transfer to BIA in trust for the NPT and any unneeded easements would be relinquished. BIA intends to evaluate the Webb Creek Diversion and habitat within Webb Creek above the weir to determine alternatives for restoring connectivity within Webb Creek, while maintaining diversion capabilities.

2.3.5 West Fork of the West Sweetwater Diversion Dam, Canal, and Flume

The West Sweetwater Diversion Dam is located adjacent to the Nez Perce Reservation in the upper reaches of the West Fork Sweetwater Creek. Water from the dam is conveyed for storage in Lake Waha by the Waha Feeder Canal. The West Fork Sweetwater Creek Diversion project facilities will remain in place for potential future needs. Water from the West Fork of the Sweetwater may be diverted into Lake Waha, using the existing diversion and infrastructure to maintain water elevation fluctuations closer to pre-LOP conditions. The intent is to maximize Sweetwater Springs' discharge, which is directly influenced by Lake Waha's elevation.

Following title transfer, real property interests would transfer to BIA in trust for the NPT and any unneeded easements would be relinquished.

2.3.6 Lake Waha, Pump and Pipeline

Lake Waha is a natural lake incorporated into the LOP as an off stream reservoir. Located contiguous with the Nez Perce Reservation and approximately 1 mile southeast of the village of Waha, the lake is contained in a natural bowl created by a prehistoric landslide. It has no natural surface outlet; natural outflow from the lake is via seepage through subsurface strata that emerges in downstream springs. Because the lake has no surface outlet, LOID draws water from storage via a pump station located on a floating platform at the north end of Lake Waha.

The project facilities will remain in place for potential future needs. Lake Waha water levels will be maintained at an elevation reflecting more natural conditions. Water levels are expected to fluctuate between spring run-off and late fall when precipitation is at a minimum. Water from West Fork of Sweetwater may be diverted into Lake Waha (using the existing diversion and infrastructure) to maximize Sweetwater Springs output, which is directly influenced by Lake Waha's elevation. Water also may be pumped, using the existing pump and pipe, to increase flows in Sweetwater Creek to maximize designated critical habitat or to maintain water surface elevation in Lake Waha during period of high runoff.

Following title transfer, real property interests would transfer to BIA in trust for the NPT and any unneeded easements would be relinquished. There would be no change with regards to public access. Public access opportunities following title transfer would be consistent with current and past opportunities. IDFG would continue to manage the recreational activities and facilities consistent with current management practices.

2.3.7 Sweetwater Diversion Dam and Canal

The Sweetwater Diversion Dam will remain in place for potential future needs. BIA intends to evaluate the Sweetwater Creek diversion and habitat within Sweetwater Creek above the diversion to determine alternatives for restoring connectivity within Sweetwater Creek, while maintaining potential diversion capabilities. The BIA and NPT intend to evaluate the Sweetwater Creek diversion and habitat within Sweetwater Creek upstream of the diversion to determine alternatives for restoring fish passage while maintaining potential diversion. Following title transfer, water will no longer be diverted to Mann Lake.

Following title transfer, real property interests would transfer to BIA in trust for the NPT and any unneeded easements would be relinquished.

2.3.8 Reservoir A Dam and Mann Lake

Reservoir A Dam will remain in place as Mann Lake will be needed for LOID operations in support of the well field. Mann Lake would function as a balancing reservoir in support of the well field. The outlet gates of Reservoir A Dam would be kept open year round, and reservoir releases would be controlled by water-user demands from the independent closed pressure-type irrigation and fire system. Outside of irrigation season, the well field would supply water to Mann Lake to fill the reservoir. System demands resulting from patron use during the early parts of the irrigation season would be met directly by the well field. As system demands exceed the well field production capacity, water would be discharged from Mann Lake to augment supply, thus meeting system demands. Towards the end of the irrigation season (commonly in September), demands would drop below the well field's production capacity and the well field would be used to refill Mann Lake.

The normal irrigation season generally ranges from April to October with peak irrigation demand typically occurring July and August. During non-irrigation season, the system providing this service would remain pressurized to provide fire protection through the distribution system. Stock water also would be released during the non-irrigation season.

Following title transfer, real property interests would transfer to BIA in trust for the NPT and any unneeded easements would be relinquished. Public access following title transfer would be consistent with current opportunities. The NPT's fishing seasons and rules are anticipated to be similar to IDFG seasons and rules. IDFG's fishing licenses would continue to be valid for non-tribal fishers at Mann Lake. The BIA and the NPT would pursue a cooperative fisheries management agreement with IDFG. Additionally, BIA and LOID would enter into a long-term operation and maintenance agreement for Mann Lake. No time table has been established to complete this agreement.

2.3.9 Filter Plant Property

The filter plant property is located at 3536 Shady Lane in Lewiston, Idaho. The title to all improvements would be transferred by the U.S. to LOID to be operated in a manner similar to how it has been operated over the last 30 years.

The filter plant property serves as a conduit for releases from Mann Lake. Under Alternative B, the filter plant would operate the same as a conduit; water would flow moving downstream from Reservoir A Dam and upstream to refill Mann Lake from the well field.

Following title transfer, real property interests would transfer to LOID. There are currently no recreational or public access opportunities associated with this asset. This will continue post transfer.

2.3.10 Hereth Park Property

The Hereth Park property is located at 1520 Powers Avenue in Lewiston, Idaho, and is the headquarters and maintenance facilities for the LOID. Facilities would be transferred to LOID for future use consistent with current management. Additionally, the facilities for the irrigation and domestic distribution system would be operated and maintained as they are under current conditions.

Currently, the City of Lewiston operates and maintains Hereth Park through an agreement with Reclamation. Consistent with past operations, LOID would work with the city to enter into a contract for the purpose of maintaining park operations and maintenance consistent with current and past park management.

Currently, the Central Orchards Sewer District (COSD) has their headquarters and maintenance facilities on the property through a lease agreement with Reclamation. Consistent with past operations, LOID would work with the COSD to enter into a contract with LOID for the purpose of maintaining operations and maintenance consistent with current and past management.

2.3.11 Pilot Well

The pilot well, as described in Section 2.2.5, will be incorporated into the full build out of the well field. The pilot well represents the first of several wells to be constructed on LOID's property to develop the 8,500-af water permit and will be available for full incorporation into the LOID system following completion of the environmental compliance process. Data and information obtained through the pilot well study, and the successive well field development, will be used in the placement, design, drilling, and operation of each successive well in an effort to increase efficiency, optimize site utilization, and reduce costs.

2.3.12 Water Exchange

As previously discussed, implementation of Alternative B involves the replacement of Lapwai Creek Basin surface water with regional aquifer ground water. As development of the well field advances and wells are brought into production as part of the LOID system, water corresponding to the full sustainable production rate of the corresponding well will be left instream within the current surface diversion system. How this water will be managed within the system will largely be dependent upon the water year, respective water availability, and how many wells are currently in place. As wells come into production water would be left within the system to maintain a higher water surface elevation in Soldiers Meadow Reservoir and Lake Waha for the purpose of maintaining water availability to meet new instream flow requirements in both Webb and Sweetwater Creeks, as well as increased spring output at Sweetwater Springs.

Following completion of the well field, the associated water exchange, and the subsequent title transfer to LOID and BIA, LOID and BIA will execute an operations agreement for Reservoir A Dam and Mann Lake as discussed in Section 2.3.8. At project completion, LOP water rights would be transferred from Reclamation to the BIA in trust for the NPT.

2.3.13 General Land Management

Under Alternative B, land management practices will continue to be consistent with past practices. During the well field-development process, LOID will continue to operate and maintain the LOP consistent with current and past practices. Current access opportunities and system maintenance will continue. Additionally, Reclamation and LOID will continue to administer use agreements consistent with past actions.

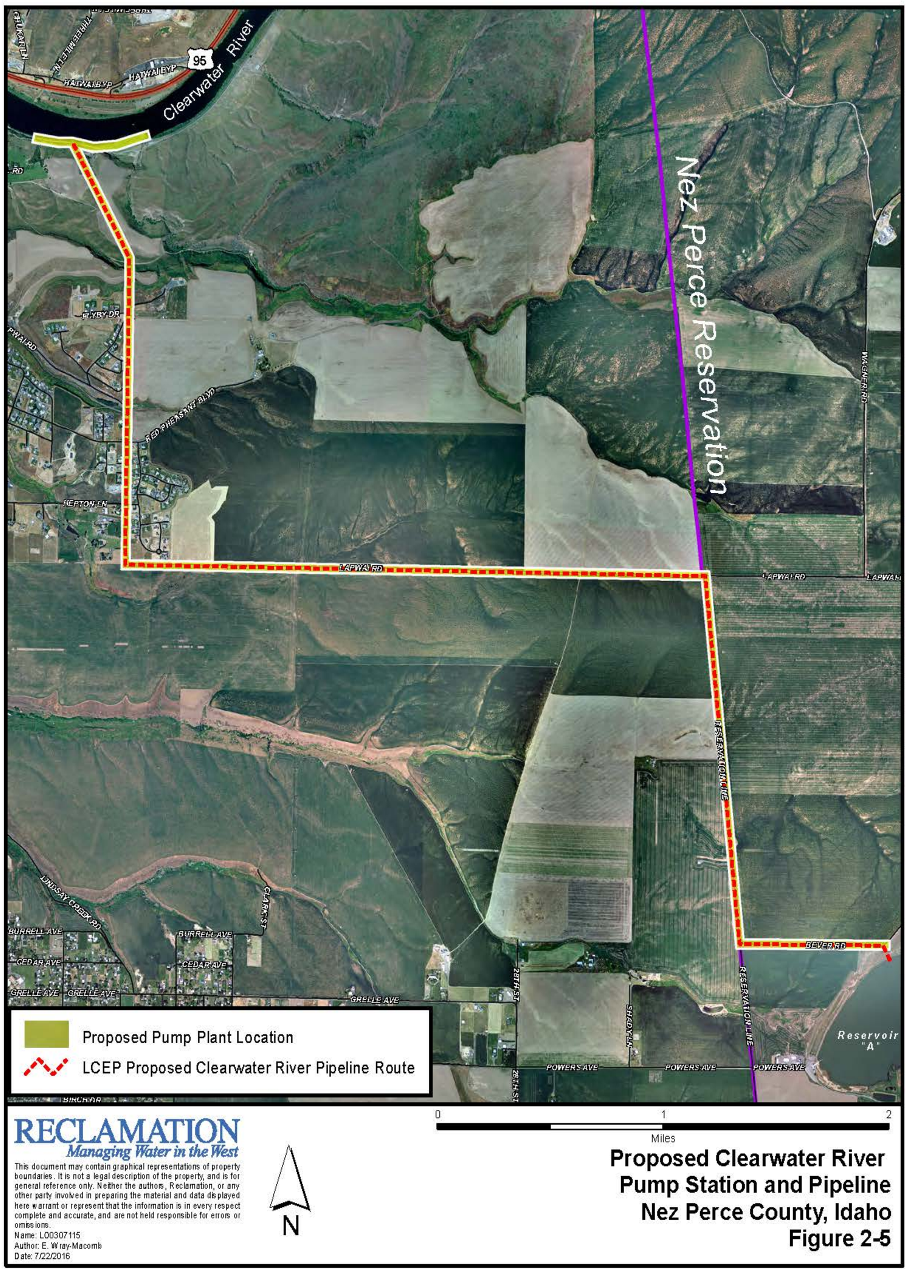
Following title transfer, LOID and BIA will continue to manage their respective LOP features and assets consistent with past actions. This will be executed both directly and through the use of management agreements. If, through successive years of use, the BIA and the NPT identify elements of the LOP surface diversion and conveyance system that are not necessary to meet operational objectives, the respective feature will be either retired in place or restored to natural conditions. The appropriate compliance will be conducted once plans for these elements are in place and are reasonably certain to occur.

2.4 Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

2.4.1 Summary of the Alternative

The Clearwater River Pump Alternative has been identified multiple times as an alternate source of water to the LOP. The Clearwater River Pumping Plant (Pump Plant) would be located on the south bank of the river, northwest of Mann Lake Figure 2-5shows the approximate location of the pump station and pipeline. The Pump Plant would provide water directly to Mann Lake in a single lift via a pipeline system. The pipeline system would largely be co-located with existing rights-of-way and easements; however, new easements would need to be acquired for this alternative.

Figure 2-5. Proposed Clearwater River Pump Station and Pipeline



This alternative has high volume and head pumping requirements; therefore, multiple pumps would be required. The pump sizes would be limited to 600 horsepower (hp) so low-voltage motors and electrical equipment could be used, thereby requiring approximately 4 to 6 pumps (number dependent upon pilot well operation). The motors would be housed within a pumping plant located along the Clearwater River. A screened intake pipe would be located in the river at a distance sufficient to provide water at all reasonable water levels. Screening would be designed and fitted consistent with NOAA, IDFG, and USFWS requirements for pumps in rivers involving ESA-listed fishes.

The Pump Plant would be operated similar to the well system as previously described. It is anticipated the pumps would fill Mann Lake prior to the onset of irrigation season, thereby not requiring use during the winter months. Once irrigation season begins, pumping to Mann Lake would begin to offset demands from Mann Lake. During peak irrigation season when user demands exceed pump capacity, Mann Lake would be slowly drafted to meet demands. As user demands fall below the pumping capacity of the Pump Plant, Mann Lake would slowly fill until it reaches its maximum operational elevation.

Unlike Alternative B, implementation of Alternative C cannot be incrementally staged. The well field identified in Alternative B can be progressively implemented as funds become available and wells are completed and brought on line into the LOID system. However, the Pump Plant and associated pipeline system would be brought on line to provide water to the LOID as a complete unit. This would require a higher upfront capital investment. The single-lift nature of the Pump Plant and pump design do not allow for an incremental approach. Therefore, LOID would continue to use the current surface diversion and conveyance system during planning, design, construction, and testing of the Pump Plant. Once final testing is complete, source water to Mann Lake would switch from the Sweetwater Canal to the Clearwater River Pump Plant. At project completion, LOP water rights would be transferred from Reclamation to BIA in trust for NPT.

The transfer of water rights and title to LOP assets would coincide with conversion from the current surface system to the Pump Plant. Consistent with Alternative B, water rights associated with the existing LOP surface system, LOP features, and assets located above including Mann Lake, would be conveyed to BIA to be held in trust for the NPT. LOP features and assets located below Mann Lake would be transferred to LOID. Since Federal reclamation projects are expressly authorized by Congress and since Section 106 of the Reclamation Act of 1902 stipulates that projects are owned by the U.S., an Act of Congress is required to transfer title out of Federal ownership. Likewise, the transfer of lands in trust to the BIA for the NPT will require federal legislation.

The BIA and the NPT intend to maintain all LOP structures, facilities, and easements in place consistent with current configuration. However, post-transfer operations would be conducted in a manner designed to maximize benefits to natural resources and designated critical habitat within the Sweetwater and Webb Creek drainages. This would involve operating Soldiers Meadow Reservoir and Lake Waha in an effort to maintain water availability to provide instream flows in Sweetwater and Webb creeks and restore output at Sweetwater Springs to more natural conditions. In general, if BIA and the NPT determine various features of the LOP are not necessary for maintaining reservoir elevations and stream flows sufficient to benefit natural resources within the Lapwai Basin, the BIA would dispose of the asset. This may include structure retirement, removal, and (in some cases) site restoration. All site restoration activities would be conducted in a manner consistent with Lapwai Basin restoration objectives currently maintained by the NPT. As these activities are not fully defined or have funding, they are not reasonably certain to occur at this time. However, when the projects are planned and funding is in place, the appropriate regulatory compliance would be conducted.

Prior to implementation of Alternative C, LOID would have to acquire a water right from the Clearwater River at the identified point of diversion. Per discussion with IDWR, water is available for appropriation from the main-stem Clearwater River at the proposed point of withdrawal. The intended course of action would be for protection of existing LOP water rights in the Sweetwater Watershed via the Idaho Water Supply Bank, to meet unsatisfied Idaho minimum stream flows in Webb, Sweetwater, and Lapwai Creeks, as well as in the main-stem Clearwater River. Water not diverted for the LOP from Webb and Sweetwater Creeks would be left instream and protected, reaching the Clearwater River via Lapwai Creek. A new water permit application would be submitted to IDWR by LOID. IDWR has stated that a water permit application premised on the protection of minimum stream flow for the beneficial use of existing LOP upstream water rights would be viewed as well-conceived. IDWR views the lower Clearwater River at the proposed diversion location as part of a single hydrological unit, for net effect purposes, with the lower Lapwai/Sweetwater Creek Watershed.

LOP feature disposition under Alternative C is consistent with Alternative B, as described in Sections 2.3.2 through 2.3.10, 2.3.12, and 2.3.13.

2.4.2 Pilot Well

Under Alternative C, the pilot well would be operated as part of the LOID system. Water provided by the well would offset the need for pumping from the Clearwater River at an amount equal to the sustainable operational capacity of the well. This would reduce the number of pumps necessary at the Pump Plant and possibly reduce conveyance system sizing requirements. However, the pilot well would be put into production prior to construction and completion of the Pump Plant. Due to the upfront construction costs associated with this alternative, it is not known how long the pilot well would be operated prior to the Pump Plant coming on line.

2.4.3 Water Exchange

Water corresponding to the full sustainable production rate of the pilot well would be left instream within the current surface diversion system. How this water would be managed within the system would largely be dependent upon the water year and respective water availability. Once the pump station comes into production, water would be left within the system to maintain a higher water surface elevation in Soldiers Meadow Reservoir and Lake Waha for the purpose of maintaining water availability to meet new instream flow requirements in both Webb and Sweetwater Creeks, as well as increased spring output at Sweetwater Springs. At project completion, LOP water rights would be transferred from Reclamation to BIA in trust for NPT.

2.5 Alternatives Considered but Eliminated from Further Study

As previously discussed, the 2011 LCEP Appraisal study report initially identified 32 alternatives, 10 of which fully or partially met the objectives established by the LCEP stakeholders group. From these 10 alternatives, 3 were identified that were reasonable, feasible, and fully met the following stakeholder goals

- Had a generally reasonable capital cost
- Met operational requirements
- Met long-term and annual maintenance objectives
- Had reasonable replacement costs
- Had manageable power requirements

The three final alternatives identified in the LCEP report were the following:

- Clearwater River Pumping Station, Attenuated System
- Snake River Pumping Station, Attenuated System
- Groundwater Supply, Attenuated System

Each of the three final alternatives had a corresponding on-demand alternative. The on-demand alternatives required system capacities and production rates equal to maximum user demand rates. This required very large pumping systems in each river along with a well field with 12 or more wells, causing initial construction costs, annual operational costs, and long-term maintenance to be cost prohibitive. The attenuated systems allow for the use of Mann Lake to serve as a balancing pond, as described in Section 2.3.8, thereby reducing pumping and well production needs.

The three final alternatives were determined to have a generally reasonable capital cost, relative to the other 10 alternatives that at least partially met study objectives. However, upfront capital costs for constructing pumping plants along either the Snake or Clearwater River and constructing the well field were substantial. Additionally, cultural and historical resource impacts associated with respective pump station sites further complicated the two river pump alternatives. The Clearwater River and Snake River Pump Plants have similar initial construction costs; however, the Clearwater River Pump Plant is estimated to have a lower annual operation and maintenance cost. Therefore, it was selected for further analysis in this document and the Snake River Pump Plant was not evaluated further.

2.6 Summary Comparison of the Environmental Impacts of the Alternatives

The environmental impacts of each alternative are compared in Table 2-1 against the environmental impacts that would result under Alternative 1 (No Action). Potential short and long-term, direct and indirect impacts of the alternatives are summarized.

The environmental consequences of the alternatives arranged by resource are described in detail in Chapter 3. The terms “environmental consequences” and “environmental impacts” are synonymous in this document.

Chapter 3 Affected Environment and Environmental Consequences

3.1 Introduction

This chapter provides background information and a description of the study conducted for key resources potentially affected by the proposed Lewiston Orchards Water Exchange and Title Transfer Project. It describes the affected environment of various resource areas within the project area and vicinity, and evaluates the potential effects of constructing and operating the two action alternatives and the No Action Alternative. The action alternatives (including the Proposed Action) are based on the purpose and need, and the project description developed by Reclamation and LOID.

The affected environment sections describe the existing environment that could be affected by the alternatives. The environmental consequences sections describe the potential environmental consequences of implementing the proposed alternatives on the resources evaluated below. Environmental commitments necessary to reduce any potential impacts to those resources are addressed in the environmental commitments sections. Cumulative impacts – may result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions – also are evaluated. Projects included in the cumulative impacts analysis are the rehabilitation of several portions of Lapwai, Sweetwater, and Webb Creeks by the Nez Perce Soil and Water Conservation District (NPSWCD) and NPT.

Information necessary to develop the affected environment discussion was obtained through a combination of online data review; meetings, discussions, and reports from agencies; field investigations; and a review of available aerial photography.

The Action Area referred to in each section, unless specifically mentioned otherwise, is the area potentially affected by the federal action and includes reservoirs and stream reaches used by the LOP to divert, store, and deliver water. Furthermore, the Action Area includes other elements of the human and natural environment directly or indirectly impacted by current operations of the LOP within the LOID service area. In addition, the Action Area for the Proposed Action (Alternative B) includes the well field and pipeline to Mann Lake (Reservoir A). The Action Area for Alternative C includes the Clearwater River Pumping Station and pipeline to Mann Lake (Reservoir A).

3.2 Lapwai Basin and Lewiston Orchards Project System Hydrology

3.2.1 Study and Analysis Methodology

The primary sources of information for this study came from the August 2015 Project Team Site Visit and the 2015 technical memorandum by Eric Rothwell titled *Analysis* *of Lewiston Orchards Project Title Transfer Alternative and Operations on Instream Flows in Sweetwater and Webb Creeks near Lewiston Orchards Idaho* (Rothwell, 2015). Detailed assumptions regarding historic measured outflows, storage, and diversions used in the hydrologic modeling effort can be found in the technical memorandum.

3.2.2 Affected Environment

Surface water resources within the Action Area include Sweetwater Creek, Webb Creek, and Captain John Creek in the Snake River Drainage. Sweetwater Creek and its tributaries provide irrigation water supply for LOID through a combination of natural flows and surface water reservoirs (Soldiers Meadow Reservoir, Lake Waha, and Mann Lake [Reservoir A]). Project facilities are shown in Figure 1-1.

The diversion of natural surface water for LOID results in reduced flows in Sweetwater Creek, West Fork of the Sweetwater, Webb Creek, and ultimately Lapwai Creek. Total LOID diversions from these waterways are typically approximately 22 cfs when water is available; this amount has contributions from Webb Creek drainage and Sweetwater Creek. The existing LOID system has a physical capacity of approximately 35 cfs during peak flow periods. The 2010 LOP BiOp and subsequent mediation resulted in increased instream flow requirements (NOAA Fisheries, 2010) at several locations in the Lapwai Basin. The 2015 technical memorandum written by Eric Rothwell includes hydrologic modeling and analysis of the LOP. Flow measurements, data availability, and assumptions used in the modeling effort are discussed in detail in the technical memorandum (Rothwell, 2015). All facilities are described in detail in Appendix A.

Mann Lake (Reservoir A)

Mann Lake (Reservoir A) has a maximum storage capacity of 1,960 ac-ft at a high pool elevation of 1,800 feet. Additional storage can be achieved (up to 2,440 ac-ft at a pool elevation of 1,804 feet) with additional monitoring measures on the dam. Minimum reservoir storage (low pool) is approximately 700 ac-ft (500 ac-ft for fire-flow plus 200 ac-ft for stock watering). Mann Lake (Reservoir A) is key to the LOID irrigation system. Water diversions are conveyed from Mann Lake (Reservoir A) by pipeline.

The emergency spillway was designed to discharge into Lindsay Creek, but due to the small size of the drainage area (0.98 square miles), emergency spilling is highly unlikely and has not occurred to date.

Sweetwater Creek

The Sweetwater Diversion Dam diverts water from Sweetwater Creek and releases it into Sweetwater Canal, which eventually empties into Mann Lake (Reservoir A). The construction of this facility created a 2- to 3-foot-deep pool above the diversion dam; however, the pool is periodically reduced in size because of sediment build-up over time. Reclamation and LOID are required to replace all sediment removed with gravel based on the terms and conditions of the 2010 BiOp.

All water diverted upstream as a part of the LOP (for example, Webb Creek Diversion, Captain John Diversion, West Fork Sweetwater Diversion, etc.) ends up at the Sweetwater Diversion Dam. Hence, it is a critical element to the existing system.

It should be noted that while existing LOP facilities do allow for some flood control capabilities, the project was intended as an irrigation project, not a flood control project. For example, flood waters observed in 1997 and 2011 are evidence that there is not sufficient control with the current system.

Webb Creek

Webb Creek Diversion Dam is approximately 15 miles from Lewiston and approximately 9 miles upstream from the confluence with Sweetwater Creek. The diversion canal has a capacity of approximately 20 cfs.

Soldiers Meadow Reservoir

Soldiers Meadows Reservoir is located approximately 26 miles from Lewiston, Idaho, and has total storage capacity of 2,370 ac-ft. Soldiers Meadow Reservoir stores water from Webb Creek and from upper Captain John Creek. Water is released when needed and diverted into Sweetwater creek via the Webb Creek Diversion and Webb Creek Canal.

Captain John Creek

The Captain John Diversion consists of a small impoundment structure on Captain John Creek, with the structure diverting water into the Captain John Canal. The contributing drainage area is small, as are the diversions into the LOP. Monthly flow records at the Captain John Canal from 2011 to 2012 average less than 0.5 cfs and often indicate no flow.

Lake Waha

Lake Waha is a natural lake and also serves as an off-stream reservoir with a capacity of 6,900 ac-ft. Water stored in Lake Waha is pumped back into Sweetwater Creek during irrigation season. Higher flows at Sweetwater Springs have been documented when water surface elevations of Lake Waha are higher.

West Fork Sweetwater

The West Fork diversion dam is located in the upper reaches of the West Fork Sweetwater Creek. Water from the dam is conveyed for storage to Lake Waha by the Waha Feeder Canal. The diversion capacity of these facilities is approximately 15 cfs.

Sweetwater Springs

Pool elevation of Lake Waha has been positively correlated to spring flow at Sweetwater Springs (Rocha, 2012; as referenced in Rothwell, 2015). There are impacts to Sweetwater Springs on the NPT Acclimation Facility. Water withdrawal by LOID decreases the lake elevation, which in turn decreases the output of the springs. The Sweetwater Springs have a cultural significance to the NPT.

3.2.3 Environmental Consequences

This section describes the environmental effects on the Lapwai Basin and LOP system hydrology in the project area.

Methods and Criteria

Impacts to surface water resources were qualitatively evaluated by assessing trends in affected water resources and looking at the potential for changes caused by the alternatives. Impacts on surface water resources would be considered significant if the following would occur:

- Flows in the Sweetwater Creek, Webb Creek, and Captain John Creek would change as a result of implementation of an action alternative that would not sustain the riparian vegetation or fisheries found in the Action Area.

- Impacts on hydrology would be considered significant if project implementation is expected to change flows in such a way as to affect aquatic species.

Alternative A – No Action

Short-term Impacts No short-term impacts to hydrology are anticipated under the No Action Alternative.

Long-term Impacts Under the No Action Alternative, operations of the LOP would continue into the future, remaining generally consistent with past operations. However, the pilot well would be incorporated into the LOP. The LOID would operate and maintain the pilot well as part of the current system, and a quantity of water would be protected instream for fish improvements in the Sweetwater Creek watershed in accordance with the MOA between Reclamation and LOID. Protection of this water as instream flow is described in the Water Rights Section (3.5). As a result, system hydrology, including diversions; stream and spring flows; reservoir elevations; and storage quantities would be impacted, depending on the well's full productive capacity. Surface water flows in Sweetwater Creek and Webb Creek may increase as a result of reduced diversions by LOID on the order of 4.5 cfs total (the pilot well's estimated production). Hydrologic estimates that would be maintained under the No Action Alternative (based on historic data) are found in Reclamation's 2015 technical memorandum (Rothwell, 2015).

Alternative B – Well Field Construction, Full Groundwater Exchange and Title Transfer (Proposed Action)

Short-term Impacts As wells come into production the amount of water based on the wells full productive capacity would be left instream. This incremental addition of water to the streams would incrementally improve instream habitat until the full well field has been completed. Protection of this water as instream flow is described in the Water Rights Section (Section 3.5).

Long-term Impacts. A principal motivation for the Proposed Action is to improve conditions in Sweetwater Creek and Webb Creek, with the goal of returning flows in both creeks to more natural conditions. As a result, all diversions (Sweetwater, West Fork Sweetwater, and Webb Creek), as well as the Lake Waha Pump, would not be operated post-transfer; except to increase flows in Webb Creek and/or Sweetwater to maximize designated critical habitat in Sweetwater Creek. Actual operations and objectives for instream flows are likely to change over time as hydrologic conditions change and more information becomes available.

- **Mann Lake (Reservoir A).** The LOID fully anticipates that Mann Lake (Reservoir A) would still be required after wells are constructed to allow for pumping groundwater into the lake for storage. This storage capacity is important for LOID, especially during hot and dry peak use periods. The primary use of the lake would be irrigation. As a result of filling the reservoir from pumped groundwater instead of the historical surface diversions, it is anticipated that reservoir levels of Mann Lake (Reservoir A) would fluctuate more than in the past. It takes 4 months to fill the reservoir, so LOID would plan on beginning to pump to the reservoir in January to save both water and money. Under the Proposed Action, the reservoir could fluctuate more than current operations, dropping at times to existing low pool elevations or lower (Rothwell, 2015).

- **Captain John.** Due to the small contributing drainage area and low diversions into the LOP (on the order of 0.5 cfs or less average measured diversion), impacts on Captain John Creek under the Proposed Action would be minimal.

- **Soldiers Meadows Reservoir.** Post-transfer hydrologic modeling results indicate a higher carryover of storage and higher low pool elevations each year in Soldiers Meadow Reservoir due to decreased demand on stored water during summer months (Rothwell, 2015). As this storage no longer would be used for LOID irrigation water, the annual variation in storage would be reduced and carryover storage would increase over time. This would increase the likelihood for achieving flows greater than the required minimum BiOp target flows.

- **Webb Creek**. Under the Proposed Action, the project facilities will remain in place and may be required to use water stored in Soldiers Meadow Reservoir to be released downstream to maximize designated critical habitat in Webb Creek and/or Sweetwater Creek. Water may be transferred from the Webb Creek drainage to the Sweetwater Creek drainage to maximize designated critical habitat in Sweetwater Creek. This also would likely lead to beneficial effects on natural resources over the long term and restore the system to its natural state.

- **West Fork Sweetwater Creek.** Under the Proposed Action, the West Fork Sweetwater Creek Diversion project facilities will remain in place for potential future needs. Water from the West Fork of Sweetwater may be diverted into Lake Waha using the existing diversion and infrastructure to maintain a consistent, full-pool elevation. The intent is to maximize Sweetwater Spring discharge, which is directly influenced by Lake Waha elevation. This will be especially useful based on climate change models predicting this area going from snow melt driven system to a rain event.

- **Captain John Creek.** Due to the small contributing drainage area and low diversions into the LOP (on the order of 0.5 cfs or less average measured diversion), impacts on Captain John Creek under the Proposed Action would be minimal.

- **Lake Waha.** Under the Proposed Action, Lake Waha water levels are anticipated to return to natural equilibrium conditions and restore historical connectivity between the lake and Sweetwater Springs. While there is still a range of uncertainty in flow magnitude and timing, hydrologic modeling efforts indicated that the lake settled into a new equilibrium between approximately 3,374 to 3,388 feet. Without the filling and draining of the lake for LOID irrigation water storage and diversions, the pool elevation of Lake Waha is anticipated to vary less over the course of the season. This would likely result in an increased discharge throughout the year at Sweetwater Springs.

- **Sweetwater Springs.** Due to the connectivity between Lake Waha and the Sweetwater Springs, there are beneficial effects on Sweetwater Springs on the NPT Acclimation Facility under the Proposed Action, specifically because LOID would no longer be pumping water out of Lake Waha. Sweetwater Springs is predicted to contribute 3-10 cfs at 50 degrees Fahrenheit under natural lake elevation fluctuations. This unique critical cold water discharge would increase flows in Sweetwater Creek.

- **Sweetwater Creek and Lapwai Creek.** NPT is anticipated to remove the Sweetwater Diversion Dam following implementation of the Proposed Action, though the exact timeframe of removal is unknown. Removal of the dam and restoration of the site to a natural riverine system would provide benefits to natural resources over the long term through more natural flow conditions. Post-transfer flow conditions below the Sweetwater Diversion show a year-round increase in summer base flows, higher peak flows, and a higher likelihood of achieving flows greater than the minimum BiOp target flows more reliably (Rothwell, 2015). Post-transfer flow conditions below the Sweetwater Diversion show a year-round increase in flows, higher peak flows, and a higher likelihood of achieving the BiOp target flows more reliably (Rothwell, 2015).

Flood control capabilities of the LOP would be reduced under the Proposed Action; although, as previously mentioned, the impact of the Proposed Action would be minimal because there are few existing flood control capabilities with the current system.

Environmental Commitments

Since the Proposed Action would restore flows in the Lapwai Basin closer to historical conditions, no environmental commitments are required.

Cumulative Impacts

No projects related to surface or groundwater use have been identified with the exception of continued restoration of the Lapwai Creek watershed by NPT and the NPSWCD. Restoration of pre-diversion flows into Sweetwater and Webb Creeks with implementation of Alternative B would beneficially act with the restoration activities by providing additional flows to support the restoration efforts.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange and Title Transfer

Short-term Impacts Due to the anticipated construction period for this alternative, no short-term impacts to hydrology are anticipated under Alternative C.

Long-term Impacts This alternative would have the same effects on surface water quantity as those described in the Proposed Action. The principal difference between this Alternative and the Proposed Action is that this alternative cannot be incrementally staged. The quantity and timing of water pumped from the Clearwater River, relative to the river's flow, would not result in impacts to the Clearwater River.

Environmental Commitments

Since Alternative C would restore flows in the Lapwai Basin to pre-diversion conditions, no additional conservation measures are required.

Cumulative Impacts

Cumulative effects with implementation of Alternative C are the same as those described under the Proposed Action.

3.3 Hydrogeology

3.3.1 Study and Analysis Methodology

The primary sources of information for this study are based on existing literature on the regional and local hydrogeology, including reports by Ralston (2011, 2015a, 2015b).

3.3.2 Affected Environment

Regional Geologic Setting

The LOID service area is located within the Lewiston Basin, which is deeply underlain to considerable depth by layers of basalt and sediments of the Columbia River Basalt Group (CRBG) (Ralston, 2011). There are also modern, or Holocene, sediments and surface deposits present in the area; including alluvium, alluvial fan deposits, loess, landslide deposits, and Bonneville and Missoula Flood deposits (Kauffman et al., 2009). Although there are two primary geologic units found in the area (Quaternary-aged alluvium less than 10,000 to 20,000 years old and the Miocene-aged CRBG strata approximately 17.5 to 16.5 million years old), the CRBG is of most interest due to its connection with groundwater available to the project (Kauffman et al., 2009).

Columbia River Basalt Group

The basalt and aquifer (underground reservoir) in the area consist of the layered flood basalt flows of the CRBG. The CRBG is a thick sequence of more than 300 continental flood basalt flows that cover an area of more than 59,000 square miles in Washington, Oregon, and western Idaho (Tolan et al., 1989; Camp et al., 2003; Camp and Ross, 2004) with a maximum thickness of more than 10,000 feet. Several of the more recent compilations of CRBG geology and hydrogeology are found in reports by the U.S. Department of Energy (USDOE) (1988), Reidel et al. (2002), Ground Water Management Area (GWMA) (2009a, 2009b, and 2009c), Tolan et al. (2009), and Burns et al. (2011). More detailed discussions of CRBG geology and hydrogeology are provided in those reports.

Regionally, the CRBG is subdivided into four formations, from youngest to oldest, the Saddle Mountains Basalt, Wanapum Basalt, Grande Ronde Basalt, and Imnaha Basalt (Swanson et al., 1979a, 1979b). These formations are further subdivided into members; both formation and members are defined on the basis of a combination of unique physical, geochemical, and palemagnetic characteristics.

As basalt flows cooled and solidified, they formed layers called the flow top, flow interior, and flow bottom. This layered structure exerts fundamental controls on groundwater in the CRBG. Interflow zones are the intervals between each lava flow that contains various combinations of flow top (from the underlying flow) and flow bottom (from the overlying flow) features.

Columbia River Basalt Group Aquifers

From a hydrogeologic standpoint, CRBG aquifers are dominated by layered groundwater flow systems, with interflow zones holding most of the groundwater. This can be seen as spring lines in outcrops on valley walls where water is discharging from interflow zones. Groundwater flow within an individual CRBG interflow is directly influenced by the physical properties of that interflow zone. Groundwater movement from one CRBG layer to another is commonly through faults. Interflow zones within the CRBG are the primary suppliers of water for wells in the area.

Local Geologic Setting

Kauffman et al. (2009) summarized the geology of the area. Ralston (2011) provides an excellent description of the local hydrogeologic setting. Wells in LOID service are hydraulically connected to each other (Ralston, 2015a). The existing and proposed LOID wells would pump water from the Grande Ronde Formation. Sustained pumping rates of more than 3,000 gpm have been reported in the area (Ralston, 2011, 2015a, and 2015b). Ralston (2011, 2015a, 2015b) has completed an analysis of the local hydrogeology, including significant hydraulic testing of wells in the area and groundwater modeling (both analytical and numerical), to assist in ascertaining if the local aquifer would be capable of sustaining water production to meet the demands of the LOP.

The following hydrogeology discussion has been taken from Ralston (2011).

The regional ground-water flow system in the Grande Ronde Formation within the Lewiston basin has been well documented for much of the area (Cohen and Ralston, 1980; Stevens, 1994). The dominant area of recharge for the regional ground-water flow system within the Grande Ronde Formation is believed to be located south of Asotin along the Snake River. The primary discharge area for the aquifer is believed to be west of Clarkston near Chief Timothy Park where the geologic structures that form the Lewiston grade cross the Snake River.

All of the larger production wells in the Lewiston Basin penetrate and obtain ground water from the Grande Ronde Formation. Ground water is obtained from the interflow zones. An individual well's yield is based on the sum of the yields of all the interflow aquifers penetrated by the screened or open-hole portions of the well. Most of the private wells are shallower and are completed in either the Saddle Mountains or the Wanapum Formations that are distinct from the deeper Grande Ronde formation. The general pattern is that deeper wells have lower ground-water levels than shallow wells.

Table 3-1, prepared from Ralston (2011), presents information on the deep public supply wells that obtain ground water from the Grande Ronde Formation. Not all of the wells are presently in use. The table was created based on information from Stevens (1994) and from the water supply entities. Table 3-1 includes wells for LOID, Asotin Public Utility District (APUD) and the City of Lewiston. Because the Grande Ronde

Formation is hydraulically connected to the Snake and probably the Clearwater Rivers, the majority of wells shown in Table 3-1 have ground-water levels approximately at the elevation of the Snake and Clearwater Rivers (680 to 740 feet).

A large number of private wells exist within the Lewiston Basin with most considerably shallower than the wells that penetrate the regional aquifer. The wells also have higher ground-water elevations than the typical range for the regional aquifer in the Grande Ronde Formation. Cohen and Ralston (1980) have identified a hydraulic boundary within the regional aquifer in the Clarkston area. They found that APUD wells 5 and 6 did not respond within 1 day to the pumping of APUD Well 1.

Table 3-1. Information on Selected Wells in the Lewiston Basin

Well No.	Discharge (gpm)	Static Depth to Water (feet)	Pumping Depth to Water (feet)	Surface Elevation (feet)	Well Depth (feet)	Well Bottom Elevation (feet)	Specific Capacity (gpm/ft)	Water Level Elevation (feet)
APUD Well 1	2,950	186	241	850	970	-120	54	711
APUD Well 2	–	69	–	793	1,958	-127	–	724
APUD Well 3	3,500	226	414	999	1,100	-104	24	733
APUD Well 4	–	155	–	876	840	36	–	721
APUD Well 5	3,325	420	525	1,147	1,330	-183	21	707
APUD Well 6	3,225	287	333	993	1069	-76	70	731
APUD Well 7	2,900	450	567	1,180	1340	-160	25	716
LOID Well 1	–	851	–	1,554	–			703
LOID Well 2	500	501	900	1,742	1,957	-215	1	1,241
LOID Well 3	660	695	1,312	1,419	2,617	-1,198	1	724
LOID Well 4	1,100	847	870	1,566	1,625	59	47	719
Lewiston Well 1A	–	42	–	730	735	-5	–	688
Lewiston Well 2	–	20	–	735	275	460	–	715
Lewiston Well 3	–	108	–	837	600	237	–	729
Lewiston Well 4	–	15	–	743	358	385	–	728
Lewiston Well 5	–	128	–	855	600	255	–	727
Lewiston Well 6	1,330	565	572	1,306	1,791	-485	190	741

Source: Ralston, 2011

Note:
gpm/ft = gallon per minute per foot

3.3.3 Environmental Consequences

This section describes the environmental effects on hydrogeology at and in the vicinity of the project area.

Methods and Criteria

Existing hydrogeologic maps, reports, and other data were reviewed to assess environmental consequences of impacts to groundwater resources and geology.

Impacts on hydrogeology would be considered significant if project implementation is expected to reduce groundwater levels or quality in such a way as to restrict future development of groundwater resources.

Alternative A – No Action

Under the No Action Alternative, groundwater resources use and geology would remain essentially the same, including continued demand on the aquifer from the pilot well and other wells in the area. Adverse effects of no action include upstream agricultural accumulation risks of water used in the LOID area with human contact.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts No short-term impacts to hydrogeology are anticipated under Alternative B, given that the estimated pumping for the project is anticipated to result in 10 to 15 feet of groundwater level decline over 20 years (Ralston, 2015b).

Long-term Impacts Ralston (2015b) estimated pumping for the project could result in 10 to 15 feet of permanent water table decline over 20 years. Wells in the area have specific capacity values of approximately 20 gpm/ft of drawdown, meaning a well would have 100 feet of drawdown at a flow rate of 2,000 gpm. Ralston (2011) reports that well interference should be less than 20 feet (that is, 20 feet of additional drawdown in adjacent wells) if wells are located at least 400 to 500 feet away from another production well. This information suggests that there is water available in the Grande Ronde formation, and that pumping for the project would not affect the ability of other wells in Grande Ronde formation to pump well water.

Ralston (2011) reports a hydraulic connection between the aquifer and the Snake River, based on available hydrologic data. It was also reported that Cohen and Ralston (1980) documented a hydraulic connection between the regional aquifer and the discharge area along the Snake River, based on data indicating a water level change in APUD wells associated with the filling of the reservoir above Lower Granite Dam in February 1975. The data showed that the groundwater levels in the aquifer (data collected in 2011) were higher than they were in 1961 shortly after the initiation of pumping by APUD.

Groundwater withdrawal from the aquifer peaked at approximately 3,200 million gallons per year, based on data presented in Ralston (2011). Groundwater withdrawal in 2009 was approximately 2,300 million gallons (approximately 7000 ac-ft) per year Ralston (2011). Using groundwater for the LOID irrigation supply, in combination with existing groundwater pumping, would approximately double current pumping quantities, resulting in a total groundwater withdrawal of approximately 5,000 million gallons (approximately 15,300 ac-ft) per year. Increasing groundwater withdrawal would lead to decreased water levels in the aquifer. Ralston (2011) suggests that increased groundwater pumping would lead to sufficient water level decline to balance the aquifer system by either increasing the rate of natural recharge and/or decreasing the rate of natural aquifer discharge. Based on data presented in Ralston (2011), the additional water level decline would be on the order of tens of feet, and it is unlikely that the additional water level decline would be more than 30 feet (Ralston, 2011). This would not represent a significant effect.

Environmental Commitments

No environmental commitments are proposed.

Cumulative Impacts

The level of the groundwater table at any particular time is a result of all impacts/stresses to the aquifer that have occurred. Ralston (2011) presents data that suggests the cumulative impact (groundwater level decline) of operating the well field would be no more than 30 feet, suggesting there would be minimal cumulative effects with implementation of Alternative B.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange and Title Transfer

Short-term Impacts This alternative does not involve additional groundwater pumps being installed and, therefore, no short-term impacts to hydrogeology are anticipated under Alternative C.

Long-term Impacts This alternative involves additional groundwater pumping from the pilot well, but at a rate that does not impact the aquifer. Therefore, no long-term impacts to hydrogeology are anticipated under Alternative C.

Environmental Commitments No environmental commitments are proposed.

Cumulative Impacts No additional projects utilizing groundwater or surface water have been identified. Therefore, this alternative is not anticipated to contribute to cumulative effects related to past, present, or reasonably foreseeable actions impacting this resource.

3.4 Water Quality

This section describes existing surface water quality in the project area, which includes Webb Creek from the source to the confluence with Sweetwater Creek, Sweetwater Creek from the source to the confluence with Lapwai Creek, and Captain John Creek to the confluence with the Snake River.

3.4.1 Study and Analysis Methodology

The primary sources of information for this study come from the August 2015 Project Team Site Visit and the 2012 §305(b) Integrated Report prepared by IDEQ.

3.4.2 Affected Environment

IDEQ is required to submit to EPA a list of the state's impaired waters. Though not a part of this project, IDEQ previously identified the Sweetwater Creek and Webb Creek to be assessed for water quality conditions. According to the Idaho Administrative Procedures Act (IDAPA) 58.01.02, beneficial uses that are to be protected for the Sweetwater Creek and Webb Creek within the Proposed Action Area are cold water aquatic life and secondary primary contact recreation.

The EPA is responsible for administering the Clean Water Act (CWA) within the boundaries of the 1863 Nez Perce Reservation. The state of Idaho developed a list of water quality limited assessment units for water bodies that included areas over which the EPA acknowledged that the state did not have jurisdiction. That list included water bodies on the Nez Perce Reservation within the project area.

Pursuant to Section 303 of the federal CWA, IDEQ developed and published the 2012 Integrated Report, in which Category 5 waters make up the Section 303(d) List of water quality limited water bodies. According to the IDEQ 2012 Integrated Report, 303(d) List, a short reach of Sweetwater Creek falls into Category 2 waters, which fully support those beneficial uses that have been assessed. The remainder of Sweetwater Creek (from source to Webb Creek), as well as Webb Creek (from source to mouth) falls into Categories 5 and 4c.

Category 5 impaired water bodies do not meet applicable water quality standards for one or more beneficial uses due to one or more pollutants. Category 4c impaired water bodies are designated as such if the impairment is not caused by a pollutant (for example, temperature), but rather by a pollution (for example, flow alteration). Causes listed for the Sweetwater Creek and Webb Creek include: cause unknown, fecal coliform, other flow regime alterations, physical substrate habitat alterations, sedimentation/siltation, and water temperature. To date, there has been no EPA-Approved Total Maximum Daily Loads analysis completed for the portion for the Lapwai Basin containing the Sweetwater Creek and Webb Creek within the Action Area.

3.4.3 Environmental Consequences

This section describes the environmental effects on water quality at and in the vicinity of the project area, which includes Webb Creek from the source to the confluence with Sweetwater Creek, Sweetwater Creek from the source to the confluence with Lapwai Creek, and Captain John Creek to the confluence with the Snake River.

Methods and Criteria

Impacts to water quality were qualitatively evaluated by assessing trends in affected water quality and looking at the potential for changes caused by the alternatives. Beneficial or adverse effects on water quality can be assessed based on either of the following potential outcomes:

- Implementation of an action alternative resulting in degraded water quality to surface waters within and downstream of the Action Area such that any fully supporting water body becomes impaired (and consequently 303(d) listed), or such that an already-impaired water body is placed in a higher assessment category.
- Implementation of an action alternative resulting in improved water quality to surface waters within and downstream of the Action Area such that an impaired water body is removed from the 303(d) list after a total maximum daily load is developed by IDEQ and approved by EPA (not as a part of this project).

Alternative A – No Action

Under the No Action Alternative, the short and long-term impacts from LOP operations would continue into the future, remaining generally consistent with past operations, with the exception of the incorporation of the pilot well into the LOP. The LOP blocks access to and diverts water from the most significant cold-water refugia in the lower Clearwater River basin (Sweetwater Springs), and the LOP and its operations result in elevated water temperatures that exceed temperature standards approvable by the EPA under the CWA. These effects are potentially significant given that high summer water temperatures have been identified as the greatest limiting factor for the region's ESA-listed Snake River steelhead. While the addition of the pilot well could potentially reduce surface water diversions and increase stream and spring flows, due to the continued diversion of water to Lewiston Orchards (which results in flow regime, sedimentation/siltation, and temperature alterations within the water resources) as well as necessary maintenance activities, continued impairment of waters within the Action Area is anticipated with respect to beneficial uses that are intended to be protected under the CWA. The NPT asserts that, under No Action, renewal of stayed ESA litigation will additionally include claims under the CWA.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts Implementation of environmental commitments described below would avoid short-term impacts to water quality under Alternative B. Water quality will increase as water is incrementally left in the waterbodies.

Long-term Impacts Alternative B would result in beneficial impacts to water quality through increased water flows and decreased water temperature as a result of the retention of cold water flows from Sweetwater Springs (the most significant cold water refugia in the lower Clearwater Basin) in stream. As discussed in Chapter 2, under the Proposed Action, BIA and NPT intend to maintain all LOP structures and facilities in place consistent with current configuration. However, post-transfer operations could be conducted in a manner designed to maximize beneficial impacts to natural resources, including water quality, within the Sweetwater Creek and Webb Creek drainages. Captain John Creek would also realize a similar benefit to water quality from the increase flows. Since post-transfer flows in the basin are anticipated to reflect a more natural hydrograph, improvements to water quality as a result of improved sediment transport and decreased water temperature are expected. Water temperature in Mann Lake (Reservoir A) could be expected to increase as a result of higher temperature groundwater being conveyed and stored in the reservoir. Sediment and nutrient levels would be expected to decrease as a result of using groundwater to fill Mann Lake instead of surface diversions. Temperature increases, sediment decreases, and nutrient decreases are discussed in Section 3.9, Fisheries. Other potential impacts due to this anticipated temperature increase are discussed in other sections.

Environmental Commitments

Erosion control measures would be implemented where construction activity could result in stormwater discharges to surface water. Equipment would not operate in-stream and all re-fueling of equipment would occur in uplands away from surface water. All construction equipment would be maintained in proper working order and maintained according to manufacturer's instructions. All fluid leaks would be repaired immediately.

Cumulative Impacts

Improved water temperature in Sweetwater and Lapwai Creeks would interact beneficially with streamside shading improvements associated with the Lapwai Creek restoration activities by NPT and NPSWCD. Therefore, beneficial cumulative impacts are anticipated from implementation of Alternative B.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Short-term Impacts Implementation of environmental commitments described above would avoid short-term impacts to water quality under Alternative C.

Long-term Impacts This alternative would have the same effects on surface water quality as those described in the Proposed Action. The principal difference between this Alternative and the Proposed Action is that this alternative cannot be incrementally staged. With the Clearwater River as the primary source of irrigation water, water temperature in Mann Lake (Reservoir A) would not be expected to increase under Alternative C.

Environmental Commitments

Environmental commitments would be the same as proposed under the Proposed Action.

Cumulative Impacts

Cumulative impacts would be the same as under the Proposed Action.

3.5 Water Rights

This section supplies the background information and a description of the study conducted for water rights.

3.5.1 Study and Analysis Methodology

The primary source of information for this analysis was from IDWR online water rights database.

3.5.2 Affected Environment

The State of Idaho regulates waters of the state. The NPT regulates and administers tribal water rights within the Nez Perce Reservation. Idaho constitution and laws declare to be public waters all the waters of the state when flowing in their natural channels, including the waters of all natural springs and lakes within the boundaries of the state, and ground waters of the state. The State of Idaho can issue private water rights for the diversion and use of public waters. In this case, a water right is considered a real property right. The constitution and statutes of the State of Idaho protect private property rights, including water rights (Idaho Code §42-2601 through 42-2608). Currently, Reclamation holds title to water rights associated with the LOP, which LOID utilizes to divert and convey surface water collected within the LOP by LOP facilities, to the respective point of use within LOID. A summary of Reclamation water rights is provided in Table 3-2.

Table 3-2. Reclamation Water Right Summary

SRBA Water Right No	Source	Water Right and Beneficial Use - Area	Water Right and Beneficial Use - Type
85-02146	Webb Creek for storage in Soldiers Meadow Lake	2000 ac-ft per year (afy) storage	Irrigation and municipal
85-02147	Capt John Creek for storage Soldiers Meadow Lake	6.3 cfs 2,000 (afy)	Irrigation and municipal
85-02049	Lake Waha	10 cfs (combined with No. 84-2063 may not exceed 10 cfs)	Irrigation and municipal
85-02063	Lake Waha	10 cfs	Irrigation and municipal
85-15424	Lake Waha	3,497.5 afy storage	Irrigation and municipal
85-11087	Lake Waha from West Fork Sweetwater Creek	20 cfs	Irrigation and municipal
85-00016	Sweetwater Creek	55 cfs natural flow diversion to storage	Irrigation and municipal
85-04483	Sweetwater Creek to be diverted into Sweetwater Canal for storage in Mann Lake	10,500 ac-ft storage	8,000 irrigation storage 1,000 stockwater storage 1,500 municipal storage
85-2065	Webb Creek	19 cfs	Irrigation and municipal

LOID has applied for a new water right for groundwater. This new right would provide LOID the water required to replace the LOP system. A summary of the State of Idaho water rights is provided in Table 3-3. The summary is limited to the groundwater water rights associated with the LOP. The LOID has additional water rights that are not associated with the exchange project.

Table 3-3. Water Right Summary

Idaho Water Right No.	Owner	Source	Priority Date	Use	Diversion Rate [a]	Place of Use
85-15755	LOID	Groundwater	May 8, 2014	Municipal	18 cfs	LOID Service area

Conditions of Approval:

This right is intended to replace the use of existing surface water rights 85-16, 85-2049, 85-2063, 85-2065, 85-2146, 85-2147, 85-4483, 85-11087, and 85-15424 within LOID over time. Concurrent with this replacement effort, the existing surface water rights may be changed to other purposes of use or places of use, subject to approval by the Department within the appropriate statutory process. Meanwhile, for use within LOID, this right when combined with the existing surface water rights shall not exceed a total diversion rate of 110.30 cfs or a total storage volume of 19,306.0 ac-ft.

Wells constructed after February 12, 2015, as points of diversion for this right shall be designed to appropriate water exclusively from the regional aquifer found in the Grande Ronde formation.

Proof of Beneficial Use Date: August 1, 2019.

Notes:
[a] Additional permitted beneficial uses are detailed in the water right back file provided in Appendix D. The IDWR placed additional conditions of approval on this right. For the full list, see the water right back file provided in Appendix D.

3.5.3 Environmental Consequences

Methods and Criteria

Water rights records and data were used to evaluate effects to existing water rights for the project.

Impacts on water rights would be considered significant if project implementation is expected to result in water users not being able to fulfill their water rights due to project operations.

Alternative A – No Action

There would no short- or long-term impacts to water rights under the No Action Alternative, given no action would result in no changes to existing LOP water rights.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts No short-term impacts to water rights are anticipated under Alternative B, given the water right transfer is anticipated to result in water users being able to fulfill their water rights. The development of the well field would provide an alternate water source to satisfy LOID water demands. As the well field is developed, surface water would be incrementally exchanged for ground water on a one-to-one basis. The water exchange is based on the development of a groundwater supply system capable of delivering 8,500 ac-ft annually to the LOID service area. The LOID applied for a water permit from IDWR consistent with this concept. The IDWR issued a permit for the project on July 18, 2014 with a priority date of May 8, 2014 (Table 3-3). The permit includes 8,500 ac-ft for municipal use annually within the LOID service area. The application includes an additional storage right in Mann Lake (Reservoir A) in a quantity of 3,043 ac-ft, based on reservoir size plus seepage and evaporation. The 3,043 ac-ft storage right would have an alternative permitted use for fire protection. The total diversion rate in the LOID water permit is 18 cfs. The application and permit have been publicly supported by the NPT, Reclamation, IDFG, and IDEQ.

Long-term Impacts Because the surface water rights for the LOP would be replaced with water rights associated with groundwater, there would be no adverse effect on LOID water users. Conversely, LOID may be able to supply a greater quantity of water each irrigation season than is currently available, thereby effectively satisfying their obligations to LOID patrons. Currently, water delivery is limited due to climatic conditions and a full supply is not available most years. The LOID has rarely been able to deliver a full allocation to each patron over the entire irrigation season. One of the negotiated elements of the proposed water exchange is that sufficient groundwater would be developed to meet the 8,500 ac-ft of annual use, which is the full amount under contract with Reclamation and the same as LOID's total water right. Idaho Code 43-1830 requires LOID to hold an election seeking approval from the majority of its patrons to authorize the title transfer interest in the LOP storage rights. A new water permit application would be submitted to IDWR by LOID. As ground water wells come online, diversion of surface water from the LOP would be reduced in an amount equal to an agreed upon in-lieu water exchange quantity, to be left instream through the Idaho State Water Bank for instream flows. As part of this transfer, at project completion LOP water rights would be transferred from Reclamation to BIA in trust for NPT. An additional long-term beneficial effect of Alternative B is that SRBA-decreed

'B-Stream' minimum flow water rights in the lower Lapwai Creek watershed and Sweetwater Creek watershed would be more likely to be met and fulfilled under a completed water exchange and resulting elimination of LOID water diversions from the Sweetwater Creek watershed.

There are no senior water rights downstream of the Action Area that would be adversely affected by the change in water rights source.

Environmental Commitments

No environmental commitments are required.

Cumulative Impacts

No additional projects utilizing groundwater or surface water have been identified. Therefore, this alternative is not anticipated to contribute to cumulative effects related to known past, present, or reasonably foreseeable actions impacting this resource.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Short-term Impacts Short term impacts would be the same as those described for the Proposed Action with the exception that the new water source would be Clearwater River water instead of groundwater.

Long-term Impacts Because the current surface water rights for the LOP would be replaced with water pumped from the Clearwater River, there would be no adverse effect on LOID water users. Water pumped from the Clearwater River would be sufficient to meet the 8,500 ac-ft of annual use, which is the full amount under contract with Reclamation and the same as LOID's total water right. The water right transfer would be the same as described for Alternative B.

There are no senior water rights downstream of the Action Area that would be affected by the change in water rights source.

Environmental Commitments

No environmental commitments are required.

Cumulative Impacts

No additional projects utilizing groundwater or surface water have been identified. Therefore, this alternative is not anticipated to contribute to cumulative effects related to known past, present, or reasonably foreseeable actions impacting this resource.

3.6 Land Use

Land use classifications characterize the natural and/or human activities that occur at, or are planned for, a given location. Comprehensive plans and zoning regulate the type and extent of land uses allowable in specific areas. Land use impacts typically result from actions that negatively affect or displace an existing use.

3.6.1 Study and Analysis Methodology

The following resources were used to characterize the land-use affected environment:

- Existing project-related maps
- Online aerial photography
- City of Lewiston Zoning Map
- City of Lewiston Comprehensive Plan
- Nez Perce County Zoning Map
- Nez Perce County Comprehensive Plan

3.6.2 Affected Environment

This section generally describes the existing land uses in the Action Area. It also lists the relevant goals for the applicable comprehensive plans.

The Action Area consists of a series of combined diversion, conveyance, and storage structures located on Sweetwater, Webb, and Captain John Creeks – all within the Lapwai Creek and Captain John Creek watersheds predominantly located within Nez Perce County. Elevations range from approximately 1,500 to 4,600 feet. The area consists of timbered ridges, mountain plateaus, deep canyons, and fertile benches. Lands are owned and managed by a variety of entities, including the NPT, Bureau of Land Management (BLM), Reclamation, Idaho Department of Lands, and private interests. NPT ownership includes lands held in trust by the U.S. for NPT, lands held in fee by NPT, and lands held by individual NPT members, both in fee and in trust. The lower portions of the Action Area give way to fertile benches where dry-land farming occurs. Agricultural lands are generally used for grazing and crop production.

The LOID service area is located within the city limits of Lewiston and unincorporated Nez Perce County. Land use within LOID consists of a mixture of residential, agricultural, industrial, commercial, public, and municipal uses. Urban development is located in and near Lewiston.

The Alternative B well field would include 10 parcels of approximately 82 acres in the southern portion of the City of Lewiston (Figure 2-3). Currently, LOID owns 1 of the 10 parcels. The parcel owned by LOID (approximately 3.3 acres) includes a well that was constructed in 2014 and began operation in 2015, as described in Chapter 2. A driveway from 10th Street provides access to the parcel. The parcel is zoned Agricultural Transitional (F2) and Suburban Residential (R1) per the *City of Lewiston Zoning Map* (City of Lewiston, 2013). The purpose of the Agricultural Transitional Zone is to provide a transition zone from agricultural land uses to residential land use within the city limits where centralized water and sewer are not available. The purpose of the Suburban Residential Zone is to provide for agricultural or transitional area for suburban residential uses. Utilities within these zones are considered conditional uses.

Private landowners own the other nine parcels, which are undeveloped agricultural land or natural land, including a perennial creek that flows east to west. Access for agricultural production is provided from 10th Street. The parcels are zoned Agricultural Transitional (F2) and Suburban Residential (R1) per the *City of Lewiston Zoning Map* (City of Lewiston, 2013). Adjacent land uses include single-family residential to the east and north, and agricultural to the west and south.

The *City of Lewiston Comprehensive Plan* is the official policy guide for the 20-year vision for the City of Lewiston. The primary goal of the land use element of the comprehensive plan is to: "To promote orderly development and arrangement of land uses throughout the community; provide ample space for future growth, ensure the compatibility of adjacent land uses and follow sound environmental planning principals" (City of Lewiston, 1999). The comprehensive plan designates the well field parcels for residential use.

The Alternative C Pump Plant would be located in unincorporated Nez Perce County. The Pump Plant would be located on land adjacent to the Clearwater River zoned Agricultural (AG-20) per the *Nez Perce County Zoning Map* (Nez Perce County, 1998). The existing land use is undeveloped. Mill Road provides access to the location. The purpose of the AG-20 zone is to maintain important agricultural uses and areas considered suitable for open space, watershed protection, and wildlife habitat. Public and utility uses are considered a conditional use.

The pipeline from the Pump Plant to Mann Lake (Reservoir A) would be located in the Agricultural (AG-20) and Residential (RR and R-1) zones per the *Nez Perce County Zoning Map* (Nez Perce County, 1998). The purpose of the Residential zones is to provide opportunities for residential development near employment, shopping, and city services (RR), and to encourage clustering of medium density residential uses in neighborhood nodes that allow for more efficient provision, use and maintenance of public infrastructure, and services while promoting more efficient use of land (R-1).

The pipeline would be located on property boundaries or existing right-of-way and follows Beaver Grade, Reservation Line Road, and Lapwai Road. Existing land uses include undeveloped land, and rural residential and agricultural uses where not located within transportation rights-of-way.

The *Nez Perce County Comprehensive Plan* is the official policy guide for the 20-year vision for Nez Perce County. Land-use goals include the following:

- To arrange land uses so that they are orderly, convenient, and suitably related to each other and to their natural settings.
- To retain a strong agricultural land-use base to support the agrarian economy and protect the rural character of Nez Perce County.
- To provide for areas for human habitation and commercial activity in ways that would restrain urban sprawl, protect the human and natural environment, and insure adequate support by public facilities.

The comprehensive plan also includes one goal statement related to public services: to provide essential public service facilities and utilities that effectively meet current and future needs (Nez Perce County, 1998).

3.6.3 Environmental Consequences

This section describes the environmental effects on land uses and ownership at, and in, the vicinity of the project area.

Methods and Criteria

Online aerial photography (Google Maps, 2016) of the Action Area and the description of alternatives in Chapter 2 was used to determine how land use within the Action Area would change for each alternative during construction and operations. The applicable comprehensive plan was also reviewed to determine if alternatives would be consistent with the plan. Current annual water shortages would be assumed to continue with the No Action Alternative.

Impacts on land use would be considered significant if land use changes resulted in land uses incompatible with the City of Lewiston or Nez Perce County zoning and comprehensive plans.

Alternative A – No Action

No construction would occur under Alternative A and, therefore, there would be no short-term impact on land use from construction activities.

Because this alternative presents a continuation of current conditions associated with the existing water supply and conveyance system, LOID's ability to maintain reliable delivery while balancing system needs would continue to be difficult. If water becomes unavailable, irrigated urban farms may be forced out of production (long-term fallowing) and residential/industrial uses may be curtailed until another water source or delivery option is developed or a less water intensive crop is planted – which would result in an indirect change in land use. In addition, any future actions by LOID to address large-scale rehabilitation and replacement of facilities could impact land uses adjacent to facilities. Potential land use effects would be addressed during environmental review and permitting for these future actions. These effects, while disruptive to local residents, would not be considered significant.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Alternative B would require short-term construction activities for the construction of each well and would permanently remove land from agricultural use. Land disturbed during construction and not required for operations and management would revert to its existing use during operations. The following sections describe short-term and long-term impacts in more detail.

Short-term Impacts Alternative B would construct a well field on 10 parcels located within the City of Lewiston (Figure 1-3). The well field would be constructed incrementally as funding becomes available. Limited duration construction activities would occur during the approximately 3 years needed to complete the entire process, including permitting for each well. Construction of each well would temporarily generate construction traffic from 10th Street for an unknown period within the 3-year timeframe; as well as noise, dust, and vibration from onsite construction activities. These construction activities would not result in land use effects to adjacent parcels or land use patterns of the surrounding area, because of the short duration of the construction period and because construction activities would be confined to the 10 parcels for well field development. Construction would directly impact the existing land use of the well field parcels during construction. These temporary effects would not be significant.

Long-term Impacts

Well Field Operations The LOID would acquire land from up to 10 parcels (approximately 82 acres) zoned Agricultural Transition (F2) and Suburban Residential (R1) for well field development. Because these parcels would be dedicated to a well field, they would be permanently removed from agricultural production. These lands also would be removed from the available supply of land for future residential development within the city of Lewiston. The *City of Lewiston Zoning Map* and *City of Lewiston Comprehensive Plan* (City of Lewiston, 2013 and 1999) identify other undeveloped and under-developed areas within city limits for future development. Therefore, the city of Lewiston could accommodate future growth in other areas within city limits.

Each well would introduce a new use to the parcels where they are developed. This change in land use from agricultural land to a well field would represent a direct impact on land use.

Well operation would not impact land uses of adjacent parcels or change land-use patterns in the surrounding area. The most proximate existing structures to any proposed wells would be approximately 45 feet (from a residential structure at the southeast corner of the proposed well field) and approximately 40 feet (from a standalone garage at the northeast corner of the proposed well field). Therefore, well operation would not introduce an incompatible land use to the area. For these reasons, Alternative B would have no indirect land use effects.

Alternative B would not interfere with the primary land use goal of the *City of Lewiston Comprehensive Plan*. By providing a new water source to LOID customers, Alternative B would support existing and future land uses within LOID, including City of Lewiston water users. Therefore, Alternative B would be consistent with the comprehensive plan.

LOP Facilities during Well Field Development Under Alternative B, land management practices surrounding LOP facilities would continue into the future consistent with past practices. During the well field-development process, LOID would continue to operate and maintain the LOP consistent with current and past practices. Current access opportunities and system maintenance would continue. Additionally, Reclamation and LOID would continue to administer use agreements consistent with past actions. These actions would not change the existing land use. For these reasons, Alternative B would have no land-use impact on LOP facilities during well field development.

Section 2.3 of Chapter 2 describes the specific features of the LOP and their disposition, as well as water exchange associated with Alternative B after well field development is completed. After title transfer, LOID and BIA would continue to manage their respective LOP features and assets. For LOID retained property, management would be consistent with past actions. The BIA and NPT would operate facilities primarily for restoration of natural resources, designated critical habitat, and ESA-Listed A-run Steelhead, but this action would not change the existing land use surrounding these facilities. For these reasons, Alternative B would not have a land use impact during the title transfer and agreement process.

If, through successive years of use, BIA and NPT identify elements of the LOP surface diversion and conveyance system that are not necessary to meet objectives, then the respective feature would be either retired in place or restored to natural conditions, which would change the existing land use. However, these changes would be expected to have negligible land-use effects because the retirement or conversion to natural conditions would be consistent with Lapwai Basin restoration objectives. This activity would change the existing land use to more natural conditions and be consistent with restoration objectives. Therefore, the land use impact would be low.

Environmental Commitments

After project construction is complete, areas with construction disturbance that are not needed for operation and maintenance would be restored to its pre-construction condition.

Cumulative Impacts

There are no anticipated large changes in land use with Proposed Action B. Therefore, it is not anticipated that effects to land use from this alternative would contribute to additional cumulative land use impacts related to past, present, or reasonably foreseeable actions impacting this resource,

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Alternative C would construct a pumping plant and pipeline that would not change land use during construction, but would temporarily impact activities related to the existing land uses. Land disturbed during pipeline construction would remain in its existing use during operations. The following sections describe short-term and long-term impacts in more detail.

Short-term Impacts Alternative C would require acquisition of land rights to the Pump Plant site (fee title) and pipeline route (easements or right-of-way).

Construction of a new pump plant on the Clearwater River, northwest of Mann Lake (Reservoir A) in unincorporated Nez Perce County, would require approximately 12 months and would temporarily generate construction traffic on Mill Road, and noise and dust from onsite construction activities. These construction activities would not result in land use impacts to adjacent parcels because of the short duration of the construction period and because construction activities would be confined to the area for the Pump Plant construction. Construction would not directly impact the land uses of adjacent parcels or land-use patterns of the surrounding area. All land disturbed during construction not permanently part of the Pump Plant or needed for operations and management would be restored to preconstruction condition.

Alternative C would also construct a pipeline of approximately 6.6 miles in length between Mann Lake (Reservoir A) and the Pump Plant on the Clearwater River, as shown in Figure 2-5. Construction activities would generate construction traffic on roadways in the vicinity of the alignment, and noise and dust during the construction period. These activities would be limited to the construction period and would not permanently change land use.

The pipeline could be co-located with existing right-of-way subject to existing easements for approximately 5.4 miles along Beaver Grade, Reservation Line Road, and Lapwai Road. These roadways would remain open during construction. Therefore, it is likely that this portion of the pipeline would avoid direct impacts to land use during construction.

The remainder of the pipeline route (approximately 1.2 miles) would not be within an existing public right-of-way; instead, the pipeline would run through the area between Mann Lake (Reservoir A) and Beaver Grade and the area between Lapwai Road and the Pump Plant, as described below

- Between Mann Lake (Reservoir A) and Beaver Grade, the pipeline would be constructed on one parcel zoned AG-20 (less than 0.1 mile)
- Between Lapwai Road and Flyby Drive, the pipeline would be constructed to follow parcel boundaries zoned R-1 (approximately 0.35 mile).
- Between Flyby Drive and the Pump Plant, the pipeline would be constructed on parcels zoned R-1 and AG-20 (approximately 0.75 mile).

In these areas, construction of Alternative C may require taking agricultural lands along the pipeline alignment out of production during construction, depending on the timing of the construction; this action would represent a direct impact on land use during construction. This impact would be short-term and limited to the construction period; therefore, the impact would be minimal.

Long-term Impacts

Pump Plant and Pipeline Operations. Operations of the Pump Plant would change land use after construction. This change in land use from undeveloped land along the Clearwater River to a pump plant would represent a direct impact on land use. Because this area of land would be dedicated to a pump plant, it would be removed from the supply of agricultural land within Nez Perce County.

Pump plant operation would not impact land uses of adjacent parcels, or change land use patterns in the surrounding area. The Pump Plant would operate more than 0.25 mile from the nearest residence; therefore, operation would not introduce an incompatible land use to the area. For these reasons, the Pump Plant would have no indirect land use impacts.

The pipeline would have no direct or indirect impacts on land use during operation, as land disturbed from pipeline construction would return to its pre-construction land use.

Alternative C would be consistent with the *Nez Perce County Comprehensive Plan* (Nez Perce County, 1998) to protect agricultural land uses. By providing a more reliable water source to LOID customers, Alternative C would support existing and future land uses within LOID. Therefore, Alternative C would be consistent with the *Nez Perce County Comprehensive Plan* and zoning regulations.

LOP Facilities during Pump Plant Operations. The conversion from the current surface system to the pump-plant system would trigger the transfer of water rights and title to LOP assets. As with Alternative B, after title transfer, LOID and the BIA would continue to manage their respective LOP features and assets. For LOID retained property, management would be consistent with past actions. The BIA and NPT would operate facilities primarily for restoration of natural resources, designated critical habitat, and ESA-Listed A-run Steelhead, but this action would not change the existing land use surrounding these facilities.

If, through successive years of use, BIA and NPT identify elements of the LOP surface diversion and conveyance system that are not necessary to maintain stream flows sufficient to benefit natural resources, maximize designated critical habitat, and for ESA Listed A-run steelhead within the Lapwai Basin, then the respective feature would be either retired in place or restored to natural conditions, which would change the existing land use. However, these changes would be expected to have negligible land use impact because the retirement or conversion to natural conditions would be consistent with Lapwai Basin restoration objectives. This activity would change the existing land use to more natural conditions and be consistent with restoration objectives. Therefore, the land use impact would be low.

Environmental Commitments

The following environmental commitments would be made to minimize the impacts to land use from construction:

- After project construction is complete, areas with construction disturbance not needed for operation and maintenance would be restored to its pre-construction condition
- Pipeline construction disturbance would be limited to 100 feet in width to minimize the amount of land that would be impacted during construction; and disturbance would be minimized within the 100-foot disturbance area
- Work with property owners to avoid access disruptions during pipeline construction
- Compensate landowners at fair market value for any temporary lost agricultural production from pipeline construction

Cumulative Impacts

There are no anticipated large changes in land use with Alternative C. Therefore, it is not anticipated that effects to land use from this alternative would contribute to additional cumulative land use impacts related to past, present, or reasonably foreseeable actions impacting this resource.

3.7 Recreation

This section provides an overview of existing recreation resources and use patterns found within the Action Area.

3.7.1 Study and Analysis Methodology

The primary sources of information for this resource consisted of the *Lapwai Creek Watershed, Idaho Ecosystem Restoration Concepts – Final Report* (USACE, 2013); a 2012 draft annual report developed by IDFG entitled *Fishery Management Annual Report: Clearwater Region* (IDFG, 2015a); the Reclamation Pacific Northwest Region website for recreation (www.usbr.gov/pn/recreation/index.html) (Reclamation, 2015); figures supplied by Reclamation and Google Earth; and Reclamation and IDFG staff input.

The Action Area for recreation resources consists of the project footprint and areas, and existing facilities that would be altered by the project. The project footprint for recreation includes the proposed pipeline corridor rights-of-way, well locations, pumping stations, project reservoirs, creeks, and other associated project-related infrastructure owned by LOID.

3.7.2 Affected Environment

Recreation within the Action Area consists primarily of lake-oriented activities that occur at the three project-related bodies of water described below. The proximity of these bodies of water to Lewiston (9 miles to Mann Lake [Reservoir A], 19 miles to Lake Waha, and 26 miles to Soldiers Meadow Reservoir) make them relatively popular resources for lake-based recreation, particularly fishing. Soldier Meadows Reservoir, Lake Waha, and Mann Lake (Reservoir A) are representative of many lakes/reservoirs in Idaho and the Pacific Northwest relative to the fish species they support. Species in these reservoirs include cold water and warm water fish (IDFG, 2013). Kokanee salmon and rainbow trout are important and sought out cold-water game fish in these waters. Warm-water species present in these lakes include largemouth bass, smallmouth bass, bluegill, yellow perch, brown bullhead and channel catfish. Smallmouth bass may also be found in the Clearwater River. Compared to lake-oriented recreation, the other types of recreational activities that occur in upland areas of the Action Area are more dispersed and wide-spread. These activities include hunting (some of which may be aided by the presence of canal access roads), all-terrain vehicle (ATV) riding on local roads and a hillside area adjacent to Soldiers Meadow Reservoir (which may by unsanctioned), fishing in creeks in the general Action Area, wildlife viewing, and photography.

Soldiers Meadow Reservoir

The approximately 1-mile long, 2,370 acre-feet of storage, Solder Meadow Reservoir has approximately 3.7 miles of shoreline, some of which is adjacent to Reclamation-managed land, and the rest is adjacent to private land (USACE, 2013). Recreational facilities at the reservoir include a concrete boat ramp (one lane), a dock for boat launching and fishing, restrooms, handicapped facilities, and parking. These facilities are managed by IDFG. The reservoir typically reaches maximum elevations in late May or early June. Water usually begins to be released for irrigation and to meet the 2010 BiOp minimum flows in June or July (with the highest releases occurring in July and August). These releases result in fluctuations in water level of up to 30 feet to occur at the reservoir. The fluctuations can result in the boat ramp and docks not being usable at low elevations (Dupont, 2015).

Recreational activities at the reservoir include boating (motorized boating that does not exceed trolling speed is allowed), fishing (from boats and reservoir banks), other water sports, and picnicking (Public Lands Interpretive Association, 2015). The draft IDFG 2012 annual report included an angler opinion survey of Soldier Meadow Reservoir (IDFG, 2015a). The survey found that 63.1 percent of the people surveyed were visiting the reservoir primarily to fish, 17.8 percent primarily to camp, 6.2 percent primarily to picnic, and 12.9 percent for other reasons (IDFG, 2015a). According to the survey, most anglers targeted any fish 53.8 percent of the time and rainbow trout 30.1 percent. Other fish that were targeted include black crappie, yellow perch, or other. The IDFG draft report estimated that 4,636 angling trips were taken to the reservoir in 2003 and 2,494 in 2011. The draft IDFG 2012 annual report also contained estimates of the number of fish caught at Solders Meadow Reservoir every 6 years between 1993 and 2012 (IDFG, 2015a). The estimates indicate a range of angling success; 22,385 fish caught in 1993, 10,702 fish caught in 1999, 16,161 fish caught in 2005, and 10,042 fish caught in 2012. The IDFG angler survey reported that the anglers rated their fishing experience at Soldiers Meadow Reservoir as good (38 percent), fair and poor (22 percent each), and excellent (18 percent).

Although not part of the reservoir or its shoreline, hillsides above the west side of the reservoir that are accessed via 575 Road are used by ATVs (which has caused scarring and damage). West of the reservoir is 65,000 acres of state land managed by IDFG where activities such as hunting, hiking, and wildlife viewing occur. The NPT owns 30,000 acres of land south of the reservoir.

Lake Waha

Lake Waha has approximately 4,808 acre-feet of storage. The lake is 0.8 mile in length and has approximately 3-miles of shoreline, most of which is adjacent to private land. Recreational activities include boating, fishing (from boats and the lake's bank), other water sports, picnicking, and camping (Public Lands Interpretive Association, 2015). Lake Waha's recreational facilities are managed by IDFG and are concentrated along the lakes northwest shoreline. They include a concrete boat ramp (one lane), a floating dock used for boat launching and fishing, restrooms, Americans with Disabilities Act facilities, camp sites, and parking. The LOID tries to minimize the drawdown of Lake Waha as much as possible (for operational reasons), which also provides benefits to recreational access to the lake.

The draft IDFG 2012 annual report disclosed that 70.1 percent of people surveyed were visiting Lake Waha primarily to fish, with the rest reporting other reasons (IDFG, 2015a). According to the angler survey described in the annual report, Lake Waha anglers targeted any fish 46.2 percent of the time and rainbow trout 38.7 percent. Other targeted fish included bass and other, which would include various warm water species, such as yellow perch, bass, etc. The IDFG estimated that 741 angling trips were taken to the reservoir in 2003 and 1,665 in 2011. The angler survey found that anglers rated their fishing experience at Lake Waha in the following order: good (30.4 percent), fair (28.4 percent), excellent (26.5 percent), and poor (14.7 percent).

Mann Lake (Reservoir A)

The 139 surface-acre Mann Lake (Reservoir A) is located within the Nez Perce Reservation and is surrounded by rolling terrain used for agricultural production. The reservoir is approximately 0.7 miles long and has approximately 3 miles of shoreline that is adjacent to private land. Mann Lake (Reservoir A) typically fills in May or June, and is allowed to draft significantly in July and August to maintain as much storage as possible higher in the system at Soldiers Meadow Reservoir and Lake Waha. These fluctuations can compromise use of recreational facilities (use of the boat ramp) when the reservoir is at its lowest elevations.

The reservoir's recreational facilities support day use activities and include a restroom, parking area, two-lane concrete boat ramp with a dock. Recreational activities include boating and fishing from the dock, boats, and banks. This reservoir receives the most recreational use of the three bodies of water that are evaluated. Unlike Soldiers Meadow Reservoir and Lake Waha, the draft IDFG 2012 annual report noted increases in use at Mann Lake (Reservoir A) from 2003 and 2011 (IDFG, 2015a). It was estimated the reservoir received 6,733 angling trips in 2003 and 8,554 in 2011. A more level reservoir elevation (wet water year) may account for the increase in use. According to the draft IDFG 2012 annual report's angler survey, 51.8 percent of the people surveyed reported fishing as the reason they were visiting Mann Lake (Reservoir A), followed by other (36.7 percent), bird watching (8.3 percent), and picnicking (3.2 percent). When asked what fish they were targeting, anglers responded with: any fish (37.9 percent), rainbow trout (32.6 percent), crappie (14.1 percent), bass (12.6 percent), other (1.6 percent), and bluegill (0.9 percent). The fishing experience at Mann Lake (Reservoir A) was rated by angers as follows: good (40.4 percent), excellent (25.6 percent), fair (25.5 percent), and poor (25.5 percent).

Mann Lake (Reservoir A) also is a well-known birding destination that supports a variety of different birds (raptors, shorebirds, song birds, upland birds, water birds, and waterfowl) during year and is a highlighted location on the Idaho Birding Trail (IDFG, 2016b).

Creeks, Diversion/Canals, and Access Roads

As currently configured, the project transfers water between creeks, and from creeks to reservoirs via pipelines, pumps, and canals. The creeks affected by water diversions are Captain Johns Creek (west of the Captain John Diversion), Webb Creek (between the Webb Creek Diversion and confluence with Sweetwater Creek), West Fork Sweetwater Creek (between West Fork Sweetwater and Sweetwater Diversion), Sweetwater Creek (between the Sweetwater Diversion and Lapwai Creek), and Lapwai Creek from the confluence with Sweetwater to the confluence with the Clearwater River. The one creek that receives water from other creeks before emptying into a canal is the portion of Webb Creek (including Soldier's Meadow Reservoir) between the Captain John Diversion and Soldiers Meadow Reservoir. Recreation along this creek is limited upstream of Soldiers Meadow Reservoir due to limited spring flow, and no flow the majority of the year.

The diversions, canals, and associated access roads are not open to public access. The exception to this is the road leading into and around Mann Lake.

Hereth Park

The 17 acre LOID property on Powers Avenue contains the LOID headquarters and maintenance facilities and Hereth Park. The park is operated and maintained by the City of Lewiston and contains facilities, including a playground, restrooms, large picnic shelter, parking, and ballfield (Hereth Field).

Well Field

The location for the proposed well field the vicinity of Tammany Creek Road does not contain developed recreation resources.

3.7.3 Environmental Consequences

This section describes the environmental effects on recreation at and in the vicinity of the project area.

Methods and Criteria

Impacts to recreation were qualitatively evaluated by assessing two factors.

- The first factor assessed was how the alternatives would physically change access to, and use of, recreational resources found within the Action Area.
- The second factor assessed was how the transfer of management responsibilities of recreation resources would change their use. Impacts to recreation would be considered important and adverse if project implementation eliminated, or significantly reduced, the use of recreational resources at the three reservoirs evaluated in this EA or at recreational resources in the Action Area.

Alternative A – No Action

Current conditions would continue under the Alternative A and due to reservoir elevation fluctuations, managing reservoirs for recreational fishing would continue to be a short-term and long-term challenge. There would be no short-term impacts related to construction. Recreational facilities and use patterns likely would not change with Alternative A for activities such as reservoir boating and fishing, creek fishing, hunting, and wildlife viewing/photography.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts There would be no short-term construction-related impacts to recreation at the reservoirs, lake, or Hereth Park because there would be no construction activities at these locations. There would be beneficial short-term effects to recreation at Soldier Meadow Reservoir and Lake Waha because water elevations would have less fluctuation.

Long-term Impacts The following examines the long-term impacts of Alternative B on recreation associated with reservoirs and lakes; creeks, diversion reaches, canals, and access roads; and Hereth Park.

Reservoirs and Lakes Under Alternative B for Soldiers Meadow Reservoir, public access following title transfer would be consistent with current opportunities. Current IDFG fishing seasons and rules would continue to apply to non-tribal fishers at Soldiers Meadow Reservoir. The BIA and the NPT would pursue a cooperative fisheries management agreement with IDFG. No time table has been established to complete this agreement. Alternative B would have a greater effect on recreation at reservoirs and Lake Waha than the No Action Alternative. With this alternative, changes in the operation of Soldiers Meadow Reservoir and Lake Waha would result in less reservoir level fluctuation and higher pool elevations in the summer than what occurs with the baseline condition. As a result, the boat launch ramps and dock would be usable more frequently with Alternative B compared to the baseline condition. It is likely that more stable reservoir elevations also would benefit fish populations at Soldiers Meadow Reservoir and Lake Waha, which would be expected to improve angling success. Operations at Mann Lake (Reservoir A) with Alternative B would not greatly differ from baseline operations in terms of allowing access to, and use of, recreation facilities.

Lake Waha would be operated as a natural lake, which would alter historic operational conditions at the lake depending on the water year. In most years, Lake Waha would not fill as high it has under the baseline condition, but the pool elevation would not fluctuate as much as it does, compared to the baseline condition. As a result, the boat launch ramps and dock would be usable more frequently with Alternative B compared to the baseline condition. The more stable in pool elevation compared to the baseline condition, may improve fish populations and fishing success. Public access opportunities following title transfer would be consistent with current and past opportunities. IDFG would continue to manage the recreational activities and facilities consistent with current management practices.

Mann Lake (Reservoir A) would be filled using a network of wells that would pump groundwater on demand to maintain storage and meet water use demand. Filling the reservoir from pumped groundwater would result in more fluctuation than in the past. The LOID would plan on beginning to pump to the reservoir in January to save both water and money. Under the Proposed Action, the reservoir would be heavily used for storage and would fluctuate more than current operations typically allow, dropping at times to existing low pool elevations or lower.

The water temperature of Mann Lake (Reservoir A) also would likely increase due to the higher temperature of groundwater compared to surface water, but sediment and nutrient input would be reduced. The reduction in sediment and nutrient may reduce the algae blooms currently seen under current conditions. This would likely result in a shift in fish species in the reservoir to a more warm-water fishery. The higher water temperature also may extend the fishing season because the water would stay warmer longer into the winter. Overall, Alternative B would result in small changes to the recreational use of Mann Lake (Reservoir A) compared to the baseline condition, but would not adversely affect the lake. In addition, higher water temperatures would be of benefit to some bird species, particularly in the winter, if the higher temperatures delay or prevent the freezing of the reservoirs surface.

Following title transfer, real property interests would transfer to BIA in trust for NPT and any unneeded easements would be relinquished. Public access following title transfer would be consistent with current opportunities. The NPT’s fishing seasons and rules are anticipated to be similar to IDFG seasons and rules. IDFG’s fishing licenses would continue to be valid for non-tribal fishers at Mann Lake. The BIA and the NPT would pursue a cooperative fisheries management agreement with IDFG. Additionally, BIA and LOID would enter into a long-term operation and maintenance agreement for Mann Lake. No time table has been established to complete this agreement

Creeks, Diversion /Canals, and Access Roads The fish population would be expected to increase with additional flows passing through the portions of Sweetwater Creek, the West Fork of Sweetwater Creek, Webb Creek (in which flows had been diverted in the baseline condition), and Lapwai Creek. Correspondingly, it can be assumed that there would be an increase of some degree in angling activity along these and other segments of the four creeks. Public use of the access road to and along Mann Lake would remain consistent with current opportunities.

Hereth Park Alternative B would have no effect on Hereth Park.

Well Field The establishment of a well field the vicinity of Tammany Creek would have no effect of recreation resources.

Environmental Commitments

No environmental commitments are proposed.

Cumulative Impacts

Recreational opportunities would not change under Alternative B. Therefore, this alternative is not anticipated to contribute to cumulative effects related to known past, present, or reasonably foreseeable actions impacting this resource.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Short-term Impacts Short-term impacts associated with noise from construction of the Pump Plant near the Clearwater River would be experienced by recreationists passing the site on the Clearwater River. These temporary impacts would not be significant. All other short-term impacts of Alternative C would be the same as those identified for Alternative B.

Long-term Impacts

Reservoirs and Lakes The short-term impacts of Alternative C would be the same as those identified for Alternative B.

Creeks, Diversions, Canals, and Access Roads The short-term impacts of Alternative C would be the same as those identified for Alternative B.

Hereth Park Alternative C would have no effect on Hereth Park.

Well Field The establishment of a well field the vicinity of Tammany Creek would have no effect of recreation resources.

Pumping Plant With Alternative C, the Pump Plant near the Clearwater River would create noise that would be heard (when in operation) by recreationists passing the site on the Clearwater River.

Environmental Commitments

No environmental commitments are proposed.

Cumulative Impacts

Recreational opportunities would not change under Alternative C. Therefore, this alternative is not anticipated to contribute to cumulative effects related to known past, present, or reasonably foreseeable actions impacting this resource.

3.8 Vegetation and Wetlands

This section describes existing vegetation resources, including wetlands and State of Idaho-listed sensitive species that occur, or could potentially occur, within the project area. Any federally-listed T&E species are addressed in Section 3.11.

3.8.1 Study and Analysis Methodology

The primary source of information for this analysis includes the *Draft Clearwater Subbasin Assessment* (Ecovista, et al., 2003), the *Lapwai Creek Watershed Ecological Restoration Strategy* (Richardson, et al., 2009), and observations from a site visit performed August 5 through 7, 2015. These documents address lands within the Clearwater River watershed, and the Lapwai Creek Watershed, which falls within the Clearwater River Subbasin. The Action Area falls entirely within the Clearwater Subbasin, and partially within the Lapwai Creek Watershed. Information pertaining to aquatic resources (wetlands and waterways) is from National Wetlands Inventory (NWI) (USFWS, 2015a) and National Hydrography Dataset (USGS, 2015). The site visit was conducted to observe existing conditions at the existing diversions, reservoirs, and canals, and at the proposed well sites and pipeline routes.

3.8.2 Affected Environment

The Action Area has a high degree of topographic complexity, with elevation ranging from approximately 1,200 feet in the northwest section to 5,300 feet in the southeast. The northwestern portion consists of rolling plains and hills, and is dominated by urban centers and intensive crop production. Elevation increases towards the southeastern half, where mountainous areas are used for grazing. Major drainages in the Action Area include the Clearwater River, Sweetwater Creek, Lapwai Creek, Webb Creek, and Captain John Creek. Reservoirs within the Action Area include Mann Lake (Reservoir A), Soldiers Meadow Reservoir, and Lake Waha.

Most of the land suitable for farming within the Action Area has been converted to dryland or irrigated agricultural land. Approximately 104,186 acres within the Action Area are used for farming. The primary crops include alfalfa, winter wheat, and rape seed, among others. Bunchgrass communities are relegated to canyon walls and other areas unfit for farming; some of these areas are grazed. Canyon areas occupy approximately 85,120 acres. Forested areas also have been impacted; most areas are second-growth. Forested areas occupy 62,484 acres. Riparian areas border most of the waterways in the Action Area, covering approximately 1,053 acres. Noxious and invasive weed cover has increased with disturbance to the native plant community. Common non-native species include cheatgrass (*Bromus tectorum*), yellow starthistle *(Centaurea solstitialis*), and Russian thistle (*Salsola tragus*). The remaining 16,876 acres in the Action Area are developed. Vegetation in developed areas consists of manicured lawns and ornamental trees.

Historically, forested areas at higher elevations were composed of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). Understory plants included oceanspray (Holodiscus discolor), ninebark (*Physocarpus malvaceus*), and serviceberry (*Amelanchier alnifolia*). Native bunchgrasses, such as Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*), were dominant components of upland and canyon land areas. Northern slopes throughout the area had shrubby vegetation including snowberry (*Symphoricarpos spp*.), black hawthorn (*Crataegus douglasii*), and rose (*Rosa spp*.).

Aquatic resources mapped within the Action Area include palustrine emergent wetlands (PEM), palustrine forested-scrub-shrub (PFO-PSS) wetlands, lakes, rivers, and ponds (Figure 3-1) (USFWS, 2015a). Aquatic resources identified within the Action Area are described below.

The palustrine system is defined as all non-tidal wetlands dominated by trees, shrubs, persistent emergent vegetation, emergent mosses, or lichens. This particular system was developed to group the vegetated wetlands traditionally called by names such as marsh, swamp, bog, fen, and pond (Cowardin et al., 1979). Two classes of palustrine wetlands are identified in the Action Area (PEM and PSS-PFO wetlands). PEM wetlands are dominated by emergent vegetation and contain less than 30 percent cover from shrubs or tree layers (Cowardin et al., 1979). The PFO-PSS wetlands include a combined layer of woody shrub and tree layers meeting a 30 percent cover minimum (Cowardin et al., 1979).

The PEM are the most common wetland type found within the Action Area, 2,066 acres (USFWS, 2015a). Emergent wetlands within the Action Area that are predominantly seasonally flooded have been identified within agricultural fields and include historic drainages, adjacent to natural watercourses, along canal alignments, and associated irrigation seeps. The majority of the PEM wetlands are found at the headwaters of natural watercourses in the undeveloped southeastern portion of the Action Area. The PEM vegetation of this region commonly includes redtop (*Agrostis alba*), sedge species (*Carex* spp.), potentilla (*Cinquefoil* spp.), rush (*Juncus* spp.), reed canarygrass (*Phalaris arundinacea*), timothy (*Phleum pratense*), bulrush (*Scirpus* spp.), cattail (*Typha* sp.), and false hellebore (*Veratrum viride*) (USFWS, 1998).

Scrub-shrub/forested wetlands in the Action Area, 433 acres (USFWS, 2015a), may commonly contain red osier dogwood (*Cornus stolonifera*), hawthorn (*Crataegus* spp.), woods rose (*Rosa woodsia*), and willow (*Salix* spp.) in the shrub layer. Red alder (*Alnus rubra*), cottonwood (*Populus deltoides*), aspen (*Populus tremuloides*), and willow are common in the forested layer. Scrub-shrub and forested wetland are located along streams were soils are temporarily flooded.

Ponds, 129 acres, (USFWS, 2015a) and lakes, 3,436 acres including reservoirs (USFWS, 2015a) do not contain a predominance of vegetative cover and are typically associated with surface water impoundments, including irrigation infrastructure, golf courses, and other predominantly man-made features. These features (as mapped by NWI) provide a variety of ecological functions, including the opportunity to improve water quality, hydrologic function, and wildlife habitat. Wetlands and other aquatic resources have the opportunity to improve water quality based on vegetation cover, soil type, and presence of ponding or inundation that retard or reduce the amount of pollutants and sediments potentially entering receiving surface water features. High hydrologic function reduces flooding and stream erosion where aquatic resources retain and delay flood events through surface water storage during wet periods. These aquatic resources also reduce flooding and erosion to downstream property and receiving aquatic resources. Wildlife habitat function considers if an aquatic resource has the potential to provide habitat based on vegetation cover and structure, surface water presence, richness of plant species, interspersion of habitats, and special habitat features and buffers.

State Listed Plants

The IDFG maintains geographic information system databases concerning occurrences of rare and sensitive plant species throughout Idaho. Rankings for these plants are based on distribution and population levels, and range from S1 to S4, with S1 being critically imperiled and S4 being apparently secure. The 13 state-listed special status plants located in Action Area with ranks of S1 or S2 (IDFG, 2016b) are shown in Table 3-4.

The Plant Element Occurrence Database prepared by IDFG's Idaho Fish and Wildlife Information System (IFWIS) follows the NatureServe ranking system for occurrences of rare and sensitive species. This system classifies occurrences by the time since the last confirmed siting of the species in question (Hammerson, et al., 2008). Historical occurrences lack recent field verification of species presence; that is, within the past 40 years. Occurrences categorized as current have been verified within the recent past.

3.8.3 Environmental Consequences

The quality of an area's vegetation is an important factor in determining the suitability of wildlife habitat. Vegetation provides forage and cover for birds and wildlife, and can be an indicator of an area's overall ecological integrity. Wildlife habitat and wetlands, including riparian areas, also support water quality and hydrologic functions. These functions include all processes necessary for the self-maintenance of the wetland ecosystem, such as primary production and nutrient cycling.

Table 3-4. State Listed Plant Species that May Occur within Action Area, Including Information on Habitat and Known Locations

Common Name	Scientific Name	State Rank [a]	Habitat	Recent Occurrence within Action Area [b] (X = Yes)
Green-band Mariposa Lily	*Calochortus macrocarpus* var. *maculosus*	S2	Undisturbed dry habitats in rocky, basaltic substrates on hillsides, rock outcrops, cliff bands, and grasslands on steep slopes [c]	X
Palouse Thistle	*Cirsium brevifolium*	S2	In open grasslands and grassy areas (roadsides) rarely extending far into forest or shrublands [d]	X
Idaho Hawksbeard	*Crepis bakeri* ssp. *idahoensis*	S2	In canyon grasslands and on dry mountain slopes [c]	X
Salmon-flower Desert-parsley	*Lomatium salmoniflorum*	S2	Open rocky slopes near Clearwater River [e]	X
Spacious Monkeyflower	*Mimulus ampliatus*	S1	Seepy grasslands and roadcuts, and in basalt outcrops [d]	X
Stalk-leaved Monkeyflower	*Mimulus patulus*	S1	Moist banks of streams and ditches [f]	
Holzinger's Orthotrichum Moss	*Orthotrichum holzingeri*	S1	In dry, rocky, mountain habitats [d]	
Palouse Goldenweed	*Pyrrocoma liatriformis*	S2	Palouse grasslands and transition zones between ponderosa pine and prairies [c]	X
Wolf's Currant	*Ribes wolfii*	S2	Moist woods and meadows [f]	X
Spalding's Silene	*Silene spaldingii*	S1	Open mesic grassland and sagebrush-steppe communities [g]	X
Purple Thick-leaved Thelypody	*Thelypodium laciniatum* var. *streptanthoides*	S2	Rock crevices, cliffs, rocky outcrops, among boulders, serpentine rock, talus, canyon walls, and limestone ledges [h]	X
Douglas' Clover	*Trifolium douglasii*	S2	Moist to wet open meadows, forested wetlands, and stream banks [c]	X
Plumed Clover	*Trifolium plumosum* ssp. *amplifolium*	S2	Dry hillsides to meadowlands [e]	

Notes:

[a] S1 = Critically imperiled: at very high risk of extinction because of extreme rarity (often five or fewer populations), very steep declines, or other factors
S2 = Imperiled: at high risk of extinction or elimination because of very restricted range, very few populations, steep declines, or other factors
[b] Recent = Presence confirmed within the past 40 years (Hammerson, et al. 2008)
[c] WDNR, 2013
[d] NatureServe, 2015
[e] Hitchcock and Cronquist, 1973
[f] Morin, 2009
[g] USFWS, 2007
[h] Al-Shebaz, 2010

Methods and Criteria

Impacts to vegetation and wetlands were quantitatively evaluated. Impacts on vegetation resources would be considered significant if project implementation reduced overall native vegetation resources through increased introduction of invasive species, particularly of legally noxious weeds and/or cheatgrass; and/or reduced habitat availability and function for wildlife habitat, especially breeding bird habitat, as a result of reduction in riparian forested and/or shrub habitat.

Impacts on wetland resources would be considered significant if project implementation is expected to reduce wetland acres through direct impact, including fill, excavation, or hydrologic influence that alters the wetland hydrology that supports existing wetland resources.

The approximate acreages of land that would be impacted are detailed in Table 3-5. Areas within the footprint of each alternative were assigned to one of the following land cover types: agricultural land, canyonland, developed, disturbed, lake, PEM wetland, riparian fringe, riverine, and road right-of-way. Canyonland refers to steeply sloped areas found throughout the Action Area. Developed land includes yards, roads, and other areas near buildings. Disturbed land refers to the area of nonnative vegetation surrounding Mann Lake (Reservoir A). Road right-of-way refers to a 15-foot-wide buffer along roadsides that is maintained by the county highway department.

Temporary impacts include pipeline installation. Permanent impacts include the well field from Alternative B and the Pump Plant along the Clearwater River and outflow at Mann Lake (Reservoir A) from Alternative C. For temporary pipeline impacts, acreages were calculated by multiplying the length of the pipeline crossing each land cover type by 100 feet, which is the width of the proposed construction corridor. The well field is composed of agricultural land and canyon land. Wells would be drilled only on agricultural land, not canyon land. As such, well field impacts were determined by measuring the area of agricultural land that would be disturbed in the proposed well field. Pump Plant impacts were determined by overlaying the land cover type map with the plant's footprint (1.00 acre). There are no potential impacts to special-status plant species.

Table 3-5. Summary of Impacts to Each Land Cover Type by Alternatives (in acres)

Land Cover Type	Alternative A Temporary	Alternative A Permanent	Alternative B Temporary	Alternative B Permanent	Alternative C Temporary	Alternative C Permanent
Agricultural Land	0	0	0	86.52	57.09	0
Canyonland	0	0	0	0	5.53	0
Developed	0	0	0	0	6.44	0
Disturbed	0	0	0	0	0.44	0.47
Lake	0	0	0	0	0.21	0
PEM Wetland	0	0	0	0	0.44	0.44
Riparian Fringe	0	0	0	0	0.22	0.21
Riverine	0	0	0	0	0	0.32
Road Right-of-way	0	0	0	0	9.65	0
Total	**0**	**0**	**0**	**86.52**	**80.02**	**1.44**

Alternative A – No Action

Short-term Impacts No short-term impacts to vegetation or wetlands are expected under Alternative A. The pilot well has already been drilled and any short-term effects have been mitigated. Effects to vegetation as a result of the pilot well becoming functional would be long-term.

Long-term Impacts Under Alternative A, instream flows could potentially increase as water pumped through the pilot well reduces water demands from the creeks. These increases in flow are anticipated to have beneficial long-term effects to wetland resources at Sweetwater Creek and Webb Creek. Wetland communities along these natural watercourses could potentially expand due to increased surface flows. There would be no permanent loss of riparian and wetland vegetation along Sweetwater Canal, as this canal will remain in operation. Any long-term effects on vegetation and wetland resources would be nonsignificant.

Cumulative Impacts

The NPSWCD and NPT are actively working to rehabilitate several portions of Lapwai, Sweetwater, and Webb Creeks. These efforts would benefit from the increased flows and more natural hydrograph when upstream diversions cease. Therefore, beneficial cumulative effects to this resource under this alternative are anticipated. This alternative would not be anticipated to contribute to any adverse cumulative effects related to known past, present or reasonably foreseeable actions impacting this resource.

Alternative B – Well Field Construction, Full Groundwater Exchange and Title Transfer (Proposed Action)

Alternative B would have short-term and long-term impacts on the vegetation within the project area. Wetlands are expected to be beneficially permanently affected within the Action Area.

Short-term Impacts No short-term impacts to vegetation or wetlands are expected under Alternative B. Effects to vegetation as a result of well field construction would be long-term. Well construction located on upper bluffs would not affect wetland resources because no wetland resources have been mapped or are expected to be present in this area. Any aquatic resources located within, and adjacent to, the existing LOID conveyance system would not be impacted in the short term. Aquatic resources associated with Sweetwater Creek, Sweetwater Canal, Lapwai Creek, and other natural and constructed watercourses are expected to recover as water is incrementally added.

Long-term Impacts Under Alternative B, long-term V to vegetation would include the permanent removal of vegetation from 82 acres in the well field. This area already is in agricultural production and would present no net loss of native vegetation.

Long term effects to wetlands under Alternative B would include the permanent die-off of riparian and wetland vegetation associated with irrigation water leaks adjacent to the Sweetwater Canal. Beneficial long-term effects to wetland resources are expected at Sweetwater Creek, Webb Creek, and Lapwai Creek. Beneficial long-term effects include expanded wetland communities along these natural watercourses due to increased surface water flows. Under Alternative B, surface water would not be diverted from the natural watercourses and into the Sweetwater Canal. As a result, surface water flows would increase in total volume and duration, reflecting a more natural hydrograph that includes seasonal flooding of adjacent wetland and riparian areas. Increased surface water volume within the natural watercourse systems of Sweetwater Creek, Webb Creek, and downstream Lapwai Creek has the potential to expand riparian and wetland acreage adjacent to these natural systems. The permanent loss of riparian and wetland vegetation along Sweetwater Canal would be offset by increases in these habitats along Sweetwater, Webb, and Lapwai Creeks.

Environmental Commitments

Prior to construction, weed control would be implemented on all ground being disturbed by this project. This would include the removal of noxious weeds via chemical and mechanical means. The revegetation of all disturbed areas immediately after construction would minimize open ground where weeds could germinate. Constraints to keep the public from driving onto reseeded areas would be incorporated into the project design.

Prior to entering the worksite and after work is finished, all vehicles would be power-washed to minimize the spread of noxious weeds. All weeds germinating on reseeded or revegetated construction sites would be controlled using an approved herbicide. A dye would be placed in the weed control slurry so that spray radius could be seen by both the sprayer and LOID. Spraying would include a dripless wand method so that spray would not be accidently dripped on unintended vegetation.

Natural restoration of riparian and wetland areas along watercourses (Sweetwater Creek, Webb Creek, and Lapwai Creek) where flow would be restored to a natural hydrograph would serve as mitigation for the loss of riparian and wetland vegetation along canals that no longer receive flow. An overall increase in riparian and wetland acreage in the lower Lapwai Creek and the Sweetwater Creek watershed is expected is expected.

Cumulative Impacts

Cumulative impacts under Alternative B would be similar to those described in Alternative A, but would occur at a larger scale. More water would be consistently left in the system NPSWCD and NPT are actively working to rehabilitate several portions of Lapwai, Sweetwater, and Webb Creeks. These efforts would benefit from the increased flows and more natural hydrograph when upstream diversions cease. There would be no known adverse cumulative effects, but beneficial cumulative effects are expected.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Alternative C would have temporary and permanent effects on the vegetation and wetlands within the project area. Mitigation would be the same as under Alternative B.

Short-term Impacts Under Alternative C, short-term effects to vegetation and wetland vegetation would include disturbance to vegetation during pipeline construction; these areas total 80.02 acres. Areas not needed for operation and maintenance would be revegetated after the completion of construction with a mixture of native species, potentially including bluebunch wheatgrass, Sandberg bluegrass, and wetland seed mix. This would result in a net increase of native vegetation.

Short term wetland impacts are expected under Alternative C. Surface water intake construction at the Pump Plant on the Clearwater River would temporarily effect areas below the ordinary high water mark during construction. Aquatic resources associated with Sweetwater Creek, Sweetwater Canal, Lapwai Creek and other natural and constructed watercourses are not expected to be impacted in the short term.

Long-term Impacts Long-term effects to vegetation would total 1 acre. This would include the loss of 0.32 acres of riverine habitat and 0.21 acres of riparian habitat at the site of the pump house. The remaining 0.47 acres of the pump house footprint would impact disturbed land. In addition, 0.44 acres of PEM wetland habitat located along the proposed pipeline footprint would be permanently impacted due to disturbance during pipeline construction activities.

Beneficial long-term effects include expanded wetland communities along these natural watercourses due to increased surface water flows. Under Alternative B, surface water would not be diverted from the natural watercourses and into the Sweetwater Canal. As a result, surface water flows would increase in total volume and duration, reflecting a more natural hydrograph that includes seasonal flooding of adjacent wetland and riparian areas. Increased surface water volume within the natural watercourse systems of Sweetwater Creek, Webb Creek, and lower Lapwai Creek has the potential to expand riparian and wetland acreage adjacent to these natural systems.

The permanent loss of riverine, riparian, and PEM wetland habitat through construction of the pump house and pipeline would be offset by increases in these habitats along Sweetwater, Webb, and Lapwai Creeks.

Environmental Commitments

Environmental commitments are the same as described for the Proposed Action. Additionally, the site of the pump house would be situated to minimize disturbance to or avoid riverine and riparian habitat along the Clearwater River.

Cumulative Impacts

Cumulative impacts would be the same as described for the Proposed Action.

3.9 Fisheries

This section describes existing fish and aquatic resources, including State of Idaho-listed sensitive species that occur or could potentially occur within the project area. Any federally-listed T&E species are addressed on Section 3.11.

3.9.1 Study and Analysis Methodology

Sources of information for this analysis include the Clearwater Rapid Watershed Assessment (NRCS, 2006), Lapwai Creek Watershed Ecological Restoration Strategy (Richardson et al., 2009) IDFG Angler Guide (IDFG, 2013), and Fishes of Idaho (Simpson, 1982). A site visit was conducted from August 5 to 7, 2015.

The Action Area for fish and aquatic resources includes all waters that are affected by either the existing operation of LOID activities or by future water operations related to any of the action alternatives. Based on the location of water diversions and proposed operations, the Action Area for fish and aquatic resources is considered to include Soldier Meadows Reservoir, Lake Waha, and Mann Lake (Reservoir A). Additionally, the Action Area for fish and aquatic resources includes Captain John Creek (from the headwaters of the North Fork to its mouth); all portions of the Webb and Sweetwater Creek drainage systems where flows are currently altered; and Lapwai Creek from its confluence with Sweetwater Creek, downstream to the Clearwater River, and extending approximately 500 feet downstream (to account for effects associated with noise and sediment as a result of construction activities) of the proposed Clearwater pumping station (as described in Alternative C). Although these waters contribute flows to the Clearwater and Snake rivers and, ultimately the Columbia River, the effects of the alternatives on flow velocities and depths are considered negligible outside the Lapwai Creek and Captain John Creek drainages (NMFS, 2010). Therefore, the Snake and Clearwater rivers (downstream of the proposed pumping station) are not considered part of the Action Area for fish and aquatic resources addressed in this EA. The primary potential for adverse effects on to fish and aquatic resources is related to Alternative C and construction and operation of the proposed Pump Plant.

3.9.2 Affected Environment

With the exception of Captain John Creek (which discharges into the Snake River), the entire Action Area for fish and aquatic resources occurs within the greater Clearwater River watershed (which is recognized as Hydrologic Unit Code [HUC] 17060306). Soldiers Meadow Reservoir, Lake Waha, Sweetwater Creek, Webb Creek, and Lapwai Creek all belong to the Lapwai Creek Watershed, which lies within the Clearwater River HUC. Like most watersheds throughout the west, the Clearwater River system is influenced by hydroelectric development and receives return flows from irrigated agriculture, hatchery effluent, sewer treatment plant discharges, and natural spring flows.

Cold water biota and salmonid spawning are both designated as beneficial uses in the Action Area. Biological diversity of cold water biota in the lower Clearwater River has been reduced from historic conditions and is clearly stressed by water quality concerns surrounding temperature, nutrient loading, and sedimentation. In turn, salmonid spawning in Sweetwater and Lapwai Creeks, and the mainstem Clearwater River is reduced.

Aquatic biota that may occur in the Action Area include some T&E fish (addressed in Section 3.11, Threatened and Endangered Species), invertebrates, numerous exotic fish species, and a few remaining native species. Fish assemblages in the Action Area are indicative of both riverine and lake habitats.

Lapwai Creek provides habitat for a variety of resident and anadromous fish species. Fish observed include mottled sculpin (*Cottus bairdi*), redside shiner (*Richardsonius balteatus*), largescale sucker (*Catastomus macrocheilus*), bridgelip sucker (*Catostomus columbianus*), chiselmouth (*Acrocheilus alutaceus*), and speckled dace (*Rhinichthys osculus*) (Richardson et al., 2009). Salmonids documented in the Action Area include steelhead/rainbow trout (Oncorhynchus mykiss), Chinook salmon (*Oncorhynchus tshawytscha*), and coho salmon (*Oncorhynchus kisutch*). Kokanee salmon (*Oncorhynchus nerka*) are found in Lake Waha and Soldiers Meadow Reservoir (IDFG, 2013).

Soldiers Meadow Reservoir, Lake Waha, and Mann Lake (Reservoir A) are representative of many lakes/reservoirs in Idaho and the Pacific Northwest relative to their fish assemblages. Species in these systems include both cold water and warm water fish (IDFG, 2013). Kokanee salmon and rainbow trout are important and sought out cold water game fish in these waters. Warm-water species present in these lakes include largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), bluegill (*Lepomis macrochirus*), yellow perch (*Perca flavescens*), brown bullhead (*Ameiurus nebulosus*), and channel catfish (*Ictalurus punctatus*). Smallmouth bass may also be found in the Clearwater River.

More than 20 species of fish have been identified as having potential to occur in the area (Table 3-6). Westslope cutthroat trout (*Oncorhynchus clarki lewisi*), steelhead, Chinook salmon, bull trout (*Salvelinus confluentus*), sockeye salmon (*Oncorhynchus nerka*) and white sturgeon (*Acipenser transmontanus Richardson*) are recognized as state-sensitive fish species occurring in Nez Perce County, with statewide ranks of either S1, S2, or S3 (as determined by the IDFG IFWIS).

Table 3-6. Fish Species Potentially Occurring in the Project Area

Common Name	Scientific Name	Status
Largescale Sucker	*Catostomus macrochirus*	None
Bridgelip Sucker	*Catostomus columbianus*	None
Mottled Sculpin	*Cottus bairdi*	None
Paiute Sculpin Torrent Sculpin Chiselmouth	*Cottus beldingii* *Cottus rhotheus* *Acrocheilus alutaceus*	None None None
Westslope Cutthroat Trout	*Oncorhynchus clarki lewisi*	S3
Steelhead/Rainbow/Redband Trout	*Oncorhynchus mykiss*	S3/None
Coho Salmon Chinook Salmon	*Oncorhynchus kisutch* *Oncorhynchus tshawytscha*	None S1
Mountain Whitefish	*Prosopium williamsoni*	None
Sockeye/Kokanee Salmon Bull Trout White Sturgeon	*Oncorhynchus nerka* *Salvelinus confluentus* *Acipenser tranmontanus*	S1/S2 S3 S1
Speckled Dace	*Rhinichthys osculus*	None
Longnose Dace Redside Shiner	*Rhinichthys cataractae* *Richardsonius balteatus*	None None
Channel Catfish	*Ictalurus punctatus*	None
Brown Bullhead	*Ameiurus nebulosus*	None
Yellow Perch	*Perca flavescens*	None
Bluegill	*Lepomis macrochirus*	None
Smallmouth Bass	*Micropterus dolomieu*	None
Largemouth Bass	*Micropterus salmoides*	None
Pumpkinseed	*Lepomis gibbosus*	None

Notes:
None = No special status (not ranked as S3 or greater risk)

S1 = Critically imperiled: at high risk because of extreme rarity (often five or fewer occurrences), rapidly declining numbers, or other factors that make it particularly vulnerable to range-wide extinction or extirpation.

S2 = Imperiled: at risk because of restricted range, few populations (often 20 or fewer), rapidly declining numbers, or other factors that make it vulnerable to range-wide extinction or extirpation.

S3 = Vulnerable: at risk because of restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors that make it vulnerable to range-wide extinction or extirpation.

Additionally, two state-sensitive invertebrates are recognized as occurring in Nez Perce County: Columbia pebblesnail (*Fluminicola fuscus)* and shortface lanx (*Fisherola nuttalli).* With the exception of Chinook salmon and steelhead, no state sensitive species are likely to occur in the Action Area. Both of these species are addressed in greater detail in Section 3.11, Threatened and Endangered Species.

Historic and current land management activities, including construction of roads, mining, agriculture, timber harvest, grazing, residential development, and water management/withdrawal have degraded fish habitat in Sweetwater, Webb, Lapwai, and Captain John Creeks (NMFS, 2010). The lower Clearwater River and Lapwai Creek drainage now exhibit conditions characterized by reduced flows, degraded water quality, limited habitat, reduced quality of riparian cover and system disconnectivity (Ecovista et al. 2003). Lapwai Creek, Webb Creek, and the West Fork of Sweetwater Creek, are listed as impaired by the State of Idaho for temperature, sediment, and dissolved oxygen (Appendix E – Idaho State 1998 §303(d) List, EPA's 2000 Additions, and the total maximum daily load schedule, [Ecovista et al., 2003]). In short, habitat conditions (primarily related to lack of water) for fish and aquatic resources in the Action Area are severely degraded as compared to historic conditions and Sweetwater Creek, in particular, does not demonstrate ecological function that would support a self-sustaining fish population (NMFS, 2010). Additional information on aquatic baseline conditions may be found in Section 3.11, Threatened and Endangered Species.

3.9.3 Environmental Consequences

Many important fish species inhabit the Action Area and represent a beneficial recreational fishery for residents and area visitors. Fish and aquatic resources also are prey for wildlife in the area and are a key element to maintaining a properly functioning ecosystem, especially in an area of such intensive land use.

Methods and Criteria

Short or long-term adverse effects on fish and aquatic resources may result from a variety of factors related to construction activities. These include reduced or impaired water quality, habitat alteration, and displacement of individuals. Impacts to fish and other aquatic biota were qualitatively determined by evaluating the potential effects of proposed construction activities and considering the effects these may have on individual species, populations, and the habitats they occupy.

Impacts to fish and aquatic resources would be considered significant if project implementation would be expected to directly or indirectly reduce or increase existing populations.

Alternative A – No Action

Current conditions would continue under Alternative A. There would be no short-term effects to any fish and aquatic resources. There also would be no additional long-term effects to fish or aquatic resources resulting from Alternative A, other than those that occur under current conditions. Deleterious effects to species in waters of the Action Area resulting from water management and reduced flows in Sweetwater, Webb, Lapwai, and Captain John Creeks would remain consistent with baseline conditions, and the overall extent and quality of habitat for fish and aquatic resources, for the most part, would not change under Alternative A. Adverse effects related to habitat, water temperature, and passage would largely persist. However, beneficial effects to fish and aquatic resources (compared to previous conditions) may result over the long term from added flows left in Sweetwater Creek and Lapwai Creek when the pilot well comes online. This may include benefits to water quality, habitat, and connectivity. Although difficult to quantify, this is not anticipated to occur at a level that would be considered significant and existing effects on fish and aquatic resources would remain relatively consistent.

Environmental Commitments

No environmental commitments would be required under Alternative A.

Cumulative Impacts

Improved flows, resulting in increased aquatic habitat in Sweetwater and Lapwai Creek, would interact positively with other habitat restoration activities in Lapwai Creek by NPT and NPSWCD, and contribute to beneficial cumulative effects to this resource under Alternative A

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

No adverse effects to fish and aquatic resources in the Action Area would occur as a result of constructing Alternative B. Construction activities would occur away from all waters in the Action Area. In turn, there would be no direct, indirect, short-term or long-term adverse effects on to fish and aquatic resources as a result of noise from construction, habitat loss, reduced water quality, or any other element under Alternative B. However, long-term beneficial effects are anticipated as a result of increased flows. These increased flows will increase stream habitat, reduce stream temperature, and increase riparian habitat.

Short-term Impacts As wells come into full production, there will be less demand on the reservoirs and it is anticipated there will be less water fluctuation at Soldiers Meadow Reservoir and Lake Waha. The decrease in water fluctuation should have a positive effect on fisheries.

Long-term Impacts No long-term adverse effects on fish and aquatic resources would occur under Alternative B. Over the long-term, as flows are retained in Sweetwater and Webb Creeks, benefits to fish and aquatic resources in Sweetwater and Lapwai Creeks would be realized. Additional flows in Sweetwater Creek, West Fork Sweetwater Creek, Webb Creek, and lower Lapwai Creek would allow connectivity of the system. These flows would be anticipated to increase year round habitat availability and improve the riparian corridor. Flows are anticipated to reflect a more natural hydrograph (one that historically occurred in the system), which would contribute to improved sediment transport, decreased water temperature, and increased and improved rearing and spawning habitat. Improved habitat within the reach would be anticipated for all fish and aquatic resources.

An array of other ancillary benefits associated with a more naturally functioning hydrograph also would be anticipated to occur under Alternative B. The benefits of added flows in the system would be anticipated to extend to the confluence of Lapwai Creek and the Clearwater River. Increased temperatures would be anticipated to occur in Mann Lake (Reservoir A) as a result of higher temperature ground water being conveyed to the reservoir (see Section 3.4 for more detailed information on water quality as it relates to temperature). There would be a reduction in sediment and nutrient input from the groundwater supply versus the surface diversion. This could potentially reduce the algae blooms observed under current conditions. This would potentially shift the fishery in Mann Lake (Reservoir A) toward conditions more representative of a warm water fishery. Species such as bass, bluegill, and catfish may become more dominant. Cold water fishes, such as salmonids, would likely be adversely affected by the increase in temperatures and reduced habitat suitability. The fishery in Mann Lake (Reservoir A) under existing conditions is artificial in nature and managed as a put and take fishery where warm water species are already plentiful. The use of the lake as a recreational fishery would also be extended as it may not freeze over during the winter. Any impact to the fishery in Mann Lake (Reservoir A) as a result of increased temperatures (which could be considered adverse or beneficial) may be offset by the reduction in sediment and nutrients and would not be anticipated to occur at a level that would be considered significant. It is anticipated that management of waters in Soldier Meadows Reservoir and Lake Waha would be prioritized to provide unique cold water and year round habitat connectivity for designated critical habitat for ESA Listed A-run steelhead in Sweetwater, Webb Creeks, and lower Lapwai Creek. This shift in management strategies may retain higher pool levels in Soldier Meadows Reservoir and Lake Waha during the late spring and early summer; however, it would not be anticipated to deviate from existing conditions to the extent that it would measurably affect fish assemblages or populations in these water bodies. Any change to these assemblages and/or populations as a result of higher pool levels would be anticipated to be beneficial. Overall Alternative B would result in beneficial effects for fish and aquatic resources in the Action Area.

Environmental Commitments

No environmental commitments would be required under Alternative B.

Cumulative Impacts

Improved flows, resulting in increased aquatic habitat in Sweetwater and Lapwai Creek, would interact positively with other habitat restoration activities in Lapwai Creek by NPT and NPSWCD and contribute to beneficial cumulative effects to this resource under Alternative B (similar to Alternative A, but to a greater extent).

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

All short and long-term impacts to fish and aquatic resources related to Alternative C would be the same as identified for Alternative B (The Proposed Action). Beneficial effects to fish and aquatic resources in Sweetwater and Lapwai Creek would be the same. Additionally, effects to the Mann Lake (Reservoir A) fishery under Alternative C would be the same as described above for Alternative B. Nevertheless, the temperature increase would be less because water inputs would come from cooler waters in the Clearwater River as compared to groundwater extracted from the well station (under Alternative B). Additional effects to fish and aquatic resources that would occur under Alternative C are described below and related to the proposed Clearwater River Pump Station. In turn, mitigation measures for fish and aquatic resources also are identified under Alternative C.

Short-term Impacts Short-term effects associated with noise from construction would have the potential to deleteriously affect fish and aquatic resources in the Clearwater River as a result of construction of the pumping station and infrastructure. Fish in the mainstem may experience short-term habitat and water quality degradation resulting from disturbance of existing sediment in the project area. Fish in this environment also may experience temporary avoidance of migratory or rearing holding cover during construction activity because of noise and activity. Noise and degraded water quality above baseline conditions would not be anticipated to extend more than 500 feet downstream of the proposed pumping station. If realized, these effects would primarily affect juvenile fish that may be rearing near the water's edge and close to the pumping station during construction.

Short term degradation of water quality associated with the transfer of sediment into waterways would be minimized by using cofferdams and low-water work windows. Regardless of mitigation measures and methods implemented, small plumes of sediment would still likely be released during construction of the pump station (primarily in association with removal of cofferdams and re-watering). Other groundbreaking activities may have some potential for erosion in the short term; however, these effects would be minimized through the implementation of the mitigation measures described below. The new construction areas surrounding the pump station would be potential sources of sediment until they are revegetated and stabilized, but delivery to the river would be very limited because of planned revegetation and other mitigation measures to be implemented.

Aquatic organisms (including those identified as state sensitive) have the potential to be temporarily disturbed during construction. Application of best management practices and mitigation measures would minimize effects from sediment and dewatering/rewatering of the coffered area, but the physical action of working in the stream would still likely displace individual organisms. These organisms would be anticipated to return to the project area following cessation of construction activities. Short-term adverse effects to aquatic species (primarily in the form of displacement) may result in association with this alternative. Short-term effects to fish and aquatic resources would be minimal.

Long-term Impacts The short-term impacts surrounding sediment delivered to the river are not likely to be a cause of permanent decline in instream habitat quality. Long-term beneficial effects associated with construction of Alternative C would be the same as described under Alternative B. However, there would be additional long-term adverse effects related to the Pump Station and related infrastructure (such as screens) described below.

Under Alternative C, operation of the pumping station on the Clearwater River has the potential to result in long-term effects to fish and aquatic resources due to noise of operating the pumps. Mounting evidence indicates that anthropogenic noise can impact the behavior and physiology of at least some species in a range of taxa (Normandeau Associates Inc., 2012 and Popper and Hastings, 2009). Although sound generated from operation of the pumps may result in minor behavioral effects such as displacement of fish using the area, it would not be anticipated to occur at a level that would be significant. There should be no risk of impingement or entrainment of juvenile fish in the screening/pumping station because the design would be required to meet IDFG and NMFS specifications for T&E fish. Water quality in the Clearwater River would not be degraded over the long term under this alternative. The riparian vegetation that would be removed during construction of the pump station and support structure is negligible and does not provide any effective stream shade. As a result, this is not anticipated to affect temperature in the river. Disturbed areas would be restored to existing conditions. The structure proposed in association with construction of the pump station also would be amended by soils where possible. Disturbed lands would be seeded with a mixture of native grasses suitable for the site. Therefore, no long-term effects related to slope erosion would be anticipated under this alternative.

The footprint of the proposed pump station would alter bank composition from soils to concrete and riprap, but not to the extent that is anticipated to recognizably affect fish and other aquatic biota. Substrate composition and embeddedness would be minimally altered over the long term (in the pump station footprint) as a result of Alternative C, but not to the extent that it would be anticipated to adversely affect fish or other aquatic biota. Due to the nature and extent of these long-term effects, the effects would not be anticipated to occur at a level that would significantly impact fish and aquatic resources under Alternative C.

Environmental Commitments

Environmental commitments to minimize direct, indirect, short-term, and long-term impacts associated with this alternative (in addition to those identified in the project description above) are described in the following text. The following measures to minimize potential detrimental effects to water quality include erosion and sediment control, and methods to prevent deleterious materials associated with construction equipment from entering the water. To protect water quality from chemical contamination associated with construction, uncured concrete would not come in contact with flowing water; vehicles and other equipment would be refueled away from standing or flowing water in the Clearwater River; and spill containment equipment would be available during refueling. Thus, no affects from contaminants are anticipated.

No cumulative impacts to fish or other aquatic organisms are anticipated in association with this Alternative and, as a result, no environmental commitments to address cumulative impacts are required.

Guidelines that would be followed during construction of project features include:

Low-water Work Window All instream work in the Clearwater River relative to the project would be conducted during low-flow conditions. All instream construction activities would be completed within one work season.

Fish Avoidance With the exception of constructing and removing cofferdams, all construction activities for the pump station would be isolated from flowing water. Fish salvage required in association with cofferdams would be conducted by or under the direction of a fisheries biologist, using methods directed by the IDFG Scientific Collection Permit. All water intakes (pumps) used during project implementation would have a fish screen installed, operated, and maintained in accordance with IDFG and NMFS fish screen standards.

Erosion Control Measures

1. Minimize Site Preparation Impacts

   i. Site clearing, staging areas, access routes, and stockpile areas would be identified to minimize overall disturbance, minimize disturbance to riparian vegetation, and preclude sediment delivery to stream channels.

   ii. Silt fence, straw bales, straw wattles, or other sediment barriers would be placed around disturbed sites to prevent sediment from entering a stream directly or indirectly, including by way of roads and ditches.

2. Minimize Earthmoving-Related Erosion

   i. Ground-disturbing activities would be confined to the minimum area necessary to complete the project.

   ii. An onsite supply of erosion control materials (for example, silt fence and straw bales) would be used to respond to sediment emergencies. Sterile straw or weed-free, certified straw bales would be used to prevent introduction of noxious weeds.

   iii. All project operations would cease, except efforts to minimize storm or high-flow erosion, under precipitation and high-flow conditions that result in uncontrollable erosion in the construction area.

   iv. Sediment control measures would be installed prior to construction activities and would remain in place, until threats of erosion exceeding existing conditions cease. After this determination is made, all sediment control measures would be removed within 30 days and disposed of in accordance with all federal, state, and local laws and regulations.

3. Minimize Sedimentation through Dewatering

   i. Cofferdams would be placed along the bank of the Clearwater River and the area dewatered prior to any instream construction activity taking place.

   ii. Flow in the river would be diverted with a cofferdam constructed of non-erodible material, such as bladder bags, or other materials that divert water. Diversion dams would not be constructed with material mined from the stream or active floodplain. Material to be used (if needed) would come from a pre-approved borrow site outside of the active floodplain of the Clearwater River or other waters.

   iii. The temporary sumps (if required to keep the dewatered area dry during construction) would accommodate the predicted flow rate, relative to infiltration through the substrate during construction.

   iv. Any outflows would be placed in an area that minimizes or prevents damage to riparian vegetation.

   v. When necessary, water from the de-watered work area would be pumped to a temporary settling pond prior to water re-entering the stream channel.

Flow Reintroduction Cofferdams would not be removed until all poured concrete has cured. Prior to removing cofferdams in the river, the exposed substrate would be wetted and allowed to saturate while still isolated by downstream cofferdams. This would likely occur by allowing minimal flow to enter the isolated area. The construction site would be re-watered slowly to prevent the transport of excessive sediment downstream as the construction site streambed absorbs water, and to minimize a sudden increase in turbidity. Once substrate is fully saturated and waters have settled within the isolated coffered area, coffering would be removed to re-initiate unrestricted flow in the channel.

Site Rehabilitation Upon project completion, project-related waste would be removed. Rehabilitation of all disturbed areas would be conducted in a manner that results in conditions similar to pre-work conditions through spreading of stockpiled soil materials, seeding, and/or planting with native seed mixes or plants. If native stock is not available, soil-stabilizing vegetation (seed or plants) that does not lead to propagation of exotic species would be used.

   vi. Only approved herbicide application would occur as part of the action.

   vii. Trees would be retained at the project sites wherever possible. Instream or floodplain rehabilitation materials (if required) would mimic as much as possible those found in the project vicinity. Such materials may be salvaged from the project site or hauled in from offsite, and cannot be taken from streams, wetlands, or other sensitive areas.

viii. Site rehabilitation activities would be completed prior to the end of the construction field season.

Pollution Control Measures:

State Water Quality Guidelines and Clean Water Act

The CWA requires states to set water quality standards sufficient to protect designated and existing beneficial uses. In Idaho, "sediment shall not exceed quantities…which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Section 350" (IDAPA 58.01.02.200.08). In Idaho State Water Quality Standards for Aquatic Life (Section 250), "turbidity shall not exceed background turbidity by more than 50 nephelometric turbidity units instantaneously (at any point in time)" (IDAPA Idaho Code 58.01.02.350.01.a). In Section 350 (Rules Governing Nonpoint Source Activities), "best management practices should be designed, implemented, and maintained to provide full protection or maintenance of beneficial uses. Violations of water quality standards which occur in spite of implementation of best management practices would not be subject to enforcement action. However, if subsequent water quality monitoring and surveillance indicate water quality standards are not met due to nonpoint source impacts, even with the use of current best management practices, the practices would be evaluated and modified as necessary by the appropriate agencies in accordance with the provisions of the Administrative Procedures Act" (IDAPA 58.01.02.350.01.a).

Project actions would follow all substantive requirements of the CWA and provisions for maintenance of water quality standards under the jurisdiction of the IDEQ. Project activities would be in substantive compliance with all applicable state and federal laws and processes (for example, Section 404 permits).

Spill Prevention, Containment, and Reporting

All vehicles carrying fuel would have specific equipment and materials needed to contain or clean any incidental spills at the project site. Equipment and materials would be specific to the project site and would include a spill kit appropriately sized for specific quantities of fuel (absorbent pads, straw bales, containment structures and liners, and/or booms). Storing and refueling areas would be located away from streams in areas where a spill would not have the potential to reach live water. Containment structures would be used as appropriate to prevent spilled material from reaching live water. All pumps and generators used within the Clearwater River floodplain would have appropriate spill containment structures and/or absorbent pads in place during use.

Should quantities of stored fuel for the project exceed 1,320 gallons, LOID would be required to have a standard EPA-written Spill Prevention Control and Countermeasures (SPCC) Plan onsite that describes measures to prevent or reduce impacts from potential spills (for example, from fuel or hydraulic fluid) (40 Code of Federal Regulations 112, Oil Pollution Act relating to SPCC Plans).

The LOID would be required to prepare a written spill plan, also known as a Stormwater Pollution Prevention Plan (SWPPP). The plan would conform with National Pollutant Discharge Elimination System (NPDES) general permit requirements and contain a description of the specific hazardous materials, procedures, and spill containment that would be used, including inventory, storage, and handling.

Federal and Idaho state regulations regarding spills would be followed (see www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm). Any spills resulting in a detectable sheen on water would be reported to the EPA National Response Center (1-800-424-8802). Any spills over 25 gallons would be reported to the IDEQ (1-800-632-800), and cleanup would be initiated within 24 hours of the spill.

NPDES Construction General Permit

Compliance with a NPDES Construction General Permit (CGP) would prevent water quality impacts. EPA, Region 10, is the NPDES permitting authority for Idaho and is responsible for issuing NPDES stormwater permits (IDEQ does not have an EPA-approved NPDES program). Construction site operators engaged in clearing, grading, and excavating activities that disturb 1 acre or more are required to obtain coverage under an NPDES permit for their stormwater discharges. Coverage under the CGP would be necessary for stormwater management associated with construction activities (clearing, grading, and excavation) and requires an NOI and an SWPPP containing erosion control measures. Coverage under this permit is available only if stormwater discharges, allowable non-stormwater discharges, and stormwater discharge-related activities are not likely to jeopardize the continued existence of any species that are federally listed as endangered or threatened under the ESA or result in the adverse modification or destruction of habitat that is federally designated as critical under the ESA (critical habitat). This federally issued CGP triggers the requirement for ESA Review. The ESA Review requires informal consultation with the USFWS, or may trigger formal Section 7 Consultation between EPA and USFWS. This may result in the requirement for biological surveys to assess risk of federally listed species and mitigative action under Section 10 of the ESA. To be eligible for coverage under this permit, consultation must result in a no jeopardy opinion or a written concurrence by USFWS and/or NMFS on a finding that the stormwater discharge(s) and stormwater discharge-related activities are not likely to adversely affect listed species or critical habitat.

Coverage under the CGP does not trigger review under NEPA because the CGP does not regulate new sources (that is, dischargers subject to New Source Performance Standards under section 306 of the CWA). Therefore, Alternative C is statutorily exempted from NEPA. However, some construction activities might require review under NEPA for other reasons, such as federal funding or other federal involvement in the project.

Minimize Exposure to Heavy Equipment Fuel/Oil Leakage

Methods to minimize fuel/oil leakage from construction equipment into the stream channel would include the following:

i. All equipment used for instream work would be cleaned of external oil, grease, dirt and mud, and leaks repaired prior to arriving at the project site. All equipment would be inspected by the Contract Administrator before unloading at site. Any leaks or accumulations of grease would be corrected before entering streams or areas that drain directly to streams or wetlands. Equipment shall not have damaged hoses, fittings, lines, or tanks with the potential to release pollutants into any waterway.

ii. Equipment used for instream or riparian work would be fueled and serviced in an established staging area. When not in use, vehicles would be parked in the designated staging area. The staging area would be in an area that would not deliver fuel or oil, for example, to streams.

iii. Oil-absorbent floating booms and other equipment, such as absorbent pads appropriate for the size of the stream, would be available onsite during all phases of construction. Booms would be placed in a location that facilitates an immediate response to potential petroleum leakage.

iv. Vehicle staging, cleaning, maintenance, refueling, and fuel storage would occur as far as possible from any stream, waterbody, or wetland to minimize concerns associated with exposure to fuel and other fluids.

Aquatic Invasive Control Measures Many streams have invasive aquatic species such as the New Zealand Mudsnail and Whirling Disease. Many of these species are practically invisible to the naked eye and impossible to detect if attached to heavy equipment. To ensure that equipment is not contaminated, any visible plants, mud, and dirt would be removed at a predetermined decontamination area away from the Snake River or other waters.

Cumulative Impacts

Beneficial cumulative impacts to fish or other aquatic organisms would be the same as described under Alternative B (Proposed Action). Withdrawal of surface water from the Clearwater River under this alternative has the potential to contribute to minimal adverse cumulative effects related to known past, present, or reasonably foreseeable actions related to surface water use on the Clearwater River; however, it would not be anticipated to occur at a level that would measurably affect fisheries resources in the area.

3.10 Wildlife

This section describes existing wildlife resources that occur, or could potentially occur, within the project area, including State of Idaho sensitive species. Federally listed T&E species are addressed in Section 3.11.

3.10.1 Study and Analysis Methodology

The primary sources of information for this analysis include the Lapwai Creek Watershed Ecological Restoration Strategy (Richardson et. al, 2009) and IFWIS (IDFG, 2015b), and a site visit conducted from August 5 through 7, 2015.

3.10.2 Affected Environment

Wildlife use in the Action Area is directly related to habitat availability and suitability. As described in Section 3.8, habitats available include dryland and irrigated crops, evergreen and mixed forest, and grassland areas dominated in some areas by non-native grasses and forbs. Riparian habitat is concentrated primarily along Sweetwater and Webb Creeks and along the shores of the larger water bodies, and is vegetated with natives such as cottonwood, willow, birch (*Betula spp*.), and red-osier dogwood. Along drier, south facing slopes, these species have been displaced by non-native species to varying degrees. Aquatic habitats in the Action Area include wetlands delineated as PEM, PSS, PFO and open water. The PEM habitat is found along the shorelines of the Clearwater River, Mann Lake (Reservoir A), Lake Waha, and Soldiers Meadow Reservoir; to some extent along Sweetwater, Webb, and Lapwai Creeks; and the canals to varying degrees. It consists of low lying emergent vegetation, such as rushes and sedges, and provides some ground cover and refugia along the periphery of water bodies. PSS-PFO wetlands are found mainly along water courses and, depending on the extent of their connectivity, provide varying degrees of shrub and tree canopy cover.

Compared to historical conditions, wildlife diversity and abundance in the Action Area has decreased through reduction in native vegetation and plant structural diversity, altered land use, and watershed management activities. Despite this, the varied topography, diverse vegetation and abundant edge habitat throughout the basin continues to support a variety of wildlife species (Richardson et al., 2009).

Birds are the most common wildlife in the Action Area. Common upland game birds include grouse (*Tetraonina spp*.), wild turkey (*Meleagris gallopavo*), California quail (*Callipepla californica*), ring-necked pheasant (*Phasianus colchicu*), gray partridge (*Perdix perdix*), and mourning dove (*Zenaida macroura*) (Richardson et al., 2009). A variety of non-game species also utilize this area, including lazuli bunting (*Passerina amoena*), Bullock's oriel (*Icterus bullockii*), lark sparrow (*Chondestes grammacus*), western meadowlark (*Sturnella neglecta*), redwing blackbird (*Agelaius phoeniceus*), spotted sandpiper (*Actitis macularius*), red-eyed vireo (*Vireo olivaceus*), willow flycatcher (*Empidonax traillii*), yellow-breasted chat (*Icteria virens*) and many other passerines and raptors (Richardson et. al, 2009).

Federal agencies are required to protect migratory birds under the four Migratory Bird Treaty Act (MBTA) Conventions to which the U.S. is a signatory (Executive Order 13186). Many North American birds are considered migratory under one or more of the MBTA Conventions. There are likely migratory birds nesting in the Action Area including raptors, waterfowl, and songbirds. Around Mann Lake (Reservoir A), fall migration starts in early July with western sandpiper (*Calidris mauri*) and continues through late October. All grebes are possible in the fall and spring. Caspian terns (*Sterna caspia*) are regular residents in summer. Virginia (*Rallus limicola*) and Sora rails (*Porzana carolina*) can be found in the marshy areas. American white pelican (*Pelicanus erythrorhynchos*) can be found from March to May. All six swallow species found in Idaho, Say's phoebe (*Sayornis saya*), and Bewick's wren (*Thryomanes bewickii*) are known to occur in the area. Nesting northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*) also can be seen in the Action Area (IDFG, 2015b and 2016b). Osprey (*Pandion haliaetus*) and bald eagle (*Haliaeetus leucocephalus*) are regular winter visitors. Peregrine (*Falco peregrinus*), prairie falcons (*Falco mexicanus*), and merlin (*Falco columbarius*) can be present during shorebird migrations. Cooper's (*Accipiter cooperii*) and sharp-shinned hawks (*Accipiter striatus*) are year-round residents. Migrating and nesting waterfowl habitat is present in the Action Area (in and around the waterbodies of Mann Lake (Reservoir A), Soldiers Meadow Reservoir, and Lake Waha).

Mann Lake (Reservoir A) is a well-known birding destination and is a highlighted location on the Idaho Birding Trail (IDFG, 2015b and 2016b). A great number of shorebirds occur along the shores of Mann Lake (Reservoir A), including but not limited to great blue herons (*Ardea herodias*), American avocets (*Recurvirosta americana*), long-billed curlews (*Numenius americanus*), killdeer (*Charadrius vociferous*), and white-faced ibis (*Plegadis chihi*). In addition to shorebirds, it includes sightings for raptors, songbirds, upland birds, water birds, and waterfowl. More than 75 different species are recognized by IDFG as target species for this site. Although no specific surveys were conducted to document waterfowl (or other wildlife) in the Action Area, species most likely to use the area include mallards (*Anas platyrhynchos*), gadwalls (*A. strepera*), and cinnamon teal (*A. cyanoptera*); and also redheads (*Aythya americana*), ruddy ducks (*Oxyura jamaicensis*), pintails (*Anas acuta*), American wigeon (*Anas americana*), green-winged teal (*Anas crecca*), and northern shovelers (*Anas clypeata*). Other wintering waterfowl, including Canada geese (*Branta canadensis*) and tundra swans (*Cygnus columbianus*), have been documented.

Big game species found in this area include both white-tailed (*Odocoileus virginianus*) and mule deer (*Odocoileus hemionus*), elk (*Cervus canadenisis*), black bear (*Ursus americanus*), and mountain lion (*Puma concolor*). Upland and non-game species utilizing the area include terrestrial fur bearing mammals, such as red fox (*Vulpes vulpes*), coyote (*Canis latrans*), badger (*Taxidea taxus*), bobcat (*Lynx rufus*), and cottontail rabbit (*Sylvilagus floridanus*). Wetland and open water furbearers, such as beaver (*Castor Canadensis*), muskrat (*Ondatra zibethicus*) and mink (*Neovison vison*), also may be found throughout the waterways (Richardson et al., 2009). A variety of smaller mammals are also found throughout the Action Area.

Nez Perce County has a significant number of sensitive wildlife species identified by IDFG, including mammals, birds, amphibians, reptiles, and invertebrates. Table 3-7 identifies sensitive wildlife species for Nez Perce County (Richardson et. al, 2009). Many of these species have potential to occur in the Action Area. For more detailed information regarding federally listed T&E species, see Section 3.11.

Table 3-7. Sensitive Species Found in Nez Perce County

Common Name	Scientific Name
Mammals	
Pallid Bat	*Antrozous pallidus*
Townsend's Big-eared Bat	*Corynorhinus townsendii*
Spotted Bat	*Euderma maculatum*
Long-eared Myotis	*Myotis evotis*
Fringed Myotis	*Myotis thysanodes*
Long-legged Myotis	*Myotis volans*
Yuma Myotis	*Myotis yumanensis*
Western Pipistrelle	*Pipistrellus hesperus*
Merriam's Shrew	*Sorex merriami*
Lynx	*Lynx canadensis*
Birds	
Peregrine Falcon	*Falco peregrinus anatum*
Northern Pygmy-owl	*Glaucidium gnoma*
Bald Eagle	*Haliaeetus leucocephalus*
Mountain Quail	*Oreortyx pictus*
Flammulated Owl	*Otus flammeolus*
White-headed Woodpecker	*Picoides albolarvatus*
Pygmy Nuthatch	*Sitta pygmaea*
Great Gray Owl	*Strix nebulosa*
Reptiles and Amphibians	
Woodhouse's Toad	*Bufo woodhousii*
Ringneck Snake	*Diadophis punctatus*
Invertebrates	
Columbia Pebblesnail	*Fluminicola fuscus*
Shortface Lanx	*Fisherola nuttalli*

3.10.3 Environmental Consequences

Wildlife is found throughout the Action Area and is an important resource for ecological, recreational, and aesthetic purposes. Game species are pursued during recreational hunting seasons and bird watching is a popular activity where public access is permitted. Nesting habitat along Sweetwater and Webb Creeks, as well as the larger waterbodies (such as Mann Lake [Reservoir A]), and foraging habitat in agricultural fields provide an important resource to support migratory birds and the food chain above them.

Methods and Criteria

Wildlife impacts are directly related to vegetation (habitat) loss described in Section 3.8 and indirectly to construction-related activities, such as noise, vehicle collisions, and human presence. There is potential for special status wildlife species (noted in the table above) to occur in the Action Area; however, no long-term impacts are anticipated to special status wildlife species.

Impacts on wildlife would be considered significantly adverse if project implementation is expected to endanger the long-term viability of local or regional wildlife populations. Impacts on wildlife would be considered significantly beneficial if project implementation is expected to substantially increase the size or viability of local or regional wildlife populations.

Alternative A – No Action

Current conditions would continue under the Alternative A. No beneficial or adverse wildlife effects over the long-term resulting from Alternative A would occur. Wildlife habitat for nesting and foraging would remain consistent with baseline conditions and the overall extent and quality of habitat currently available for wildlife would not change under Alternative A.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts Temporary construction activity would result in indirect short-term wildlife effects as a result of noise and disturbance. Construction during spring and early summer has the potential to disrupt migratory bird nesting activity; however, this is not anticipated due to the degraded condition of areas where construction activity is proposed to occur. Sound would startle any nesting wildlife that may be near construction areas and has the potential to result in nest abandonment. Raptors are especially sensitive to human disturbance around nests. Mitigation measures would reduce this effect, but the potential for displacement of birds that would occur in the project area during construction does exist. Any effects to birds protected under the MBTA Conventions following the implementation of mitigation measures (see environmental commitments below) would be minimal and would not be anticipated to be significant. Noise associated with construction also has the potential to displace wildlife, other than birds, that may occur in the general vicinity during periods of construction. The extent of these effects would be short term and insignificant because the areas proposed to be disturbed by construction are degraded and do not currently provide much suitable habitat for wildlife.

No land would be cleared for construction of a pipeline under Alternative B because it would tie into an existing pipeline.

Construction activities would not be anticipated to result in any mortality of small mammals, reptiles, and amphibians (see environmental commitments below).

Additionally, due to the disturbed condition of areas to be impacted by construction activity, wildlife and vehicle collisions during construction are not likely or anticipated.

Long-term Impacts Minimal and marginal habitat occurs in the proposed well field or other areas that would be disturbed permanently during the construction of Alternative B. Approximately 82 acres of agricultural land would be permanently lost with construction of the well field and other infrastructure associated with Alternative B. This would be considered a less than significant impact given that the degraded state of the land to be converted provides no quality habitat for wildlife. Operation of the pumps at the well field would not be anticipated to measurably affect wildlife in the area because habitat is degraded and not suitable for breeding or foraging. Therefore, no measurable direct effects from ground disturbance under Alternative B would be anticipated for wildlife in the Action Area.

Patches of riparian vegetation that have evolved along the existing Sweetwater Irrigation Canal would die over time. This loss of vegetation would be associated with the incrementally reduced use of the canal. The habitat includes patches of herbaceous vegetation and scattered stands of cottonwood and willow trees. Trees are scattered and in clumps along the canal or downslope in areas that receive seeping water from the operation of the canal. Therefore, the removal of the trees would not disconnect any wildlife travel corridors. The nature of the herbaceous vegetation along the canal does not provide waterfowl or shorebird nesting habitat, although migratory birds could nest in the trees. The trees would be permanently lost; nevertheless, this would not be considered a significant impact given that the amount of riparian vegetation anticipated to be gained as a result of increased flows in Sweetwater Creek, Webb, and Lapwai Creeks would more than offset any potential short-term adverse effects

There is the possibility for avian and power line interaction on the electric transmission power poles constructed to supply power to the well pumps. Birds, especially raptors, use power poles for nesting and perching, resulting in an electrocution risk. Implementation of the guidelines to protect birds published by the Edison Electric Institute's, Avian Power Lines Interaction Committee (APLIC) would reduce this risk to non-significance (APLIC, 2006).

Long-term beneficial effects associated with Alternative B would be realized for wildlife utilizing Webb, Sweetwater, West Fork Sweetwater, and Lapwai Creeks. Under Alternative B, these creeks would receive additional flows and function more as perennial systems. They are anticipated to provide additional habitat quality and quantity for birds, mammals, reptiles, amphibians and invertebrates.

Additionally, availability of open water habitat for waterfowl, shorebirds, raptors, and other wildlife would increase temporally with the shift in water temperatures anticipated to occur at Mann's Lake. Higher temperature groundwater would be pumped in from the well field. In turn, it is anticipated the lake would not freeze over in the winter and would provide year-round open water habitat for wildlife in the area. Big game and small mammals would likely utilize this year-round water source, and birds from the area would likely capitalize on the availability of open water habitat during the winter months, when most open water bodies are frozen over. More detail regarding water quality as it relates to temperatures in Mann Lake may be found in Section 3.4, Water Quality.

These effects are not anticipated to be significant and over the long term would be primarily beneficial.

Environmental Commitments

The following environmental commitments would be implemented to reduce all impacts to non-significant levels.

- Land disturbed by construction would be the minimum needed to minimize habitat disruption.
- Areas disturbed during construction and not needed for O&M would be restored to existing conditions following construction to avoid long-term effects on wildlife habitat.
- Construction and laborer vehicle speed would be kept low to minimize vehicle and wildlife collisions.
- Construction would be confined to daylight hours to avoid light pollution impacts on wildlife.
- Vegetation clearing would be completed during the non-breeding season (mid-summer to late winter) to avoid disturbance to nesting migratory species.
- Pre-construction breeding bird surveys would be conducted to ensure there are no active nests.
- Construction would not be allowed adjacent to active migratory bird nests until the young have fledged from the nest.
- The avian protection measures published by APLIC would be included in the power line design specification.

Cumulative Impacts

This alternative is not anticipated to contribute to cumulative adverse effects related to known past, present or reasonably foreseeable actions impacting this resource. Flows more representative of the natural hydrograph would be anticipated to improve riparian habitat and function in Sweetwater, Webb and Lapwai Creeks Cumulative beneficial effects to wildlife may occur as a result of past, current, and/or future restoration actions conducted by NPT and NPSWCD.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

All impacts to, and mitigation measures for, wildlife resources related to Alternative C would be the same as identified above for Alternative B (the Proposed Action) except as follows.

Short-term Impacts Short-term impacts associated with noise from construction would be the same in nature as described under Alternative B; however, they would be greater in magnitude due the increased area of land that would be temporarily disturbed as a result of construction and because lands disturbed near the Clearwater River provide better habitat for wildlife than lands in the well field (associated with Alternative B).

80.02 acres of primarily agricultural land (Table 3-5) would be temporarily disturbed under Alternative C. A small amount of this would be aquatic habitat, wetland, and riparian fringe. This habitat would be lost for breeding and foraging during construction, and for as long as one growing season following construction as vegetation recovers. For the most part, lands that would be disturbed under Alternative C do not offer high quality habitat for wildlife in the area under existing conditions, and a large extent of similar habitat types occur within the project vicinity that would be accessible to any wildlife and that may be displaced as a result of construction. Construction activities would not be anticipated to result in any mortality of small mammals, reptiles, and amphibians. Additionally, due to the disturbed condition of areas to be impacted by construction activity, wildlife and vehicle collisions during construction is not likely or anticipated. Despite the anticipated increased short-term impacts associated with Alternative C (due to the increased project footprint) overall, impacts would not be significant.

Long-term Impacts Long-term impacts associated with construction of Alternative C would be the same in nature as described under Alternative B; however, they would be greater in magnitude due the higher quality of habitat that occurs near the Clearwater River, as opposed to the well field (under Alternative B).

Under Alternative C, operation of the pumping station on the Clearwater River would result in long-term effects due to noise of operating the pumps. This may result in the permanent displacement of wildlife using the area for breeding, nesting, and/or foraging. This is not a significant impact because of the availability of numerous alternative nesting locations for birds and habitat for other wildlife that may be displaced. No additional migratory bird effects would be anticipated.

Approximately 1 acre of land consisting of PEM wetland, riverine, and riparian vegetation would be lost with construction of the pumping station. Although this represents a greater impact to aquatic habitats than would be realized under Alternative B, it is not to the extent that it would be anticipated to be a significant impact because no local or regional wildlife populations would be affected by this action.

Long-term beneficial impacts to wildlife would be the same as under Alternative B, but would be realized in a shorter amount of time. Flow restoration to Sweetwater Creek would occur immediately and not incrementally over time, as with Alternative B.

Environmental Commitments

Environmental commitments would be the same as proposed for Alternative B.

Cumulative Impacts

Although this alternative would potentially affect habitats adjacent to the Clearwater River (as a result of the pumping station), all effects would be anticipated to be minimal. Therefore, this alternative is not anticipated to measurably contribute to cumulative adverse effects related to known past, present, or reasonably foreseeable actions impacting this resource. Beneficial cumulative effects to wildlife resources under Alternative C would be the same as described for Alternative B above.

3.11 Threatened and Endangered Species

This section describes existing T&E resources that occur, or could potentially occur, within the project area.

3.11.1 Study and Analysis Methodology

The primary sources of information for this analysis include USFWS IPaC information (www.ecos.fws.gov), the BiOP for the Operation and Maintenance of LOP (NMFS, 2010), the USFWS Bull Trout Draft Recovery Plan (USFWS, 2002), and a site visit conducted from August 5 through 7, 2015.

The Action Area for T&E resources includes the project footprint in Nez Perce County, as well as any waters that provide potential habitat for listed species and their critical habitat and are affected by either the existing operation of LOID activities or by future water operations related to any of the action alternatives. The USFWS website for Idaho identifies all the listed, proposed, and candidate species for each county (USFWS, 2015b). The USFWS identified T&E species that may occur in Nez Perce County. NMFS (2010) has identified species under their jurisdiction that may be affected by any of the alternatives. The T&E species that are known or expected to occur in the county or proximate waters are Spalding's catchfly (*Silene spaldingii*; threatened), Water Howellia (*Howellia aquatilis*; threatened), Snake River chinook salmon (threatened), Snake River Basin steelhead (threatened), Snake River sockeye salmon (endangered), bull trout (threatened), and their critical habitats. Expected presence in the Action Area is based on habitat suitability, occurrence of similar habitats, and available literature.

Based on the location of water diversions and proposed operations, the Action Area for T&E fish is considered to include Captain John Creek (from the headwaters of the North Fork to its mouth); all portions of the Webb and Sweetwater Creek drainage systems where flows are currently altered; and Lapwai Creek from its confluence with Sweetwater Creek, downstream to the Clearwater River, and extending approximately 500 feet downstream (to account for impacts associated with noise and construction activities) of the proposed Clearwater River pumping station (as described in Alternative C). Although these waters contribute flows to the Clearwater and Snake Rivers, and ultimately the Columbia River, the effects of the alternatives on flow velocities and depths are considered negligible outside the Lapwai Creek and Captain John Creek drainages (NMFS, 2010). Therefore, the Snake and Clearwater River (downstream of the proposed pumping station), are not considered part of the Action Area for T&E species addressed in this EA. There would be no effect as a result of any of the alternatives on Snake River sockeye salmon or its critical habitat, as it does not occur in the designated Action Area for this project). Therefore, this species is not addressed further. Additionally, Water Howellia is a wetland plant that requires conditions consistent with specific wetland habitat conditions to occur. Although wetlands along the existing Sweetwater Canal in the Action Area may be affected as a result of Alternatives B and C, none of these wetlands have specific habitat elements that would support Water Howellia. Therefore, no suitable habitat for Water Howellia occurs in the Action Area and it has no potential for occurrence. There would be no effect to Water Howellia as a result of the project. This species is not discussed further in the document.

3.11.2 Affected Environment

Plants

Only one plant identified by USFWS for Nez Perce County, Spalding's catchfly, has the potential to occur in the Action Area.

Spalding's Catchfly

Spalding's catchfly is typically found in open mesic grassland and sagebrush-steppe communities, and occasionally open pine forests, in eastern Washington; northeastern Oregon; west-central Idaho; western Montana; and British Columbia, Canada (USFWS, 2007). Dominant grass species in these habitats include Idaho fescue and bluebunch wheatgrass. Known populations range in elevation from 1,200 to 5,300 feet. Spalding's catchfly tends to inhabit areas with relatively higher soil moisture, such as swales and northeast to northwest slopes. Spalding's catchfly was listed as threatened in 2001. Primary threats to this species include invasive species, grazing, and habitat loss due to human development.

Fish

The T&E fish addressed in this EA are under the jurisdiction of the USFWS and NMFS. Information summarized below related to the status and life history of bull trout is taken from the USFWS *Bull Trout Draft Recovery Plan* (USFWS, 2002). Effects related to existing operations of LOID on Snake River chinook salmon and Snake River Basin steelhead have been examined in detail in the BiOP for the Operation and Management of the LOP (NMFS, 2010). The following information describing the status and life history of these two species, as well as the general aquatic baseline conditions are taken directly from that document. For additional information on the listing, status, and life history of Snake River Chinook salmon and Snake River Basin steelhead, or their critical habitat related to LOID operations, please reference the BiOP (NMFS, 2010).

Snake River Chinook Salmon

Although Chinook salmon exhibit a variety of complex life history patterns, generally two distinct races of Chinook salmon are recognized, stream-type and ocean-type (Healey, 1991; Myers et al., 1998). Snake River spring and summer Chinook salmon exhibit a stream-type life history and Snake River fall Chinook salmon exhibit an ocean-type life history. Stream-type Chinook adults return to natal streams several months prior to spawning in spring or summer. They typically reside in fresh water for 2 years following emergence, reside in the ocean for 2 to 3 years, and exhibit extensive offshore ocean migrations. Stream-type Chinook typically spawn in moderate to large-sized streams in shallow gravel bars at the downstream end of pools. During freshwater rearing, juvenile Chinook disperse into tributary streams near their natal streams and are often concentrated near the mouths of stream confluences. Habitats used by juvenile stream-type Chinook salmon and their feeding habits are similar to those described for steelhead. In general, Chinook salmon tend to occupy streams with lower gradients than steelhead, but there is considerable overlap between the distributions of the two species. Ocean-type Chinook adults return to natal streams within a few days to weeks before spawning in the fall. These fish typically begin downstream migration within a few days following emergence, reside in fresh water for no more than 3 months, and reside in coastal ocean waters 3 to 4 years before maturing. Ocean-type Chinook typically spawn in large mainstem rivers, such as the Clearwater and Snake rivers, and construct redds in coarse gravel areas where there is upwelling or high inter-gravel flow. Snake River Chinook salmon occur in various life stages throughout the Clearwater drainage and critical habitat is designated within the project Action Area (NMFS, 2010). They are known to occur in the Action Area.

Snake River Basin Steelhead

The listed Snake River Basin steelhead distinct population segment (DPS) includes natural-origin populations of anadromous steelhead in the Snake River Basin of southeast Washington, northeast Oregon, and Idaho. Critical habitat for Snake River steelhead is designated within the Action Area (NMFS, 2010). Steelhead are anadromous fish that spawn in freshwater streams and mature in the ocean. All salmonid species, including steelhead, are cold-water species (Magnuson et al., 1979) that survive in a relatively narrow range of temperatures, which limits the species distribution in fresh water to northern latitudes and high elevations. Adult Snake River Basin steelhead return to mainstem rivers from late summer through fall, where they hold in larger rivers for several months before moving upstream into smaller tributaries. Adult dispersal toward spawning areas varies with elevation, with the majority of adults dispersing into tributaries from March through May, with earlier dispersal at lower elevations and later dispersal at higher elevations. Spawning begins shortly after fish reach spawning areas, which is typically during a rising hydrograph and prior to peak flows (Thurow, 1987). Steelhead typically select spawning areas at the downstream end of pools, in gravels of suitable size (Pauley et al., 1986). Upon emergence, steelhead fry move from the redds into shallow, low velocity areas in side channels, and along channel margins, to escape high velocities and predators (Everest and Chapman, 1972), and progressively move toward deeper water as they grow in size (Bjornn and Rieser, 1991). Juveniles typically reside in fresh water for 2 to 3 years, or longer, depending on temperature and growth rate (Mullan et al., 1992). Juvenile steelhead in the Action Area appear to reside in fresh water for no more than 2 years based on the absence or low numbers of steelhead older than 2 years of age in inventories by Chandler and Richardson (2005), Kucera and Johnson (1986), and Fuller et al. (1984). Smolts migrate downstream during spring runoff, which occurs from March to mid-June in the Snake River Basin, depending on elevation. Anadromous Snake River Basin steelhead exhibit two distinct morphological forms, identified as A-run and B-run fish, which are distinguished by differences in body size, run timing, and length of ocean residence. Steelhead most directly affected by the proposed action are those in Sweetwater, Webb, and Lapwai Creeks and are the smaller A-run steelhead, with a 3-to-4-year life cycle (NMFS, 2010).

Columbia River Bull Trout

The Columbia River Basin bull trout DPS was listed as threatened under the ESA on June 10, 1998 (64 FR 58909). All populations of this char in the contiguous 48 states were designated with threatened status on November 1, 1999 (64 FR 58910). Revised critical habitat designations were made final on September 30, 2010, by USFWS. The mainstem Clearwater River within the Lower Clearwater Assessment Unit is listed as critical habitat. Lapwai, Sweetwater, and Webb Creeks are not designated as critical habitat for bull trout.

Bull trout can exhibit resident, fluvial (migrate between streams and larger rivers), or adfluvial (migrate between streams and lakes) life history strategies. Channel stability, substrate composition, cover, water temperature, and migratory corridors are important for fluvial and adfluvial adult and young fish rearing and movement in streams (Rieman and McIntyre, 1993). Deep pools with abundant cover (larger substrate, woody debris, and undercut banks) and water temperatures below 59 degrees Fahrenheit (°F) are important habitat components for stream resident bull trout (Goetz, 1989). Ideal habitat for bull trout includes clean cold waters with large woody debris, undercut banks, boulders, and deep pools. Watersheds must have the specific physical characteristics to meet these habitat requirements for bull trout to successfully spawn and rear.

The decline of this species has been attributed primarily to poor land management practices that contribute to degraded instream and riparian habitat conditions (Quigley and Arbelbide, 1997). The distribution of bull trout populations is spotty and generally occurs where habitat remains in good condition. One of the remaining core areas of bull trout distribution is the Clearwater River watershed and mountains of north-central Idaho. The Clearwater River Recovery Unit (63 FR 31647) is 1 of 22 recovery units designated for bull trout in the Columbia River Basin. The Clearwater River Recovery Unit includes the entire Clearwater River Basin upstream from the confluence with Snake River. Bull trout are distributed throughout most of the large rivers and associated tributary systems within the

Clearwater River Recovery Unit, and they exhibit adfluvial, fluvial, and resident life history patterns.

The Clearwater River and proximate tributaries provide migratory, foraging, rearing, and overwintering habitat for bull trout. Juveniles and adults may be present in the mainstem year-round, although most bull trout seek thermal refugia from high summer temperatures in accessible tributaries (USFWS, 2002). An ongoing study in the Upper Salmon River Subbasin indicates that bull trout move into tributary streams on the descending peak flow hydrograph and spend the summer rearing in tributary streams prior to spawning (Schoby and Curet, 2007). Except for some high elevation lakes and streams with natural barriers, bull trout were historically likely able to move among most areas within the recovery unit. All life history forms of bull trout may be found in the Clearwater River section of the Action Area.

Aquatic Baseline Conditions

Fish habitat in Sweetwater, Webb, Lapwai, and Captain John Creeks has been degraded by historic and current land management activities including: construction of roads; mining; agriculture; timber harvest; grazing; residential development; and water management and withdrawal (by LOID and other smaller entities). As a result of these activities, the existing baseline condition of these systems is characterized by inadequate stream flows, excessive temperatures, structural impediments, degraded riparian corridors, simplified and reduced instream habitat, and excessive erosion (Ecovista et al., 2003).

Flows from the Sweetwater Springs have also likely been reduced compared to discharge rates prior to use of Lake Waha by LOID as a source of irrigation water. The existing Sweetwater Canal Diversion Dam blocks upstream fish passage. When the diversion dam in Sweetwater Creek is in operation, surface flows are diverted out of Sweetwater Creek from early spring through early fall; often leaving only minimal flows required under the 2010 Biological Opinion (NMFS, 2010). The reduction in stream flows from the diversion dams and draw-down of Lake Waha has changed Sweetwater Creek from a unique, low-elevation stream with cool water and high flows in summer, to a system that is largely dewatered in summer with warm water temperatures that approach the upper limit for steelhead. The LOID operations have had similar effects on stream flows in Webb and Lapwai Creeks. The Webb Creek Diversion Dam is located upstream of an impassable natural fish barrier. Streamflow reductions in Webb Creek often dewatered the stream, and no flows were provided for Webb Creek until 2009. Natural falls in Captain John Creek prevent upstream fish migration approximately 6 miles from the mouth; and the diversion dam is approximately 2 to 3 miles upstream from the falls. The dam diverts water from an ephemeral tributary to Captain John Creek during spring runoff. The diversion dam operates for a relatively short period of operation and captures a small percentage of surface flows from fish-bearing streams below the waterfall (NMFS, 2010).

In addition to their effects on anadromous fish, dams, and other management strategies in Webb and Sweetwater Creeks, as well as the larger Clearwater River subbasin have had an effect on migratory and resident fishes, such as Columbia River bull trout, Snake River fall Chinook salmon, and Snake River steelhead trout; this has resulted in fragmented populations. The Lower Mainstem Snake River Basin steelhead population is among the few remaining indigenous stocks of A-run steelhead that are not influenced genetically by hatchery fish. Steelhead abundance in the Lapwai Creek drainage is relatively high compared to the lower mainstem population as a whole, in spite of severe habitat alterations in portions of the drainage. The Lapwai Creek drainage has high potential for steelhead production if degraded habitat were restored, and it is an important source of A-run steelhead production (NMFS, 2010).

3.11.3 Environmental Consequences

This section describes, assesses, and discusses the environmental consequences of the range of alternatives on threatened, endangered, proposed, and candidate species located within the area of impact. This analysis is broken down by alternative and species.

Methods and Criteria

Potential impacts resulting from the three proposed alternatives on T&E plant species focus on disturbed lands associated with construction activities (project footprint) and, in the case of Alternative C, operation of the Pump Station. Impacts to T&E fish species focus on the waters of Sweetwater, Webb, Lapwai, and Captain John Creeks, and the Clearwater River (related to the proposed pumping station under Alternative C).

Impacts to federally-listed plants or fish would be considered significant if project implementation would be expected to directly or indirectly reduce existing populations, measurably increase existing populations or affect critical habitat.

Alternative A – No Action

Current conditions would continue under Alternative A. There would also be no additional short-term or long-term adverse effects on T&E resources resulting from Alternative A other than those that occur under existing conditions. Deleterious effects to salmon and steelhead in the Action Area resulting from water management and reduced flows under current water management strategies (Section 3.2) in Sweetwater, Webb, Lapwai, and Captain John Creeks would remain relatively consistent with baseline conditions; and adverse effects related to habitat, water temperature, and passage would largely persist. However, the extent of these adverse effects may be slightly reduced by added flows that will be left in Sweetwater Creek and or Webb Creek when the pilot well comes online. Although difficult to quantify, this is not anticipated to occur at a level that would be considered beneficially significant. Overall the extent and quality of habitat for T&E resources would not be anticipated to measurably change under Alternative A. Therefore, there would continue to be adverse effects (consistent with existing conditions) on listed T&E species because baseline conditions would be for the most part maintained. The current BiOp requires the release of minimum flows past both the Sweetwater Creek and Webb Creek diversions to maintain habitat conditions for steelhead located within each system below the diversions. Water left instream is subsequently not available for diversion and use by LOID. It is anticipated the No Action Alternative would require continued passage of minimum flows past the diversions that will continue through 2020, at which point the current BiOp expires and Reclamation will initiate formal consultation with NOAA. It is also anticipated if the current BiOp is renewed, minimum flows will again be required for each stream. In addition to minimum flow requirements, the current BiOp requires the collection of data to allow Reclamation and NOAA to better assess impacts to steelhead resulting from LOID operations. This data-collection involved a multiyear effort resulting in substantial cost to both Reclamation and LOID. It is likely the 2020 consultation will result in continued operational constraints and costs to Reclamation and LOID. This process will continue into the future as long as LOP surface diversions persist in the Lapwai Basin. The No Action would result in renewal of the stayed federal litigation involving the current BiOp and additional ESA compliance measures.

Environmental Commitments

Under Alternative A, no additional environmental commitments, other than those in the 2010 BiOp, would be required; subject to the risk of additional environmental commitments that could result from renewed ESA litigation involving the 2010 BiOp, which is currently stayed.

Cumulative Impacts

Any minimal beneficial effects of this alternative would not be anticipated to interact measurably with other past, present, or foreseeable habitat improvements being implemented in the Lapwai Creek watershed by the NPT and NPSWCD.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Alternative B would have the same short and long-term impacts to T&E plants as Alternative A (that is, **no effect**) because no listed plants would be disturbed as a result of construction activities. Additionally, there would be no adverse short or long-term effects to T&E fish as a result of Alternative B because no species or habitat would be adversely affected from construction activities or operations. However, it is anticipated that Alternative B would have a beneficial long-term effect on T&E fish and designated critical habitat, in particular Snake River Basin steelhead.

Short-term Impacts Temporary construction activity would not result in any indirect or direct short-term effects to T&E species or their habitats as a result of noise and disturbance. Surveys conducted by the IDFG in late June of 2016 determined that no listed plants were present in the area of the proposed well field. The survey is included as Appendix G. Noise and other disturbances associated with construction of Alternative B would be at a distance far enough away from Action Area waters such that there would be no effect on T&E fish in the area. In the short-term, as flows are incrementally retained in Sweetwater Creek, benefits to T&E fish using Sweetwater, Webb, and Lapwai Creeks would be realized. This is a fundamental component of the proposed project.

Long-term Impacts No long-term effects would occur to T&E plants under Alternative B. If any of the future wells would need to be located outside of the existing survey footprint, additional plant surveys and consultation would take place. No listed fish or their critical habitat would be affected as a result of construction activities or operation of the well field pumping station. As a result, no adverse effects on T&E fish would occur under Alternative B.

Over the long-term, water in Lake Waha and Soldiers Meadow Reservoir would be managed to maximize designated critical habitat for Snake River Basin steelhead in Webb Creek, Sweetwater Creek, and Lapwai Creek. Less water elevation fluctuations Lake Waha would contribute to increased cold water flows in Sweetwater Creek via Sweetwater Springs that would be retained (and not diverted) downstream in Sweetwater Creek. Flows are anticipated to reflect a more natural hydrograph (one that historically occurred in the system), which would contribute to improved sediment transport, decreased water temperature, and increased and improved rearing and spawning habitat (see the LOP System hydrology in Section 3.2 for a more detailed description of flows anticipated under Alternative B). An array of other ancillary benefits associated with a more naturally functioning hydrograph also would be anticipated to occur under Alternative B. The benefits of added flows in the system would be anticipated to extend to the confluence of the Clearwater River and Lapwai Creek. Overall, Alternative B would result in beneficial effects for listed salmon and steelhead in the Action Area.

Environmental Commitments

Under Alternative B, no additional environmental commitments would be required.

Cumulative Impacts

The beneficial effects of this alternative would be anticipated to interact in a positive way (at the larger watershed scale level) with other habitat improvements being implemented in the Lapwai Creek watershed by the NPT and NPSWCD.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

All impacts to T&E plants related to Alternative C would be the same as identified for Alternative B (the Proposed Action). Beneficial effects to T&E fish related to Alternative C would be the same as the identified for Alternative B. Additional adverse effects to T&E fish as a result of Alternative C may occur as follows.

Short-term Impacts Short term effects to T&E plants have the potential to occur during construction of the pipeline between the Clearwater River pumping plant and Mann's Lake. Most of the land that would be disturbed during construction has been previously disturbed by dryland farming; however, some portions contain natural habitat suitable for the endangered Spalding's catchfly. Surveys along the proposed pipeline route for the threatened Spalding's catchfly would occur prior to any construction activities. The survey is included as Appendix G. Short-term effects associated with noise from construction would have the potential to deleteriously affect T&E fish in the Clearwater River, as a result of construction of the Pump Station and infrastructure. Designated critical habitat for Chinook salmon and steelhead also would be potentially affected over the short term as a result of construction activities. The T&E fish and their critical habitat in the mainstem Clearwater River may experience short-term habitat and water quality degradation resulting from disturbance of existing sediment in the project area, and temporary avoidance of migratory or rearing holding cover during construction activity by individuals may occur as a result of noise and activity. Noise and degraded water quality above baseline conditions would not be anticipated to extend more than 500 feet downstream of the proposed pumping station. If realized, these effects would primarily affect individual juvenile salmon and steelhead that may be rearing near the water's edge and close to the Pump Station during construction. Columbia River bull trout use the Clearwater River as a migratory corridor although they would not be anticipated to occur in the Action Area during the period of construction. Any fish in the vicinity would likely be displaced almost immediately with the onset of construction activities and effects would be anticipated to occur at a level that would not significantly affect salmon or steelhead. Alternative C may affect, but is not likely to adversely affect, T&E fish.

Long-term Impacts Long-term beneficial impacts associated with construction of Alternative C would be the same as described under Alternative B. However, there would be additional long-term adverse effects related to the Pump Station and related infrastructure (such as screens).

Under Alternative C, operation of the pumping station on the Clearwater River would result in long-term effects to T&E fish due to noise of operating the pumps. This may result in the displacement of salmon and steelhead that use the area for rearing or migration. There should be no risk of impingement or entrainment of juvenile T&E fish in the screening and pumping station because the design would be required to meet IDFG and NMFS specifications, and no mortality of T&E fish would be anticipated to occur under Alternative C. Finally, minimal long-term effects under Alternative C would occur relative to the loss of cobbles, sand, and/or gravel substrate adjacent to the proposed pumping station (approximately 0.32 acres of riverine habitat), which would permanently reduce habitat available to T&E fish using the area. The Clearwater River is designated critical habitat for both Snake River Chinook salmon and Snake River Basin steelhead, as well as Columbia River bull trout. Due to the small footprint that would be affected by construction of the pumping station and the availability of like habitat near the project area and throughout the drainage, no significant effects to critical habitat for any T&E fish would occur as a result of Alternative C. Benefits to the Lapwai Creek watershed would be consistent with Alternative B. Therefore, this alternative may affect, but is not likely to adversely affect, T&E fish.

Environmental Commitments

Environmental commitments to reduce impacts to T&E fish in the Action Area as a result of Alternative C would be the same as described in Section 3.9, Fisheries.

Cumulative Impacts

There would be no adverse cumulative impacts from implementation of Alternative C. Beneficial cumulative effects for T&E species under Alternative C would be the same as described above for Alternative B.

3.12 Paleontological Resources

This section describes existing paleontological resources that occur, or could potentially occur, within the project area.

3.12.1 Study and Analysis Methodology

The Action Area for paleontological resources includes the project footprint where direct project-related ground disturbance would occur.

3.12.2 Paleontology

Impacts to paleontological resources tend to be limited to those that would directly compromise their physical integrity. The paleontological resource review was limited to the project footprint. The following sources were reviewed to determine whether documented paleontological resources are located in the action area:

- Idaho Museum of Natural History
- BLM Cultural Resources and Paleontology Website
- Idaho Geological Survey

3.12.3 Affected Environment

Paleontological resources are any fossilized remains, traces, or imprints of organisms, preserved in or on the Earth's crust (16 USC 470aaa. Section 6301.4). Actions that could negatively impact paleontological resources would include any activity that could directly displace or destroy these resources. The following are the relevant regulations that govern the treatment of paleontological resources.

The Paleontological Resources Preservation Act (PRPA) of 2009 requires the Secretary of the Interior and the Secretary of Agriculture to manage and protect paleontological resources on federal lands. The act defines "paleontological resources as any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth…" (16 USC 470aaa. Section 6301.4). The PRPA requires federal agencies under these departments to develop appropriate plans for inventorying, monitoring, and scientific and educational use of paleontological resources in accordance with any applicable agency laws, regulations, and policies. The act establishes permitting requirements for the collection of paleontological materials on federal lands and the penalties for unpermitted collection of these materials.

Chapter 41, Title 67 of the Idaho Code also protects paleontological (as well as archaeological) resources on state lands by establishing a permitting process for the removal of paleontological sites and deposits, designating the board of trustees of the Idaho State Historical Society as the approver of permits, and establishing penalties for unpermitted removal of paleontological resources.

Review of the above sources revealed that no paleontological resources have been documented within the Action Area. However, much of the Action Area is covered by late Pleistocene- to early Holocene-aged loess (Othberg et al., 2003a; Othberg et al., 2003b). Loess is a term that describes sediment that has been transported to an area via wind and is widespread across eastern Washington and southern Idaho (Busacca et al., 2004).

In other parts of eastern Washington and Idaho, late Pleistocene loess has contained paleontological resources. For example, Columbian mammoth remains have been recorded in Pleistocene-aged loess near St. John, Burr Canyon, and Cheney in eastern Washington State (Barton, 1999). Therefore, the portions of the action area that contain loess retain some sensitivity for paleontological resources. The remainder of the Action Area is covered by Holocene-aged alluvium and late Pleistocene- to Holocene-aged colluvium (Othberg et al., 2003a; Othberg et al., 2003b) both of which have limited potential to contain paleontological resources.

There are no previously documented paleontological resources within the area affected by Alternative B, the Proposed Action. Review of the proposed project elements associated with this alternative reveals that 98.2 percent of the surface area within Alternative B retains sensitivity for paleontological resources. These areas cover the majority of Alternative B, except for a small area on the western boundary.

The area affected by Alternative C also contains no previously documented paleontological resources. Review of the proposed project elements associated with this alternative reveals that 99.4 percent of the surface area within Alternative C retains sensitivity for paleontological resources. These areas are located along the entire northern length of Alternative C, except within Mann Lake (Reservoir A) to the south.

3.12.4 Environmental Consequences

Methods and Criteria

Paleontological and geological records were reviewed to determine whether paleontological resources would be affected during construction and operations.

Impacts to paleontological resources would be considered significant if project implementation is expected to damage, displace, or destroy these resources.

Alternative A – No Action

No construction would occur under Alternative A and, therefore, there would be no potential for effects to paleontological resources.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action) Short-term Impacts

Based on the methods and results described above, no paleontological resources have been documented on lands that would be disturbed or affected under Alternative B. For this reason, there would be no potential for short-term effects to known paleontological resources to occur.

Long-term Impacts Based on the methods and results described above, no paleontological resources have been documented on lands that would be disturbed or affected under Alternative B. For this reason, there would be no potential for long-term impacts to known paleontological resources to occur.

Environmental Commitments

To further reduce any potential for disturbing known or unknown paleontological resources, areas that would be disturbed during construction of the well field under Alternative B would be evaluated for site-specific conditions related to paleontological resources prior to any ground disturbing activities. Since no paleontological resources have been documented in the Action Area, and there is no potential for known paleontological resources to be affected under Alternative B, no other environmental commitments are proposed.

Cumulative Impacts

Since no known paleontological resources would be affected under this alternative, the proposed project under Alternative B would not contribute to cumulative impacts to paleontological resources in the area.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Short-term Impacts Based on the methods and results described above, no paleontological resources have been documented on lands that would be disturbed or affected under Alternative C. For this reason, there would be no potential for short-term impacts to known paleontological resources to occur.

Long-term Impacts Based on the methods and results described above, no paleontological resources have been documented on lands that would be disturbed or affected under Alternative C. For this reason, there would be no potential for long-term impacts to known paleontological resources to occur.

Environmental Commitments

To further reduce any potential for disturbing known or unknown paleontological resources, areas that would be disturbed during construction of the well field under Alternative C would be evaluated for site-specific conditions related to paleontological resources prior to any ground disturbing activities. Since no paleontological resources have been documented in the Action Area, and there is no potential for known paleontological resources to be affected under Alternative C, no other environmental commitments are proposed.

Cumulative Impacts

Since no known paleontological resources would be affected under this alternative, the proposed project under Alternative C would not contribute to cumulative impacts to paleontological resources in the area.

3.13 Socioeconomics

This section describes socioeconomic conditions in the project area; and potential changes that could occur as a result of implementing the alternatives evaluated in this EA. The socioeconomic conditions described in this chapter are related to population, employment, unemployment, and housing. Additionally, since implementation of the alternatives is likely to have an impact on recreational opportunities, a brief discussion on existing recreation economics is included in the section.

3.13.1 Study and Analysis Methodology

The Action Area for potential socioeconomic impacts from the project consists of the two-county region comprised the Lewis and Nez Perce Counties in Idaho.

The Idaho Department of Labor (IDoL) and U.S. Census Bureau (USCB) websites were consulted for current population, employment, unemployment, and housing data for Lewis and Nez Perce Counties. The IDFG *Fishery Management Annual Report* of 2016 was used to determine the economic contribution of recreational opportunities in the lakes and reservoirs in the Action Area.

3.13.2 Affected Environment

The population of the two-county region has been increasing since 2000, with most of the population increase seen in Nez Perce County. Between 2010 and 2014, the population of Nez Perce County increased by about 1 percent while that of Lewis County increased by one person. During this same period, the population of the State of Idaho increased by 2 percent. The estimated population and the changes in the population of the two counties are provided in Table 3-8. The population estimates of the State of Idaho are provided for comparison purposes.

Table 3-8. Population

Area	2000	2010	2014	Percent Population Change 2000 – 2010	Percent Population Change 2010 – 2014
Lewis County	3,747	3,821	3,822	2.0	0.0
Nez Perce County	37,410	39,265	39,655	5.0	1.0
Two-County Region	41,157	43,086	43,477	4.7	0.9
State of Idaho	1,293,953	1,567,582	1,599,464	21.1	2.0

Source: USCB, 2015a; 2015b; 2015c

Table 3-9 shows annual housing statistics for the two counties in 2014. Nez Perce County has a higher overall occupancy rate, while Lewis County has higher owner-occupancy rate. Vacancy rates are lower in Nez Perce County.

Table 3-9. Housing Statistics, 2014

Housing Parameter	Lewis County Number/Percent	Nez Perce County Number/Percent
Total housing units	1,885	17,431
Occupied	1,657/88	16,159/93
Owner-occupied	1,215/73	11,205/69
Renter-occupied	442/27	4,954/31
Vacant	228/12	1,272/7
Vacant for rent	81/36	784/62
Vacant for sale	147/64	488/38

Source: USCB, 2015c

Table 3-10 provides details on the characteristics of the labor force. It shows the 2014 annual employment data for the two counties and the State of Idaho. Both counties had lower unemployment rates than the state.

Table 3-10. Employment Data, 2014

Area	Civilian Labor Force	Employed	Unemployed	Unemployment Rate
Lewis County	1,607	1,538	68	4.3
Nez Perce County	20,412	19,583	829	4.1
State of Idaho	777,200	739,800	37,400	4.8

Source: IDoL, 2015a; 2015b

The region's economy is heavily dependent on the services sector with approximately a third of the labor force in 2014 employed in this sector. Within the services sector, the majority of employment is in the healthcare and social services and the accommodation and food services subsectors. These subsectors account for approximately three in five jobs in the two-county region (USBEA, 2016). Between 2010 and 2014, the economy in the two-county region diversified to include more durable manufacturing. However, Lewis County continues to rely heavily on natural resources (especially agriculture and forest products), while Nez Perce County continues to be the regional hub for retail, health care, media, government and transportation (IDoL, 2015a; 2015b).

As stated in Section 3.7, the lakes and reservoirs in the Action Area support lake-oriented recreational activities, particularly fishing. The *Fishery Management Annual Report* (IDFG, 2016a) shows the importance of fishing to the Clearwater Region, which includes the Action Area. In addition to evaluating habitats for specific species, the study reported in the *Fishery Management Annual Report* includes creel and angler opinion surveys (IDFG, 2016a). According to the report, the IDFG's 2011 statewide survey of anglers showed that angler effort for the counties in the Clearwater Region accounted for approximately $86.6 million. Of this amount, approximately $2.2 million and $17.7 million occurred within Lewis County and Nez Perce County, respectively. Total spending in Mann Lake (Reservoir A), Soldiers Meadow Reservoir, and Lake Waha was approximately $323,810, $245,880, and $46,970, respectively (IDFG, 2016a).

3.13.3 Environmental Consequences

This section evaluates the potential impacts on socioeconomics at or in the vicinity of the project area.

Methods and Criteria

Current population, employment, unemployment, and housing data for the two-county region were reviewed to assess whether the existing local population and housing supply is adequate under the proposed project and alternatives.

Changes in recreational opportunities as reported in Section 3.7, Recreation, of this EA were reviewed to determine if there would be an impact to the two-county regional economy.

Impacts to socioeconomic resources would be considered significant if project implementation is expected to detrimentally alter the social or economic conditions in the action area.

Alternative A – No Action

No construction would occur under Alternative A. Therefore, there would be no significant short-term impact on population, housing, or employment from construction activities.

In addition, under the No Action alternative, LOID's ability to maintain reliable delivery while balancing system needs would become increasingly difficult. Thus, water may become unavailable for residential and commercial landscaping and urban farm irrigation, forcing cutbacks in landscape maintenance and urban agriculture (short-term fallowing) until another water source or delivery option is developed, or a different (less water intensive) crop or landscaping design is planted. No significant effects on the population and housing parameters of socioeconomics would occur as a result of either of these scenarios.

Over the long-term, the impact on socioeconomics of implementing the No Action alternative would be the same as described for the short-term for employment, but the non-significant effects would continue indefinitely until another water source, water delivery option, or crop change occurs.

Since the normal routine O&M of the project is an on-going activity, there would be no effect on employment, population, or housing in the region. However, this may change to a minor or minimal impact during years when additional O&M activities are undertaken as described in the following paragraph.

In the absence of LOP, LOID would be expected to incur major rehabilitation, replacement, and infrastructure improvement costs associated with the project elements upstream of Mann Lake (Reservoir A). The total amount estimated for these activities over the next 20 years, in 2016 dollars, is $17.74 million (Reclamation, 2016). Assuming inflation, the total amount over the next 20 years is $22,880,000. The above costs would be in addition to the long-term costs associated with the normal routine O&M of the project. The cumulative total, with inflation, over the next 20 years (2016 to 2035) of these normal routine operation and maintenance was estimated at $9,490,000 (Reclamation, 2016). At this time, not enough information is available on the specific input (labor and non-labor) requirements, or the duration of the identified rehabilitation, replacement, and improvement activities. Assuming that these activities occur somewhat evenly and episodically throughout the 20-year period, the impact to the two-county region's economy and employment would be minimal. Thus, the impact to population and housing would also be minimal and not significant.

Since the current conditions would continue under Alternative A, there would be no short-term impact to the economy from changes in recreational opportunities as there would be no changes to recreation facilities (Section 3.7.2) in the Action Area. In the long run, maintenance and replacement of degraded LOP facilities, particularly reservoirs, could result in increased economic activities in the Action Area. However, these increased economic activities are likely to be episodic and minimal.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Alternative B would require short-term construction activities for the construction of each well. The acquisitions, construction, and operations of the well field would not result in significant effects to socioeconomic resources. The following sections describe short-term and long-term effects in more detail.

Short-term Impacts Construction activities associated with Alternative B would create short-term employment opportunities for construction workers in the area. This would have a beneficial effect on employment. Because the construction workers are assumed to come from the local area, there would be no significant impact on population or housing.

There would be no short-term effects to the economy as a result of changes in recreational opportunities in lakes and reservoirs as there would be no changes to lakes and reservoirs in the Action Area (Section 3.7.2).

Long-term Impacts The construction of the well fields on agricultural lands could potentially result in the loss of productive agricultural lands, which could have a minor effect on agricultural production in the area. However, in the long run, farmers and ranchers may respond to this loss of productive land by either bringing other parcels that are currently not under production into production, or by changing their operations by growing higher value crops. Since this change is likely to be gradual, based on the timing of the construction of the well fields, there would be no effect on population, housing, or employment in the region under Alternative B.

Current O&M activities would continue on LOP facilities during well development and would have no effect on population, employment, and housing in the area.

Operations related to Alternative B have the potential to increase recreational opportunities in Soldier's Meadow Reservoir and Lake Waha through the reduction in reservoir level fluctuations, which would make boat launch ramps and docks more usable more frequently (Section 3.7.2). The stable reservoir elevations would likely benefit fish and improve angling. Operations related to Alternative B have the potential to change the elevation in Mann Lake. Restoring flows and cold refugia to the Lapwai Creek watershed could increase the ESA-listed steelhead population resulting increased fishing opportunities. Depending on the net change, Alternative B has the potential to impact the economy of the two-county region. However, the magnitude of this impact is likely to be minimal compared to the baseline condition.

These effects would not be considered significant.

Environmental Commitments

No environmental commitments are needed or recommended.

Cumulative Impacts

Cumulative socioeconomic effects may occur when more than one project has an overlapping construction schedule that creates a demand for workers that cannot be met by local labor, resulting in an influx of non-local workers and their dependents as well as excessive demand on housing. Since there are no known projects whose construction schedules overlap those of the construction activities under Alternative B and since there are no significant effects under Alternative B, there would be no anticipated cumulative socioeconomic effects with implementation of Alternative B.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Alternative C would construct a pumping plant and pipeline. The following sections describe short-term and long-term effects in more detail.

Short-term Impacts Construction activities associated with the new pumping plant and pipeline would create short-term employment opportunities for construction workers in the area. This would have a beneficial effect on employment. Because the construction workers are assumed to come from the local area, there would be no effect on population or housing.

Construction of the pipeline could result in the loss of agricultural production on agricultural lands along the pipeline alignment (Section 3.6.3). However, this would be a short-term impact and would be limited to the construction period.

There would be no short-term effects to recreation or to the economy of the two-county region.

Operations related to Alternative B have the potential to increase recreational opportunities in Soldier's Meadow Reservoir and Lake Waha through the reduction in reservoir level fluctuations, which would make boat launch ramps and docks more usable more frequently (Section 3.7.2). The stable reservoir elevations would likely benefit fish and improve angling. Operations related to Alternative B have the potential to change the elevation in Mann Lake. Restoring flows and cold refugia to the Lapwai Creek watershed could increase the ESA-listed steelhead population resulting increased fishing opportunities. Depending on the net change, Alternative B has the potential to impact the economy of the two-county region. However, the magnitude of this impact is likely to be minimal compared to the baseline condition.

These temporary effects would not be significant.

Long-term Impacts Operations of the Pump Plant would result in the permanent loss of up to 1 acre of productive agricultural lands (predominantly grazing), which could have a minor effect on agricultural production in the area. As such, there would be no long-term impact to population, housing, or employment in the region under Alternative C.

Costs associated with the O&M of the Pump Plant would be minimal and would have minimal impact on population, employment, and housing in the region under Alternative C.

Operations of the pipeline would have no effect on the population, housing and employment in the region under Alternative C.

The conversion from the current surface system to the Pump-Plant system would trigger the transfer of water rights and title to LOP assets. As with Alternative B, after title transfer, LOID and BIA (as described in Section 2.3) would continue to manage their respective LOP features and assets consistent with past actions, with the exception of no longer using the diversion facilities and associated canals. This would be executed both directly, and through the use of management agreements. These activities would not affect the current O&M activities and would have no effect on population, employment, or housing in the area.

Post-transfer operations are expected to benefit the natural resources in the Action Area and have the potential to improve the recreational opportunities in the lakes and reservoirs in the Action Area. As such, Alternative C potentially can have a beneficial effect on the economy of the two-county region.

Operations related to Alternative C have the potential to increase recreational opportunities in Soldier's Meadow Reservoir and Lake Waha through the reduction in reservoir level fluctuations, which would make boat launch ramps and docks more usable more frequently (Section 3.7.2). The stable reservoir elevations would likely benefit fish and improve angling. Operations related to Alternative C have the potential to change the elevation in Mann Lake. Restoring flows and cold refugia to the Lapwai Creek watershed could increase the ESA-listed steelhead population resulting increased fishing opportunities. Depending on the net change, Alternative C has the potential to impact the economy of the two-county region. However, the magnitude of this impact is likely to be minimal compared to the baseline condition.

These effects would not be considered significant.

Environmental Commitments

No environmental commitments are needed or recommended.

Cumulative Impacts

Cumulative socioeconomic impacts may occur when more than one project has an overlapping construction schedule that creates a demand for workers that cannot be met by local labor, resulting in an influx of non-local workers and their dependents as well as excessive demand on housing. Since there are no known projects whose construction schedules overlap those of the construction activities under Alternative C and since there are no significant effects under Alternative C, there would be no anticipated cumulative socioeconomic effects with implementation of Alternative C.

3.14 Cultural and Historical Resources

This section describes cultural and historical resources in the project area and the effects of project implementation on those resources.

3.14.1 Study and Analysis Methodology

The primary source of information used for this analysis is a cultural resource inventory report prepared by the NPT, *Lower Clearwater Exchange Project Cultural Resource Inventory for Archaeological and Ethnographic Resources, Nez Perce County, Idaho* (Baird et al., 2012). This study included Idaho SHPO and Nez Perce Tribal Historic Preservation Office record searches, as well as a review of ethnographic materials held by the NPT and associated archival materials at the Nez Perce National Historical Park. Additional information came from Washington State University Manuscripts Archives and Special Collections, and Gonzaga University.

The lands associated with the proposed project are owned by Reclamation and LOID. The SHPO record search addressed all known cultural resources within 1.0 mile of the project area. A Class III archaeological survey was conducted throughout the entire project's area of potential effects (APE). A Class II survey of other lands included in proposed alternatives for pipelines from the Clearwater and Snake Rivers also was conducted. The purpose of the surveys was to locate and record archaeological and historical resources, consistent with the Secretary of the

Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716). The NPT also conducted a traditional cultural property (TCP) survey.

The Action Area for cultural and historic resources is a 1.0-mile-wide band centered on the project footprint. This footprint includes the existing reservoirs, canals, pipelines, and related infrastructure.

3.14.2 Affected Environment

The earliest evidence of human occupation of north-central Idaho extends over 12,000 years before present (B.P.). Sappington (1994) identified the following four major prehistoric cultural phases for the Clearwater Basin:

- Windust Phase (10,000 to 6,000 B.P.)
- Hatwai Phase (6,000 to 3,000 B.P.)
- Ahsahka Phase (3,000 to 500 B.P.)
- Kooskia Phase (500 to 200 B.P.)

The earliest human occupation of the Clearwater Region began with the Windust phase (ca. 10,000 to 6,000 B.P.). This early phase represents a time during which bands of mobile foragers occupied the region. The Hatwai phase (ca. 6,000 to 3,000 B.P.) represented a shift to a more sedentary way of life, as evidenced by the first pit houses and an intensification of the use of fish and camas (*Camassia quamash*). During the Ahsahka phase (ca. 3,000 to 500 B.P.), pit house villages became more widespread. The Kooskia phase (ca. 500 to 200 B.P.) represents similar patterns as mentioned above with the addition of Euroamerican trade goods, domesticated horses, and the introduction of European diseases.

The project area is the homeland of NPT, or *Nimíipuu.* This homeland covers much of the eastern Columbia River Basin and includes significant portions of Idaho, Washington, Oregon, and parts of southwestern Montana. The NPT occupation of these lands focused on the numerous rivers, streams, and other waterways coursing through this vast region. The Columbia, Snake, Clearwater, Salmon, Wallowa, Imnaha, Grande Ronde, Weiser, and Powder Rivers drained into this large area. Several large mountain ranges flank these rivers, including the Bitterroot Range to the east, the Salmon River Mountains, Seven Devils to the south, the Blue Mountains to the west, and the Palouse and Moscow Mountains to the north. Between these mountain ranges, riparian and montane environments intersperse with meadows and pockets of open grasslands. One such environment, the Palouse, is crisscrossed by rivers, and full of meadows yielding large herbaceous root crops like qeem'es (*Camassia quamash*) and qaaws (*Lomatium cous)* that remain important food staples for the NPT today.

As ancient dwellers of this vast region, the *Nimíipuu* used the area for hunting, fishing, and various gathering activities, as well as for more permanent settlement. Their aboriginal settlement patterns existed in accordance with the natural gathering cycle. Regional groupings also existed, primarily separating into two geographically situated and distinct districts or areas. They referred to the area to the south and west of the junction of the Clearwater and Snake Rivers – where Lewiston, Idaho, *(simíinikem)* rests – as *mut'eléyme* or down river people. This area included the Snake, Salmon, Grande Ronde, Imnaha, Lostine and Wallowa River drainages. Conversely, *mat'aléyme* refers to the upriver people, mostly situated on the Clearwater River. In addition to the larger groupings, band groupings or *'inéek'nikt* consisted of extended family groupings. These groups typically gathered in established winter village sites, which varied greatly in population from one season to the next. These patterns changed from one year to the next dependent upon numerous environmental and social factors, particularly the availability of food and fuel resources (Walker, 1998).

The *Nimíipuu* strategically planned their movements along seasonal rounds and patterns of transhumance to access resources located within their traditional lands (Marshall, 1977; Walker, 1987). These seasonal movements and group mobility patterns took full advantage of a dynamic and diverse resource base, and carefully coordinated with the seasonal availability of fish, game, and root crops – which would vary across ecosystems and elevations. Therefore, their travel was recurrent, opportunistic, and radial; branching out and then returning along well known travel corridors. The duration and direction of these radial surges in movement often corresponded to the unique resource procurement needs of each group, the seasonal availability of those resources, any ceremonial activities and social gatherings occurring throughout the year, and any combination of these. This dynamic, multifaceted travel patterning required not only an intimate knowledge of the landscape, but an ongoing, actively maintained connection to the land and its resources.

Due to their high degree of mobility, the NPT's social organization formed around semi-permanent villages, or *téw'yeniikes*, consisting of multifamily groups ranging in number from 30 to 200 individuals depending on the season (Walker, 1998). Marshall (1977) categorizes this social organization as amorphous, where multiple villages are linked by similar ecological relationships. Overall, social and political organization can be broken into three distinct categories: individual families, villages, and aggregate villages that can be loosely referred to as bands. These composite bands often acted as a unit for communal hunting purposes, for warfare, for defense, and for decision making during various band activities (Sappington, 1994; Sappington et al., 1995). Additionally, the village unit often provided the requisite work force needed to conduct major hunting and fishing expeditions. However, once the larger villages dispersed, it fell upon the individual family units to gather resources, especially the abundant plant resources in the region (Marshall, 1977; Sappington et al., 1995).

Winter village sites, or *tew'yenikees*, typically provided more economic security. Deer drives at this time augmented winter reserves and provided fresh meat to inhabitants of the families congregating at these locations. Structures typically consisted of an extended lodge or long house, made of mats constructed from *tok'o* or tule reeds (*Scirpus lacustris*), or from a combination of tules and buffalo hide tipis. Tribal members often situated their winter village sites in canyon bottoms along rivers, particularly where two streams met. Driftwood was often collected at these river confluences, making them optimal localities for the easy collection of winter fuel (Schwede, 1966; Walker, 1998). The lower elevation canyon lands also protected the village occupants from severe winter weather, remaining relatively free of snow. These valued locations were also usually situated near fish spawning grounds and early spring root fields found on the nearby hillsides (Marshall, 1977). Generally, at least one extended family unit composed a winter village site. These family units consisted of "two or more nuclear families united by consanguineal kinship bonds such as those between a parent and child or between siblings" (Walker, 1985).

Over 300 aboriginal Nez Perce settlements have been identified through historic records, archaeological work, and ethnographic interviews (Schwede, 1966; Shawley, 1984; Walker, 1998). Village sites are generally found at elevations below 457 meters (1500 feet) and where intermediate sized streams meet larger ones, especially at locations where fish and roots were immediately available. Camps were usually established near small streams in mountainous areas at the heads of larger tributaries where game and fish were available (Schwede, 1966).

The historic period starts with the Corps of Discovery, led by Captains Meriwether Lewis and William Clark, encountering Nez Perce on the Weippe Prairie in 1805. The Nez Perce saved the expedition from starvation, and assisted them on their way to the Pacific Ocean, and again on their return trip to St. Louis. The landmark treaty of 1855, signed by *Nimíipuu* leaders at the council in Walla Walla with Governor Isaac I. Stevens, reserved 7,000,000 acres that included most of the tribe's traditional lands. It also established the Indian Agency and stipulated that no Euroamericans were to be allowed onto reservation lands without permission of tribal leaders (Josephy, 1983).

Gold was discovered on the Reservation in 1860 in the Clearwater Mountains, on Orofino Creek. Negotiations with NPT leaders in April 1861 permitted Euroamericans to travel and mine north of the Snake and Clearwater Rivers, but they did not allow permanent settlement. This provision was violated almost immediately when Lewiston was established at the confluence of the Clearwater and Snake Rivers. For a while, tents gave the pretense of a transitory community, but these were soon replaced by more substantial structures as non-Native Americans settled in to stay. B. F. Kendall, Superintendent of Indian Affairs for the Washington Territory, said in 1862 that stopping the miners would be "like attempting to restrain the whirlwind."

The U.S. Army established Fort Lapwai in 1862, ostensibly to protect the Nez Perce from harassment by white settlers, miners, and whiskey sellers (Hutchins, 1862). The Army quickly came to see its role as protecting Euroamericans from retaliation from Native Americans in response to poor treatment. The Army was instrumental in coercing Nez Perce leaders into signing a second treaty on June 9, 1863, which reduced the reservation by 90 percent. The *Steal Treaty* was signed only after tribal leaders from areas whose lands were excluded from the new Reservation, most notably Old Chief Joseph, angrily left the negotiations. Though 51 Nez Perce signatures appear on both treaties, the second does not include many considered chiefs by the NPT. The ramifications of this agreement would contribute to the Nez Perce War of 1877 (Williams and Stark, 1975).

The 1887 Dawes Act directed BIA to divide reservations into individual parcels for each tribal member. The size of the parcels depended on the status and age of the individual. Any remaining lands were to be open for homesteading. The Dawes Act, also known as the Allotment Act, attempted to force Native Americans to abandon traditional lifestyles and adopt Euroamerican practices, such as farming. The Nez Perce Indian Reservation was allotted in 1893 and 1894 under the direction of Alice Fletcher, an anthropologist from the Peabody Museum at Harvard University. Under Fletcher, the Nez Perce were assigned allotments of 160 acres for each head of family, 60 acres for each single person over 18, 80 acres for orphans, and every person under 18 and single was to be given 40 acres. On the Nez Perce Indian Reservation, allotment and subsequent Euroamerican homesteading reduced Native American controlled lands by another 90 percent. Of the 140 million acres originally designated to be Native American lands in the U.S., only 50 million remained in Native American ownership by 1934.

The NPT took advantage of the reforms made in the Indian Reorganization Act of 1934. This act allowed tribes to establish self-government. In 1941, NPT adopted the current Tribal Constitution, establishing a nine-member Tribal Executive Committee elected by enrolled tribal members. The tribe holds a General Council twice each year to have direct input from tribal members. Over the past 40 years, the tribe has taken many steps to reassert authority over tribal lands on the reservation and Tribal sovereignty for guaranteed treaty rights within lands ceded in the 1855 and 1863 treaties, as well as usual and accustomed fishing, hunting, and gathering areas outside the ceded territory.

Today, NPT plays a crucial role in the management and preservation of its cultural and natural resources, the operation of health and judicial systems, and economic development within the reservation boundaries.

Lewiston Orchards Project

The LOP is a water system south and east of Lewiston, constructed in the early twentieth century. Harry L. Powers and Walter Burrell started the Lewiston-Sweetwater Irrigation Company in 1906 to construct an extensive irrigation system with canals and reservoirs to divert water from Sweetwater, Webb, and Captain John Creeks to Mann Lake (Reservoir A) and on to their land development, The Orchards.

The LOP planned to build three reservoirs (identified as A, B, and C on original surveys). The primary infrastructure of the LOP was built between 1906 and 1908 – including the Sweetwater Canal – to move water from Sweetwater and Webb Creeks, Reservoir A Dam and Reservoir, Mann Lake (Reservoir A), and the Main Pipeline to end users in The Orchards. The LOP system was rebuilt, replaced, and modified continuously from 1912 to the present. Reservoir C was never built, but the system was expanded to include the natural Lake Waha in 1912. Reservoir B (Soldiers Meadow Dam and reservoir), and the Captain John Creek Diversion Dam and canal were built between 1922 and 1923.

At the beginning of the project, Powers and Burrell bought thousands of acres of wheat fields on the upland bench between Lewiston and the Waha Prairie, and subdivided the properties into 5 acre plots. Although Powers and Burrell proposed to provide irrigation to 7,000 acres, the LOP eventually served only 3,841 acres. Within a few years, landowners in The Orchards were producing a variety of crops, including apples, apricots, cherries, berries, plums, pears, quinces, peaches, nuts, lettuce, and grapes. Despite going through numerous owners and managers, land use in The Orchards remained focused on small scale agricultural production into the 1940s, when suburban development began to overtake horticulture as the dominant land use. The irrigation company went through several ownerships until 1922, when landowners in the service area organized as LOID and purchased the irrigation facilities. In 1946, Public Law 79-569 authorized creation of a federal irrigation project encompassing LOID facilities and lands, and title to the facilities passed to Reclamation in 1948.

Reclamation undertook a large-scale rehabilitation project over the majority of the system between 1947 and 1951, rebuilding or replacing the existing facilities and improving the domestic water supply through construction of a water treatment plant and installation of a separate potable water conveyance system to the Lewiston community.

Previously Identified Sites

A total of 30 previously documented historic and archaeological sites were identified within 1.0 mile of the project area, including 17 archaeological sites, 1 archaeological district, 11 historic structures, and 1 historic steamboat. Four properties are listed on the National Register of Historic Places (NRHP), including the Hatwai and Hasotino archaeological village sites, the Snake River Archaeological District, and the Steamboat Jean. A total of 15 historic properties are eligible for listing, 5 are not eligible, and 6 are unevaluated. The 17 previously identified archaeological sites are all Pre-contact to Contact Period Nez Perce sites, including 4 village and camp sites, 4 lithic scatters, 4 excavated burial sites, 1 rock shelter with pictographs, 1 multi-component artifact scatter, 1 single component activity surface, 1 multi-component archaeological site, and 3 isolated finds. The 12 previously identified historic properties include 4 houses, 1 apartment building, 4 barns and/or outbuildings, 1 commercial building, the Steamboat Jean, and the LOP infrastructure.

As previously mentioned, in addition to the Class I records search, an intensive Class III archaeological survey was conducted across the entire project's APE. As a result of the survey, no new cultural resources eligible for listing in the NRHP, or otherwise, were recorded or noted.

The LOP infrastructure is the only collection of historic sites identified within the proposed project area. Below is a brief description of each of the LOP facilities including important dates:

- **Reservoir A Dam:** This dam consists of two earthen embankments that parallel each other, with the intervening area partially packed with earthen fill. Each embankment is approximately 2,200 feet long. The upper embankment (located upstream of the lower embankment) is the taller of the two with a structural height of 60 feet. The lower embankment is approximately 55 feet tall. Originally constructed by private entities in multiple phases between 1906 and 1908, the dam was not built to completion, and has operated in its partially-completed state throughout most of its existence. Modifications to the dam were done in 1922, 1925 to 1928, 1949 to 1951, and 1965, and significantly altered the original configuration. Modifications included adding a spillway in 1927, and raising and widening the upper embankment and applying new surface materials over the years. Outlet works were installed in 1951 consisting of a 36.5-inch welded-plate steel pipe placed in a concrete conduit through the base of the dam. Safety modifications were made to the dam in 1999, including construction of a stability berm with drainage features and altering the outlet portal to accommodate the stability berm.

- **Main Pipeline:** The initial irrigation system provided a timber flume and a canal to carry water from Sweetwater Creek to Mann Lake (Reservoir A). From Mann Lake (Reservoir A), water was distributed through a system of wood-stave pressure pipelines (the precursor to the current Main Pipeline) to project lands. However, the wood-stave pipe system had a limited economic life, and by the time the pipes were 30 years old and the flume 20 years old, the water distribution system had become unreliable. In 1939, LOID, aided by the Works Projects Administration, launched a program for replacing the wooden flumes with concrete bench flumes. This program continued in 1940 and 1941 but was not completed. Water delivered through the single-pipe system was unsafe for domestic use. In 1947, a 36.5-inch outside diameter enameled steel pipeline was used by Reclamation to replace the deteriorated wood stave pipe for 4,450 feet from the outlet works of Mann Lake (Reservoir A) to the intake of the water treatment plant. A 30.5-inch pipe was installed for 18,900 feet (to 16th Street and Powers Avenue); the end of the irrigation mainline totaled 4.42 miles. At the location of the water filtration plant, the system split into two, with the main pipe continuing to carry irrigation water and a separate system designed to carry domestic drinking water. Currently, the irrigation distribution system comprises more than 80 miles of irrigation pipe ranging from 1- to 36-inches in diameter. Reportedly, 71.2 miles of pressure pipe were installed by Reclamation, and extensions installed by LOID totaled more than 12 miles. The irrigation water supply is delivered to project lands totaling more than 3,900 acres, and also supplies fire hydrants in the area.

- **Sweetwater Diversion Dam:** This dam originally seems to have been built in 1906 as a log crib structure with wooden flume and a wooden sand trap that required manual cleaning. The dam and its associated features were rehabilitated by Reclamation during the non-irrigation season of 1947 and 1948 to assure the District an adequate supply of irrigation water during the ensuing summer of 1948. Work was begun by government force account on the Sweetwater works by September 15, 1947, to convert the dam into a rockfill overflow weir-type structure, with a concrete crest wall to continue diverting water from the main stem of Sweetwater Creek into the Sweetwater Canal. The dam measures 12 feet high and 80 feet long, with a diversion capacity of 77 cfs. The headworks consist of a 5 by 4 feet slide gate, concrete flume, and a self-cleaning concrete sand trap. The diversion structure is equipped with a weir blade in the overflow spillway section and a Stevens Recorder that measures forebay elevation. Remote operating and measurement equipment is installed at the outlet works into the Sweetwater Canal, the bypass into Sweetwater Creek (located in the canal sluice way at the dam), and the Sweetwater Dam overflow weir.

- **Sweetwater Canal:** In 1906, the Lewiston-Sweetwater Irrigation Company began construction of the Sweetwater Canal to provide irrigation to the uplands south and east of Lewiston. It was described as a timber flume canal for 2 miles, with the last 8 miles of a dirt canal to Mann Lake (Reservoir A). Between 1916 and 1919, the system owners (then the Lewiston Valley Water Company) widened and deepened the Sweetwater Canal so that it could carry more water and replace most of the original wooden flumes. However, water loss still plagued the canal, so in 1922 the canal was enlarged further, excavating the silt that was to be placed on both sides of the canal above the water line to create a bottom width of 7 feet and a water depth of 2.8 feet. According to the 1947 to 1948 Annual Project History of the LOP (Reclamation, 1950), Reclamation's plan to rehabilitate the LOP system included replacement of the old, deteriorating, wooden chute and siphon of inadequate capacity with a concrete chute and stilling basin, and 42-inch concrete pipe siphon. The structure's design consisted of a concrete chute section 380 feet long and a 48-inch reinforced concrete pipe siphon without copper water seals, which measured 350 feet in length. The Sweetwater Canal begins at the Sweetwater Diversion Dam and extends for approximately 9 miles to Mann Lake (Reservoir A). The canal begins as a 5-by-5-foot concrete box flume that is approximately 1.81 miles (9,565 feet) long. Then, it continues into a lined portion for approximately 1,800 feet. This section was lined between the 2006 and 2007 seasons with an impervious membrane protected on both sides by geo-textile layers. The lining also is covered with a protective layer of shotcrete. The remaining 6.4 miles of the Sweetwater Canal are earth-lined, with the exception of short sections that have been lined with compacted earth fill, pipe, or membrane liners. The end of the Sweetwater Canal spills over a 4-foot Cipolletti weir into the Mann Lake Feeder Canal.

- **Webb Creek Canal:** A 500-foot earth-lined canal was constructed in 1947 and 1948 to connect the Webb Creek pipeline and conduit to Sweetwater Creek. The canal enabled the diversion of water from Webb Creek to Sweetwater Creek and on to Mann Lake (Reservoir A). In 1965, 1,248 feet of concrete pipe was laid on the lower end of Webb Creek Canal. At the time, it was reported that the Webb Creek Canal was approximately 3 miles long, of which 0.75 of a mile was in a pipe line or an open, concrete-lined channel. A siphon was installed just west of the open canal and was completed in June of 1966. Currently, 500 feet of earth-lined canal still exists and functions at the downstream end of the pipeline, which consists of a 7,800-foot-long section of 30-inch pre-cast concrete pipe beginning at the Webb Creek Diversion Dam.

- **Webb Creek Diversion Dam:** This dam is located on the Nez Perce Reservation, approximately 15 miles southeast of Lewiston, Idaho, and 6 miles downstream of Soldiers Meadow Dam. Water from the diversion dam is conveyed to the East Fork of Sweetwater Creek by the Webb Creek Canal. Work on the Webb Creek Diversion Dam and pipeline in 1947 consisted of replacing 7,200 linear feet of old, dilapidated, wood flume in a steep walled canyon with a covered 30-inch concrete pipe benched in the canyon wall. The old wood diversion dam was replaced by a rock fill structure with concrete headworks. The concrete pipe was laid on a bench section in the canyon wall on a free flow grade and covered so that rock slides would not damage the pipe. Designs for the diversion dam were changed after it was determined solid rock could not be located for its foundation. When finally constructed, the dam was 80 feet long and 10 feet high, with an 18-inch concrete weir crest. Rock on this dam was placed with a 5/8-yard crane. Currently, the diversion dam is a rock fill overflow weir-type structure with a structural height of 20 feet. The outlet works include two rising stem slide gates that release water into two 30-inch concrete pipes. One of these pipes diverts water into the pipeline and canal; the other passes water through the dam into the creek below for sluicing purposes. The dam is equipped with a compound rectangular weir mounted to the spillway crest and a water level sensor to measure forebay elevation. The weir blade and level sensor allow LOID to measure and control water passing the dam. Automatic controls also can adjust the gates to regulate flows into the Webb Creek pipeline/canal and maintain the forebay level.

- **Lake Waha Pump Plant and Pipeline:** When Lake Waha, a natural lake that doubles as an off-stream reservoir, approaches the filled position, it leaks through a porous ridge and supplies water, which comes to the surface in downstream springs and drains into Sweetwater Creek above the Sweetwater Diversion Dam and headworks. When additional water is needed downstream, it is necessary to pump over the ridge. Originally installed in 1906, the Lake Waha pump plant and pipeline were replaced in 1922. Rehabilitation of these facilities was not included in Reclamation's initial 1948 plan. A new 250 hp Byron-Jackson submersible pump was mentioned in the 1962 to 1963 Annual Project Report (Reclamation, 1965) as being in the shop for repair, it was re-installed in September 1962. Currently, water is drawn from the lake via a pump station located on a floating platform at the north end of Lake Waha. The pump intake is located approximately 13 feet below the water surface. The pump discharge is in a HDPE pipe secured to floating blocks, which serve both as alignment and flotation. The Lake Waha Pump electrical controls and transformers are located on the hillside adjacent to the lake. The discharge line continues from the lakeshore in an underground pipeline that discharges via Forsman Draw to the West Fork of Sweetwater Creek.

- **Waha Feeder Canal:** The canal was originally constructed by private interests in 1906 to bring water to Lake Waha from the West Fork of Sweetwater Creek. In April 1965, it was reported that a mudslide washed out 50 feet of this canal, which had to be repaired and rebuilt. In 1966, LOID completely re-dug the Waha Feeder Canal and relocated 55 percent of it. They built an access road along side of it to facilitate maintenance and inspection work. New measuring weirs were installed at the headgates and outlet. Currently, the Waha Feeder Canal consists of a pipeline section that extends into an open canal and rock channel before discharging into Lake Waha above its eastern shore.

- **West Fork Diversion Dam:** This dam is located adjacent to the Nez Perce Reservation in the upper reaches of the West Fork of Sweetwater Creek. The diversion dam is a small concrete structure approximately 2 feet high.

- **Soldiers Meadow Dam:** This embankment dam is located on the headwaters of Webb Creek, approximately 26 miles southeast of Lewiston and 2 miles south of the Nez Perce Reservation. It was originally constructed as a random earth fill embankment by private interests in 1922, and ownership was transferred to Reclamation in 1947. The dam was modified in 1986 under the SOD program. Modifications included replacing the top 25 feet, and raising the crest by 7 feet. The dam is a zoned earth fill structure with a structural height of 68 feet and a crest length of 630 feet at a crest elevation of 4,529.0 feet. The upstream face of the dam is protected by a riprap blanket above an elevation of 4,500.0 feet, and the downstream face is seeded with native grasses. The spillway is located approximately 300 feet east of the right abutment of the dam, and has a discharge capacity of 7,040 cfs at reservoir water surface elevation 4526.0.

- **Captain John Canal:** This canal, constructed in 1923 by LOID, conveys water from Captain John Diversion Dam into the headwaters of Webb creek in the Sweetwater Basin. The dam was transferred to Reclamation in 1946, but was not included in the agency's original plan for rehabilitation at that time. The first 0.5 mile of the canal has a 36-inch, half-round, corrugated steel liner that was installed from 1991 to 1992. At the end of the steel liner, the canal enters an excavated earthen section that discharges into Soldiers Meadow Reservoir.

- **Captain John Creek Diversion Dam:** Originally constructed in 1923 by LOID, this small diversion/impoundment structure is located on the upper portion of Captain John Creek and diverts water into Captain John Canal for conveyance to Soldiers Meadow Reservoir. The dam was transferred to Reclamation in 1946, but it was not included in the agency's original plan for rehabilitation at that time.

- **Water Treatment Plant:** The water treatment plant is located approximately 1 mile to the west of Mann Lake (Reservoir A) and 0.5 mile off of the Nez Perce Reservation. The District's wood-stave pipelines and wooden flumes were deteriorating faster than the District's operation and maintenance program could repair them. In addition, the water running through that system "varied in color from a light gray in the winter to a chocolate brown during the seasons of heavy rain or runoff" (Clark, 1951). This resulted in the construction of a water treatment plant and a separate pipe system to carry the filtered domestic water to serve the local community (which initially was 1,500 homes and 4,000 residents of the 3,500-acre irrigation district). As originally constructed, the plant – which consisted of a brick building of mid-century design, an in-ground Dorr clariflocculator (55 feet in diameter), a 15,000-gallon elevated tank, and a 1.5 million-gallon ground-level concrete domestic storage reservoir – had a capacity of 1.5 million gal/d. In 1977 and 1978, the capacity of the plant was increased to 2.0 million gal/d by installing a rapid flow sand filter system. A 1.5 million-gallon, ground-level concrete domestic storage reservoir is located adjacent to the filter plant. The 1978 to 1979 Lewiston Orchards Project History volume (Reclamation, 1980) reported that portions of the water treatment plant were in the process of being rectified. The interior of the steel storage tank was sand blasted and repainted. A new addition was being added to the existing building to make room for a larger water sump where alum was injected into the untreated water. This addition raised the capacity to 2.4 million gallons of water per day. Use of the water treatment plant was discontinued in 1985 due to the conversion of the domestic water system from a surface to a groundwater supply.

- **Operator's Residence:** Constructed during1951 and 1952, this two-story, four-room residence with attached garage was built to accommodate the water treatment plant operator because the plant was in an isolated location at the time. Very little information is available about this building's design, but it may have been from a Reclamation's Denver Office standard drawing (a house of the same design was constructed by the agency on the Missouri River Basin Project in the Tiber Dam government camp in 1952 [Pffaf, 2007]). From photographs, it can be deduced that it was a rectangular plan wood-frame structure on a concrete foundation with no basement. This house originally had white, horizontal siding and asphalt shingles on its simple side-gabled roof. No records were found of renovations; but, from photographs, it can be discerned that by 1961, a covered front entry had been added over the concrete steps leading into the front door. A photo from 2007 revealed that the house and garage had been painted brown, and that window screens had been installed over the first floor windows at some point.

In a letter to the Idaho SHPO dated August 8, 1998, Reclamation recommended that Reservoir A Dam, and a number of associated facilities (noted in Table 3-11) did not meet the criteria for eligibility to the NRHP Places, and determined them ineligible for listing. In a response letter dated October 15, 1998, the SHPO concurred with that determination. Since then, the facilities have been continuously repaired, upgraded, and changed according to the District's needs. Five facilities (listed at the bottom of Table 3-11) were recently evaluated for historic significance (including Soldiers Meadow Dam, Captain John Canal and Diversion Dam, the water treatment plant, and the associated operator's residence). Reclamation has determined that because none of these five facilities meet the criteria for individual eligibility, and are tied to a system that has largely been determined ineligible, they should also be recommended ineligible as a result of current consultation regarding this undertaking.

Table 3-11. Structures and Facilities of the Lewiston Orchards Project

Facility Name	IHSI No. or Agency No.	National Register Determination and Date	SHPO NR Determination Concurrence Date
Reservoir A Dam	69-17936	Ineligible – 8/12/1998	10/19/1998
Main Pipeline	USBR-LOP-1	Ineligible – 8/12/1998	10/19/1998
Sweetwater Diversion Dam	USBR-LOP-2	Ineligible – 8/12/1998	10/19/1998
Sweetwater Canal	USBR-LOP-3	Ineligible – 8/12/1998	10/19/1998
Webb Creek Canal	USBR-LOP-4	Ineligible – 8/12/1998	10/19/1998
Webb Creek Diversion Dam	USBR-LOP-5	Ineligible – 8/12/1998	10/19/1998
Lake Waha Pump Plant & Pipeline	USBR-LOP-6	Ineligible – 8/12/1998	10/19/1998
Waha Feeder Canal	USBR-LOP-7	Ineligible – 8/12/1998	10/19/1998
West Fork Diversion Dam	USBR-LOP-8	Ineligible – 8/12/1998	10/19/1998
Soldiers Meadow Dam	USBR-LOP-9	Ineligible – 3/11/2016	In progress
Captain John Canal	USBR-LOP-10	Ineligible – 3/11/2016	In progress
Captain John Creek Diversion Dam	USBR-LOP-11	Ineligible – 3/11/2016	In progress
Water Treatment Plant	USBR-LOP-12	Ineligible – 3/11/2016	In progress
Operator's Residence	USBR-LOP-13	Ineligible – 3/11/2016	In progress

3.14.3 Environmental Consequences

Methods and Criteria

Cultural resources are subject to review under both federal and state laws and regulations. Section 106 of the NHPA empowers the Advisory Council on Historic Preservation (ACHP) to comment on federally initiated, licensed, or permitted projects affecting cultural sites listed in, or eligible for listing in, the NRHP. Eligibility evaluation is the process by which resources are assessed relative to the NRHP eligibility criteria. Cultural resources that are determined to be eligible for the NRHP are known as historic properties and are protected under NHPA. Impacts are considered significant if they adversely affect the NRHP eligibility characteristics of historic properties.

Under federal law, impacts to cultural resources could be considered adverse if the resources have been determined eligible for listing in the NRHP or have been identified as important to Native Americans as outlined in the American Indian

Religious Freedom Act and EO 13007 Indian Sacred Sites. Agencies are required to assess resource significance, evaluate impacts on significant sites, and select resource management actions in consultation with SHPO, ACHP, and other interested parties. In addition to this, Native Americans must be consulted where cultural resources of concern to a tribe could be present, or where human burials and other Native American Graves Protection and Repatriation cultural items affiliated with tribes could be affected by actions of agencies.

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may occur by physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or alter its setting; or neglecting the resource to the extent that it deteriorates or it is destroyed. The direct impacts associated with this project were assessed by identifying the types and locations of the proposed project activities and then determining the exact location of known cultural resources that could be affected. Indirect impacts generally result from the residual effects related to the project. These effects can include increased use of newly developed infrastructure, such as access roads, for maintenance purposes. As mentioned in the Affected Environment section of this report, a Class I Records Search, a Class III Intensive Archaeological survey, and a TCP survey were conducted to determine, to the extent possible, the location of cultural resources.

Alternative A – No Action

Under the No Action Alternative there would be no direct, indirect, short-term, long-term, or cumulative effects to historical resources. Reclamation would retain its interests in LOP and LOID would continue to operate and maintain the system. There would be no title transfer and, therefore, no effect on any National Register-eligible resources.

However, with regards to cultural effects to NPT people, the No Action alternative would continue to be in conflict with the Nez Perce time-immemorial religious practices in the Sweetwater Creek watershed that are inextricably based on the need for and use of water. The NPT asserts that under No Action, renewal of stayed ESA litigation will additionally include claims based on interference with religious uses of water in Sweetwater Creek.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts There would be no short-term effects from Alternative B.

Long-term Impacts Under the Proposed Action, LOID would acquire title of the Reclamation property interests located below Mann Lake (Reservoir A) and satisfy irrigation needs through use of an alternate water source. The remaining Reclamation property interests would be transferred to BIA to be held in trust for the NPT for future management and administration. The title transfer has the potential to adversely affect the one historic site (for example, the LOP system), but due to the fact that it is not a National Register-eligible property and does not qualify as an historic property under the NHPA, as amended, agencies do not have to consider the effects of the undertaking on non-eligible sites.

Because the well field outlined in this alternative would be incrementally constructed as funding becomes available, and because the precise locations of the proposed wells have not been specifically identified (or the lands obtained) to date, cultural resource clearances for those wells will need to occur on a case-by-case basis after the project is approved.

The other previously recorded sites listed above are not included in the title transfer and would not be impacted by this alternative. Therefore, the proposed transfer would have no adverse effect to any historic properties.

There would be beneficial effects to Nez Perce cultural and religious use of water from restored Sweetwater Creek flows under Alternative B.

Environmental Commitments

No environmental commitments are necessary because there would be no adverse effects to cultural or eligible historic properties from implementation of Alternative B.

Cumulative Impacts

No cultural or eligible historic properties would be affected through implementation of Alternative B; therefore, no cumulative effects would be anticipated to occur.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Short-term Impacts There would be no short-term effects from Alternative C.

Long-term Impacts Under the Proposed Action, a pumping plant would be constructed at a location along the south bank of the Clearwater River and provide water directly to Mann Lake (Reservoir A) in a single lift via a pipeline system. Consistent with Alternative B, LOP features and assets located above, and Mann Lake (Reservoir A) would be conveyed to be held in trust for NPT; while LOP features and assets below Mann Lake (Reservoir A) would be transferred to LOID. Also as in Alternative B, the title transfer has the potential to adversely affect the facilities of the LOP system, but it is not a National Register-eligible property and does not qualify as an historic property under NHPA, as amended. Under 36 CFR 800, agencies do not have to consider the effects of the undertaking on non-eligible sites.

The location of the construction of the Pump Plant and pipeline also has the potential to adversely affect cultural resources in that area. However, no archaeological or historic sites of National Register eligibility are known, or have been identified, within the project area for the pumping plant and pipeline portion of this alternative. This information is added to the previously reported knowledge that no archaeological or historic sites of National Register eligibility are known within the LOP system. However, Alternative C would have adverse effects on or near NPT traditional cultural properties located on the Clearwater River. If Alternative C becomes the Proposed Action, the Section 106 process would need to be carefully applied, in collaboration with NPT, to better understand and assess those effects under NHPA evaluation criteria.

Environmental Commitments

No environmental commitments are necessary as there would be no adverse effects to cultural or eligible historic properties from implementation of Alternative C.

Cumulative Impacts

No cultural or eligible historic properties would be affected through implementation of Alternative C; therefore, no cumulative effects would be anticipated to occur.

3.15 Indian Sacred Sites

This section discusses sacred sites as defined by EO 13007 and the potential of the projects effects on sacred sites, as well as the MOU signed by ACHP and numerous participating federal agencies, which further identifies federal agencies' responsibilities to identify and protect Indian Sacred Sites.

Sacred sites are defined by EO 13007 as specific, discrete, narrowly delineated locations on federally-owned land that is identified by a Native American individual or tribe determined to be an identified and appropriate representative of a Native American religion, as sacred by virtue of its established religious importance to, or ceremonial use by, a Native American religion. As a part of EO 13007 and the MOU between ACHP and multiple federal agencies, federal agencies must accommodate access to and ceremonial use of all Indian sacred sites by Native American religious practitioners, and avoid any adverse effects to the physical integrity of sacred sites. In addition to this, federal agencies must also make a good faith effort to improve the protection of tribal access to Indian sacred sites through enhanced and improved interdepartmental coordination and collaboration.

3.15.1 Study and Analysis Methodology

The NPT engaged in an ethnographic study to identify areas of religious and cultural significance in the Action Area. The Action Area is generally bounded by the Snake River to the west, Clearwater River to the north, Captain John Creek to the south, and the Lapwai Creek watershed on and adjacent to the Nez Perce Reservation to the east.

3.15.2 Affected Environment

The NPT is one of the proponents for the proposed title transfer, and Tribal members have been notified of the proposal through the NEPA scoping process (Section 4.2). In the ethnographic study, the NPT identified several areas of religious and cultural significance to the NPT that are in or near the LOP area, but did not specifically identify any as traditional cultural properties or sacred sites.

3.15.3 Environmental Consequences

Methods and Criteria

Impacts to Indian sacred sites would be considered significant if project implementation is expected to damage, displace, or destroy these sites.

Alternative A – No Action

Under the No Action alternative, there would be no title transfer. Therefore, there would be no direct effect upon Indian sacred sites, if such were present. However, as a result of the No Action Alternative, NPT may be negatively affected because it would not have direct management responsibilities over areas of religious and cultural significance within or near the LOP area

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts No Indian sacred sites have been identified on title transfer lands. Therefore, no short-term effects to Indian sacred sites are anticipated under the Proposed Action.

Long-term Impacts No Indian sacred sites have been identified on title transfer lands. Therefore, the Proposed Action would have no effect. However, as a result of the Proposed Action Alternative, NPT may be beneficially affected because they would have management responsibilities over areas of religious and cultural significance within or near the LOP area.

Environmental Commitments

No Indian sacred sites would be affected; therefore, no environmental commitments are proposed.

Cumulative Impacts

No Indian sacred sites would be affected; therefore, there would be no cumulative effects anticipated.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Short-term Impacts No Indian sacred sites have been identified on title transfer lands. Therefore, no short-term effects to Indian sacred sites are anticipated under Alternative C.

Long-term Impacts No Indian sacred sites have been identified on title transfer lands. Therefore, the Alternative C would have no effect. However, as a result of the Alternative C, NPT may be beneficially affected because they would have management responsibilities over areas of religious and cultural significance within or near the LOP area.

Environmental Commitments

No Indian sacred sites would be affected; therefore, no environmental commitments are proposed.

Cumulative Impacts

No Indian sacred sites would be affected; therefore, there would be no cumulative impacts anticipated.

3.16 Indian Trust Assets

The ITAs are legal interests in property held in trust by the U.S. for Native American tribes and individuals. The Secretary of the Interior, acting as trustee, holds many assets in trust for Native American tribes and individuals. Examples of trust assets are lands, minerals, grazing, hunting, fishing, and water rights. While most ITAs are on-reservation, they also may be found off-reservation on federally-managed unoccupied lands.

The U.S. has a responsibility to protect and maintain rights reserved by or granted to Native American tribes and Native American individuals by treaties, statutes, and executive orders. These are sometimes further interpreted through court decisions and regulations.

3.16.1 Study and Analysis Methodology

The purpose of this discussion is to determine if implementation of the proposed action would appreciably impact the current ITAs that may be in the project area.

3.16.2 Affected Environment

The NPT is a federally recognized tribe and is located on the Nez Perce Reservation in northern Idaho. Pursuant to the Treaty of 1855, Treaty of 1863, Treaty of 1868, and the Agreement of 1893, the rights of the NPT include the right to hunt, gather, and graze livestock on unclaimed and open lands, and the right to fish in all of the usual and accustomed places (Reclamation, 2004a). The NPT has cultural and religious interests in the area of the proposed project. These interests are protected under historic preservation laws, Native American Graves Protection and Repatriation Act, and EO 13007 – Indian Sacred Sites.

3.16.3 Environmental Consequences

Methods and Criteria

This is a qualitative analysis that identifies the affected environment subsequent to the implementation of the proposed action. Effects to ITAs would be considered significant if project implementation is expected to affect access to ITAs or to reduce their value.

Alternative A – No Action

Under the No Action Alternative, there would be no title transfer. Although Reclamation does not hold any trust assets for the NPT within the project area, in settlement of the 2012 tribal trust mismanagement litigation between NPT and the U.S. in Nez Perce Tribe v. Salazar, 06-2239-TFH (D.D.C) and Nez Perce Tribe v. United States, 06-910-CFL (Fed. Cl.)), the U.S. and NPT explicitly acknowledged and preserved NPT's ability to assert breach of trust claims against the U.S. arising from the construction and operation of the LOP.

There are also real property interests located on the Nez Perce Reservation on which the LOP is located and from which it operates that were condemned in state court by the Lewiston Land and Water Company. The company failed to notify or include the U.S. as a party and its condemnation of U.S. trust allotments, then used for reservoirs and canals, occurred without lawful jurisdiction and remains of disputed validity to this day. The NPT asserts that one or more of the real property interests necessary for operation and maintenance of the LOP is defective or absent and access through or use of such properties constitutes trespass against NPT. Furthermore, NPT asserts that under No Action, renewal of stayed ESA litigation will additionally include claims for unlawful taking and trespass.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts Reclamation does not hold any trust assets for NPT; therefore, no short-term effects to ITAs are anticipated under Alternative B.

Long-term Impacts Alternative B would not result in any significant negative effects on ITAs. Reclamation does not hold any trust assets for NPT. The project does involve transferring the title of features of the existing project to BIA to hold in trust for NPT, thereby creating a trust asset. Alternative B would resolve all federal trust and other property legal disputes between NPT and the U.S.

Environmental Commitments

No ITAs would be affected; therefore, no environmental commitments are proposed.

Cumulative Impacts

No ITAs would be affected; therefore, there would be no anticipated cumulative effects.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Short-term Impacts Environmental consequences for Alternative C would be the same as Alternative B.

Long-term Impacts Environmental consequences for Alternative C would be the same as Alternative B.

Environmental Commitments

No ITAs would be affected; therefore, no environmental commitments are proposed.

Cumulative Impacts

No ITAs would be affected; therefore, there would be no anticipated cumulative impacts.

3.17 Environmental Justice

The EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, dated February 11, 1994, requires Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities, as well as the equity of the distribution of the benefits and risks. Environmental Justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group should bear a disproportionate share of adverse effects.

The USCB defines minority population to include persons who identify themselves as African American, Asian or Pacific Islander, American Indian or Alaskan Native, or Hispanic (USCB, 2009a). According to CEQ, to be considered a minority population, the population of the affected area must either exceed 50 percent minority, or the minority population percentage of the affected area must be meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis, according to CEQ Environmental Justice Guidance under NEPA (1997).

USCB does not provide a specific definition for low income. The term poverty is used instead, and poverty thresholds are established each year for statistical purposes (USCB, 2009b). To be considered a low income population, the low income population in an affected area should be identified using the annual statistical poverty thresholds from the USCB. The Department of Housing and Urban Development (HUD) defines a low-income population as one that receives 80 percent of the median family income for the area (HUD, 1984).

American Indians are a minority population within the USCB definition. The CEQ additionally adds and specifies Indian tribes as a distinct environment justice category to be considered along with minority and low-income populations.

Study and Analysis Methodology

The primary sources of information for this section were USCB (2014), the Department of Labor Statistics (2014), and NPT (2010). The Action Area is generally bounded by the Snake River to the west, Clearwater River to the north, Captain John Creek to the south, and the Lapwai Creek watershed on and adjacent to the Nez Perce Reservation to the east. The Action Area is delineated in Figure 1-2.

The Action Area can be further divided into two distinct portions, the Lewiston area and the Lapwai Creek watershed area on and adjacent to the Nez Perce Reservation, based on elevation, topography, and land characteristics. The Lewiston area is generally located north of Webb road and towards the confluence of the Clearwater and Snake rivers. This area is relatively populated and typically consists of flat, plateau type landforms. The Lapwai Creek watershed area is located from and to the north of Craig Mountain draining onto the Nez Perce Reservation. This area is located on and adjacent to the Nez Perce Reservation and the watershed converges on the NPT headquarters at Lapwai

3.17.1 Affected Environment

Table 3-12 provides the numbers and percentages of population in 2014 for six racial categories (White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, and Two or More Races), the total racial minority population, and the Hispanic or Latino population for each county, the Action Area, and the State of Idaho (USCB, 2014).

The proportion of American Indians within the Action Area is many times greater than the State of Idaho due largely to the presence of the Nez Perce Reservation within the Action Area. Conversely, the proportion of persons who are Asian or Black or African American is similar to that of the State of Idaho. The Hispanic or Latino representation within Nez Perce County is nearly three times less than the State average, at 3.7 percent and 12.0 percent, respectively.

Table 3-12. City of Lapwai, LOID, Nez Perce County, and Idaho; Race and Ethnicity

Parameter	Lapwai [a]	LOID [c]	Nez Perce County [b]	Idaho [b]
Total Population	1,137.0	32,482	40,007	1,634,464
White (%)	16.6	92.3	87.4	82.8
Black or African American (%)	0.4	0.3	0.5	0.8
American Indian and Alaska Native (%)	78.1	1.7	5.8	1.7
Asian (%)	0.1	0.8	0.9	1.4
Native Hawaiian (%)	0.0	0.1	0.1	0.2
Two or More Races (%)	4.1	2.4	2.5	0.2
Hispanic or Latino (%)	4.0	2.8	3.7	12.0

Source: USCB, 2014.

Notes:

[a] 2010 Census Data accessed 1/8/16

[b] 2014 Census Data estimate accessed 1/8/16.

[c] 2014 Census Data estimate accessed 1/8/16. For LOID, data is assumed to be consistent with the City of Lewiston.

Low-income populations are identified by several socioeconomic characteristics. As categorized by the Census, specific characteristics include income (median family and per capita), percentage of the population below poverty (families and individuals), and unemployment rates. Table 3-13 provides income, poverty, and employment information for the NPT, City of Lewiston (LOID), county and the State for the year 2014 (USCB, 2014).

Table 3-13. City of Lapwai, LOID, Nez Perce County, and Idaho; Income, Poverty, and Unemployment.

Parameter	NPT [a]	LOID [c]	Nez Perce County [b]	Idaho [b]
Median family income	$30,710	$45,148	$46,608	$47,334
Per capita income	$14,768	$24,443	$24,570	$23,087
Individuals below poverty (%)	24.1	11.5	14.6	14.8
Unemployed (%)	27.4	5.5	5	6.1

Source: USCB, 2014.

Notes:
[a] NPT, 2010

[b] 2014 Department of Labor Statistics accessed 1/8/16

[c] 2014 Department of Labor Statistics accessed 1/8/16. For LOID, data is assumed to be consistent with the City of Lewiston.

Median family income and per capita income for the NPT, Nez Perce County, and the City of Lewiston (LOID) is less than the State average. Compared to the State of Idaho, the study area has about the same percentages of families and individuals below the poverty level, with the exception of the NPT, which is more than the State or county average. Other demographic data, such as unemployment also serves as indicators of low income in relation to environmental justice. In 2014, unemployment in the county was less than the State's 6.1 percent unemployment rate. The NPT's unemployment rate was much greater than the State's at 27.4 percent.

Minority populations, Low-Income Populations, or Indian Tribes: The only population in the Action Area that meets the environmental justice concerns of EO 12898 and DOI ECM 95-3 is the NPT and its Tribal members. As cited above, CEQ environmental justice guidance specifically adds Indian tribes to the required populations of concern, which simplifies the matter within the Action Area. The Action Area includes a significant portion of the NPT's Reservation, its tribal headquarters, Tribal population, and plainly affects NPT as an Indian tribe.[1] Additionally, the NPT's population income and poverty rates are significantly lower and higher, respectively, than state and county averages, and the NPT's population proportion in the Action Area as a defined minority would be meaningfully greater than in the general population of the broader region and state as well. An

[1] The NPT is a sovereign Indian tribal government and is recognized as such by the U.S. The NPT entered into treaties with the U.S. in 1855 and 1863: Treaty with the Nez Perce, June 11, 1855, 12 Stat. 957; Treaty with the Nez Perce, June 9, 1863, 14 Stat. 647 (the 1863 Treaty is "supplementary and amendatory" of the 1855 Treaty: it substantially reduced the size of the land reservation, but otherwise preserved "all the provisions" not "specifically changed," including the 1855 Article III preservation of fishing, hunting, gathering and pasturing rights. 14 Stat. 647, Preface and Article VIII). The NPT is one of 561 Indian tribes officially recognized by the U.S. 70 Fed. Reg. 71193, 71196 (November 14, 2005).

environmental justice effects assessment was conducted below with respect to the NPT and its members within the Action Area.

3.17.2 Environmental Consequences

Methods and Criteria

In accordance with CEQ, EPA, and HUD guidelines, the first step undertaken in this environmental justice analysis was to determine if there was a minority and/or low-income population in the Action Area.

If a minority and/or low-income population were determined to exist in the Action Area, then the second step undertaken in this environmental justice analysis was to determine if a "high and adverse" impact would occur. The CEQ guidance indicates that, when determining whether the effects are high and adverse, agencies are to consider whether the risks or rates of impact "are significant or above generally accepted norms." If no minority or low-income population exists in the Action Area, then the analysis is finished, and the conclusion is no effect. The NPT is identified as a minority population within the Action Area.

The final step undertaken in this analysis was to determine if the impact on the minority or low income population would be disproportionately high and adverse. The CEQ includes a non-quantitative definition stating that an effect is disproportionate if it appreciably exceeds the risk or rate to the general population.

Environmental justice impacts would be considered significant if project implementation is expected to disproportionally affect disadvantaged population.

Alternative A – No Action

Continued operation of the LOP on and adjacent to the Nez Perce Reservation would continue to impact cultural and natural resources and designated critical habitat of ESA-listed steelhead. The LOP irrigation water diversions are impairing fisheries by being a physical barrier and by decreasing stream flow that existed in the Lapwai Creek watershed, which were part a critical basis of the NPT's occupation of those lands. Low stream flow effects would be partially mitigated by incorporation of the pilot well into the LOID system. These flows would be protected for instream flows. However, the diversions would continue to be a fish barrier and affect tribal cultural and natural resources in the short and long-term.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts The short-term impacts of Alternative B would have no adverse effects on the NPT as compared with the no action alternative.

Long-term Impacts Implementation of the full groundwater exchange and title transfer would eliminate effects in the long term to Tribal cultural and natural resources. Surface water would no longer be diverted for irrigation and would be left in stream, improving designated critical habitat of ESA-listed steelhead. Additionally, the title and water rights transfers to the BIA in trust for NPT would allow for the land to be managed in a more conducive cultural and environmental manner.

Environmental Commitments

There are no environmental commitments identified for Alternative B.

Cumulative Impacts

There are no effects and, therefore, no cumulative effects from implementation of Alternative B are anticipated.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange and Title Transfer

Short-term Impacts The short-term impacts of Alternative C would be the same as those identified for Alternative B.

Long-term Impacts The long-term impacts of Alternative C would be the same as those identified for Alternative B.

Environmental Commitments

There are no environmental commitments identified for Alternative C.

Cumulative Impacts

There are no effects and therefore no cumulative effects from implementation of Alternative C are anticipated.

3.18 Climate Change

This section summarizes the existing climate of the project area, projected changes to the climate due to climate change, impacts of the project on climate change, and impacts of climate change on the project.

3.18.1 Study and Analysis Methodology

The primary source of information on the existing climate is the *Local Climate Data Summary for Lewiston-Nez Perce County Airport (KLWS)* from July 1996 through December 2008, based on daily Automated Surface Observing System data, provided by the Western Regional Climate Center (WRCC, 2008).

Sources for projected climate changes include the Northwest Chapter of the 2014 *National Climate Assessment* (Mote et al., 2014) and the report *Climate Change in the Northwest* (Dalton et al., 2013).

Climate change is driven by global GHG emissions; therefore, impact of the project on climate change is discussed qualitatively as project related GHG emissions and sequestration. Guidance on inclusion of GHG emissions and climate change in the NEPA process (CEQ, 2014) stress that, with regards to GHG and climate change analysis, the "EA or EIS should be proportionate to the effects of the proposed action." The CEQ goes on to recommend a threshold of 25,000 metric tons of equivalent CO_2 emissions per year "below which a GHG quantitative analysis is not warranted."

3.18.2 Affected Environment

Temperature

Average mean daily temperatures at the Lewiston airport range from 35ºF (average minimum of 29ºF to average maximum of 41ºF) in December to 76ºF (average minimum of 61ºF to average maximum of 91ºF) in July. The historic extreme minimum temperature is -5ºF (January 2004), and extreme maximum temperature is 110 ºF (July 2002).

Regional mean annual temperatures in the northwest are expected to rise between 3.3ºF and 9.7 ºF by the end of the century, depending on many factors, but especially total global GHG emissions (Mote et al., 2014). Temperature increases are expected to be highest in the summer and lowest in the winter (Dalton et al., 2013). Relative to the northwest region-wide average, the area around Lewiston is expected to see approximately average winter temperature increases and moderately above average summer temperature increases. Extreme temperature events are expected to increase, with number of days above 90ºF expected to increase by 8 days per year, and the freeze-free period expected to increase by 35 days by the middle of the century.

The generally warming climate would shift snow-dominant hydrographic regions to be more rain influenced and would shift summer runoff peaks associated with snowmelt to occur earlier in the year. River peak flows may increase as snowmelt occurs more rapidly. Fall low flows would decrease in magnitude and increase in duration.

Precipitation

Mean annual precipitation for the Lewiston airport is 12.4 inches. Winter and spring months tend to be wetter, with monthly averages between 1.1 and 1.7 inches; summer months tend to be drier with monthly averages between 0.5 and 0.8 inches. However, extreme precipitation events have historically been in July, with as much as 1.8 inches delivered in a single day in July 2006.

Total changes in annual precipitation due to climate change are expected to be small relative to annual variability. Annual changes in precipitation are expected to be between -5 to +14 percent by mid-century (Dalton et al., 2013). While average annual precipitation changes are expected to be small, seasonal changes are expected to be more dramatic, with higher precipitation in the fall-winter-spring, and lower precipitation in the summer. As with temperature, change in precipitation also is expected to be greatest at the extremes – with an increase in the number of dry days, as well as an increase in the number of days with very high precipitation.

Wind

Annual average wind speed at the Lewiston airport is 5.6 miles per hour, with the strongest winds generally in the winter and spring (January average of 6.4 miles per hour), and weakest in the late summer and fall (October average of 4.6 miles per hour). Peak gusts can exceed 60 miles per hour (peak 2-minute gusts above 40 miles per hour) and are generally highest during spring and winter storms. On average, more than 50 days per year experience gusts greater than 30 miles per hour and 10 days per year experience gusts greater than 40 miles per hour.

Due to system complexity, changes in wind patterns due to climate change are uncertain (Mote et al., 2014) and are not considered in this report.

3.18.3 Environmental Consequences

Methods and Criteria

Impacts of the project on climate change (GHG emissions) and of the changing climate on the project were qualitatively evaluated.

Impacts to or from climate change would be considered significant if project implementation is expected to contribute to damaging levels of GHG emissions or if the ability of the project to deliver adequate water supplies was diminished sufficiently to detrimentally change irrigation patterns.

Alternative A – No Action

Future operations of LOP are anticipated to require extensive maintenance, rehabilitation, and/or total replacement of major elements that make up the LOP to ensure adequate service to water customers. These activities would require substantial construction activities, placement of concrete, and operation of equipment – activities which are all known to emit substantial amounts of GHGs. While substantial, the amount of GHGs emitted by the maintenance and construction activities associated with Alternative A are estimated to fall well below the 25,000 metric ton threshold for quantitative analysis recommended by CEQ (2014).

As the climate changes, summers become warmer and drier, and more extreme precipitation events occur more frequently (both drought and flood), the No Action Alternative is likely to result in continued reduction in the reliability of water to LOID customers as part of the current LOP. Furthermore, the No Action Alternative also is likely to result in increased impact to ESA species as the hydrology of Sweetwater Creek shifts to an earlier and more dramatic snowmelt, and longer and lower late summer and fall low flows. Moreover, under No Action, the unique Sweetwater Springs cold water flows would continue to be diverted from fish and wildlife habitat to LOID residential and municipal water use.

Alternative B – Well Field Construction, Full Groundwater Exchange, and Title Transfer (Proposed Action)

Short-term Impacts Alternative B would result in emissions related to well field construction. These emissions would be low to moderate, especially as compared to other large regional and global GHG emissions. Sources of GHG emissions would be typical of construction projects, including the GHG emissions of operating equipment burning fossil fuels, and GHG emissions associated with construction material supply chains (cement production is a large global CO_2 emitter).

Short term effects of climate change to the project are expected to be minimal because the changes in temperature and precipitation patterns expected from climate change are anticipated to primarily occur beyond 2030.

These temporary effects would not be significant.

Long-term Impacts Alternative B would result in low continued GHG emissions related to continued operations, and maintenance of the wells and system infrastructure. The primary long-term impact to GHG emissions is the continued use of electricity to power the Pump Plant and wells. Electric power in the northwest comes from three main sources: hydroelectric, coal, and nuclear power plants. Of these, only coal power has substantial GHG emissions. Because of the area's large proportion of hydropower, long-term use of electricity by the project is expected to have relatively low, non-significant GHG emissions.

Long term effects of climate change on the project are expected to be small and not significant. The groundwater sources proposed to be used by the project are considered reliable, and are not anticipated to experience large fluctuations due to climate change related shifts in seasonal hydrology. Changing hydrology of many of the region's large rivers that support hydroelectric projects may reduce future power supply while projected higher temperatures in the summer would increase future power demand, resulting in generally higher electric rates. Increased summer temperatures may reduce the ability to perform summer system O&M; however, warmer falls, winters, and springs would generally extend the maintenance season.

The project-related restoration of flow reliability and cold water benefits to the Sweetwater Creek and Lapwai Creek watersheds will increase the adaptive buffer of the creek ecosystem to the anticipated climate change effects to creek hydrology. Because of the unique hydrologic characteristics of Sweetwater Springs, the biological value of Sweetwater Creek for steelhead is likely very high in relation to other streams in the lower Clearwater River, due to the unusually large amounts of discharge of cold water in the summer. This will allow the Lapwai Creek watershed and associated ecology to be more resilient to future climate change.

Environmental Commitments

Environmental commitments to address short term GHG emissions would include standard construction practices, such as:

- Selection of more fuel efficient and alternative fuel vehicles
- Anti-idling technology and site rules
- Selection of construction materials with lower supply chain GHG emissions, including materials produced locally

Long-term impacts to climate change, measured as GHG emissions, would be partially compensated for by increased GHG sequestration relative to the No Action Alternative. Because of the shift of LOP to groundwater sources, streams and local wetlands would be restored, increasing wetland and riparian vegetation and associated CO_2 sequestration. The additional reliability of LOP water to irrigation users also would result in additional CO_2 sequestration. Additional GHG emissions compensation would be provided by preferential selection of alternative energy sources (for example, hydropower), and a preference for low-emissions vehicles and processes used for O&M.

Cumulative Impacts

Climate change impacts related to Alternative B are anticipated to be very limited. Therefore, any cumulative effects related to known past, present, or reasonably foreseeable actions from this alternative on climate change would be anticipated to also be minimal and likely unrecognizable.

Alternative C – Clearwater River Pumping Plant and Pilot Well, Full Groundwater Exchange, and Title Transfer

Short-term Impacts Short-term impacts of Alternative C are qualitatively similar to those of Alternative B, with the difference that construction-related GHG emissions would be due to construction of a pumping plant and associated pipeline.

These temporary effects would not be significant.

Long-term Impacts Long-term impacts of Alternative C are qualitatively similar to those of Alternative B, with the difference that GHG emissions from electricity use are due to pumping plant operations.

Environmental Commitments

The environmental commitments of Alternative C are qualitatively similar to those of Alternative B.

Cumulative Impacts

Consistent with Alternative B, climate change impacts related to Alternative C are anticipated to be very limited. Therefore, any cumulative effects related to known past, present, or reasonably foreseeable actions from this alternative on climate change would be anticipated to also be minimal and likely unrecognizable.

Chapter 4 Consultation and Coordination

4.1 Introduction

The NPT, BIA, Reclamation, and LOID have been working collaboratively under a framework established in a court-mediated 2014 Agreement to inform and consult with the public and federal, state, and local agencies. Coordination began with Reclamation working very closely with the NPT, LOID and BIA through a series of meetings prior to, and through, the scoping period to develop the NEPA framework.

Reclamation, in cooperation with LOID and the NPT, used a variety of mechanisms to inform the public about the project and to encourage local residents, tribal members, and agencies to engage in activities during the scoping period and attend the scoping public meetings. For details about scoping activities and copies of notification materials, refer to the *Public Scoping Summary for the Lewiston Orchards Water Exchange and Title Transfer Project (*Appendix E*)*.

Following the scoping period, activities included ongoing interaction with the public and agencies during preparation of this EA. The public and agencies will be given the opportunity to review and comment on the Draft EA during the public comment period. Reclamation will continue to engage all parties through completion of the Final EA and, if warranted, preparation of the FONSI.

4.2 Agency Consultation and Coordination

4.2.1 National Historic Preservation Act

In compliance with Section 106 of the NHPA of 1966 (as amended in 1992), Reclamation is consulting with the Idaho SHPO to identify cultural and historic properties in the area of potential effect. A letter was sent to the SHPO on XXXX XX, 2016 initiating consultation (Appendix F).

4.2.2 Endangered Species Act (1973) Section 7 Consultation

The ESA requires Federal agencies to ensure that their actions do not jeopardize the continued existence of listed species or destroy or adversely modify their critical habitat. To comply with this requirement, agencies must consult with the USFWS or NOAA Fisheries on discretionary actions that may affect listed species. If an action may affect a listed species, the agency must initiate formal or informal consultation. If an action has no effect on listed species, no consultation is necessary.

Reclamation obtained a list of T&E species and critical habitat in Nez Perce County, Idaho. Reclamation sent consultation letters to NOAA and USFWS on XXXX XX, 2016.

4.3 Public Scoping

4.3.1 Comment Solicitation and Informational Activities

Prior to the public meetings, LOID organized many activities to familiarize the public with the project. LOID's activities during the scoping period included interviews with KLEW-TV and the *Opinion Please* radio program; running radio, TV, newspaper, and billboard advertisements; and mailing educational flyers to all LOID patrons in the district. LOID's materials directed recipients to LOID's website to learn more about the project.

A variety of materials were sent by mail to individuals, agencies, public representatives, and the NPT. Individual conservation flyers with a one-page project synopsis prepared by Reclamation were sent to each address and landowner in LOID. In addition, LOID sent educational materials and invitations to meet one-on-one with the District's Manager to every landowner in LOID who expressed any interest.

On August 21, 2015, scoping letters were mailed to property owners associated with LOP, federal and state agencies, U.S. Congressional representatives, and the NPT. The scoping letters explained the project, invited recipients to the public scoping meetings, and solicited comments and ideas about the proposed action.

4.3.2 Meetings

Reclamation conducted two public scoping meetings and met with individual agencies as part of the development of the Draft EA.

Agency Scoping Meetings

Reclamation met with NOAA and with IDFG in two separate meetings on September 2, 2015 to describe the project and solicit comments, concerns, and suggestions relative to the proposed project.

Reclamation also met with a number of local and federal government representatives and organizations to discuss the project and solicit comments, concerns, and suggestions. These included the City of Lewiston, Nez Perce County, Lewis and Clark County, and U.S. Congressional staff.

Reclamation worked very closely with the NPT and BIA, including monthly partner meetings; therefore, no additional scoping meetings with these entities were held.

Public Scoping Meetings

As part of the NEPA process, Reclamation hosted two public meetings during the scoping period. The purpose of the scoping meetings was to provide information about the proposed LOP Water Exchange and Title Transfer, and gather public input about issues and concerns associated with the proposed action.

At the meetings, participants were provided the opportunity to view information about the project by reviewing displays that provided general project information. Each display station was staffed by one or more project experts who could answer questions. This format gave meeting participants the flexibility to arrive at the meeting at a time that best suited them and to learn about the project in a more personal atmosphere.

The public scoping meetings were identical and held in two locations so community members could attend whichever was most convenient. The public scoping meetings were held:

- September 2, 2015, from 5:00 p.m. to 8:00 p.m. PST, at the Williams Conference Center located at 500 8th Avenue in Lewiston, Idaho

- September 3, 2015, from 5:00 p.m. to 8:00 p.m. PST, at the Pi-Nee-Waus Gym, located at 102 Agency Road in Lapwai, Idaho

Notification included Reclamation submitting a press release on August 7, 2015 that provided the dates of the scoping period, as well as the dates, times, and locations of the public meetings. An article announcing the public scoping meetings was published in the September issue of Ta'c Tito'oqan News, the NPT newspaper. NPT also sent email notices to Tribal members advertising the meetings. A public service announcement for the public meetings was published in the Lewiston Tribune and broadcast on local television stations.

Meeting participants were able to provide input about the project in multiple ways. Those who wished to participate filled out comment forms at a comment table or took the form home and mailed it to Reclamation at their convenience. A professional court-reporter was contracted and made immediately available to take verbal comments from those not wishing or unable to provide written comment. Finally, the website ─ established and maintained by Reclamation for the project ─ contained a fax number, two phone numbers, two email addresses, and an online comment form for public use. The address to the website was included in all press releases, articles, handouts, and letters and was displayed at the public meetings.

A total of 58 people attended the public meeting. This included:

- 53 people at the Lewiston Meeting
- 5 people at the Lapwai Meeting

4.3.3 Outcomes

Reclamation received 61 comments at the meetings, by mail, by voicemail, by fax, and by email. The comment response was as follows:

- Comment forms received at the meetings: 11
- Verbal statement received at the meetings: 9
- Comment forms received by mail: 2
- Comment forms received by email: 2
- Comments received by email: 28
- Comments received by voicemail: 1
- Comments received by fax: 2
- Comments received by letter through mail: 6

The majority of the concerns expressed in the comments focused on the following main categories in the order of most-frequently-repeated comments:

- Title of Soldiers Meadow Reservoir and Lake Waha should be transferred to IDFG
  - This will ensure that recreational access and quality of land are maintained
- Not supportive of transferring title to NPT
  - Transferring land to NPT could result in poor management of natural resources
  - The NPT has a history of closing their land to non-tribal members
- Need to ensure access to recreational areas is maintained for all
- Long-term environmental consequences of any decisions need to be taken into account
- Supportive of the water transfer, but not the land transfer
- Any agreement of transfer of title needs legal assurances and protections

All comments received are documented in Appendix E.

4.4 Follow-Up Activities

Reclamation anticipates a number of activities will be used to follow up on the input received during the scoping period. The public and agencies will be encouraged to maintain a dialogue with Reclamation, LOID, and the NPT during preparation of this EA. This will give an opportunity for those interested to keep abreast of project developments and to continue providing input on the project to the project proponents.

Following release of the Draft EA, the public and agencies will be given the opportunity to review and comment on the Draft EA during the formal public review and comment period. Reclamation will collect and review comments received during the comment period, and identify substantive comments requiring a response in the Final EA.

The Final EA will be prepared incorporating public input. Reclamation will continue to engage all parties through completion of the Final EA and if warranted, preparation of a FONSI.

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Appendix A. Legal Descriptions for Facilities and Lands Proposed for Transfer

Appendix A -Legal Descriptions for Facilities and Lands Proposed for Transfer

Description of Facilities

As described in Chapter 4 of the environmental assessment, the Bureau of Reclamation (Reclamation) has coordinated with the public and applicable agencies regarding the facilities and lands.

Table A-1. Reclamation property interest, in total acres, for each feature within the Lewiston Orchards Project (Property Interest in Acres)

Feature	Fee Title	Acquired Easement	Acquired Right-of-Way	1890 Canal Act Easement	Total
Captain John Diversion Dam and Canal	0	20	0	18	38
Soldiers Meadow Dam and Reservoir	341	0	0	0	341
Webb Creek Diversion and Pipeline	7	0	2	32	41
WF Sweetwater Diversion Dam, Canal and Flume	0	0	32	33	65
Lake Waha, Pump and Pipeline	0	87	10	14	111
Reservoir A Dam and Mann Lake	210	0	0	0	210
Filter Plant[a]	0	0	0	0	0
LOID Headquarters and Hereth Park	17	0	0	0	17
Reservoir A Pipeline and Reservoir B	3	4	6	0	13
TOTAL - Lewiston Orchards Project	578	111	50	97	836

[a] Reclamation holds title to the filter plant itself. Lewiston Orchards Irrigation District (LOID) holds title to the underlying property.

Captain John Diversion Dam

Captain John Diversion Dam is located on the upper portion of Captain John Creek in the Snake River Drainage. Project facilities in the Captain John Creek Basin consist of a small diversion dam on Captain John Creek and the Captain John Canal, which conveys water from the diversion into the headwaters of Webb Creek in the Sweetwater Basin. The first half mile of the canal has a 36-inch, half round, corrugated steel liner that was installed from 1991 to 1992. At the end of the steel liner, the canal enters an excavated earthen section that discharges into Soldiers Meadow Reservoir.

Soldiers Meadow Dam and Reservoir

Soldiers Meadow Dam and Reservoir is an embankment dam located on the headwaters of Webb Creek, approximately 26 miles southeast of Lewiston, Idaho, and 2 miles south of the Nez Perce Reservation. The dam was originally constructed as a random earth fill embankment by private interests in 1922, with ownership transferred to Reclamation in 1948. The dam was modified in 1986 under the Reclamation Safety of Dams (SOD) program. The following description and specifications are for the facility as modified in 1986.

The dam is a zoned earth-fill structure with a structural height of 68 feet and a crest length of 630 feet at a crest elevation of 4,529.0 feet. It impounds a reservoir containing approximately 2,370 acre-feet (ac-ft) of active storage at a water surface elevation of 4,517.9 feet. The upstream face of the dam is protected by a riprap blanket above elevation of 4,500.0 feet, and the downstream face is seeded with native grasses.

The spillway is located approximately 300 feet east of the right abutment of the dam and has a discharge capacity of 7,040 cubic feet per second (cfs) at a reservoir water surface elevation of 4,526.0 feet. It consists of the following items:

- A grouted, riprap-lined inlet channel
- Left and right spillway dike embankments
- An uncontrolled trapezoidal weir at crest elevation of 4,517.9 feet
- Six 48-inch diameter corrugated metal pipes (CMPs) passing under the dam access road approximately 80 feet downstream from the spillway weir
- An excavated and riprapped discharge channel with six drop structures formed by a vertical section of CMP; the upstream portion of the riprap lining of the discharge channel is grouted
- Restroom, parking and dispersed picnic facilities around the north end of Soldier's Meadow

Webb Creek Diversion Dam and Pipeline

The Webb Creek Diversion Dam is located on the Nez Perce Reservation approximately 15 miles southeast of Lewiston, Idaho, and 6 miles downstream of Soldiers Meadow Dam. Water released from the diversion dam is conveyed to the East Fork of Sweetwater Creek by the Webb Canal.

The diversion dam is a rockfill overflow weir-type structure with a structural height of 20 feet. The outlet works includes two rising stem slide gates that release water into two 30-inch diameter concrete pipes. One of these pipes diverts water into the pipeline and canal; the other passes water through the dam into the creek below for sluicing purposes. The dam is equipped with a compound rectangular weir mounted to the spillway crest and a water level sensor to measure forebay elevation. The weir blade and level sensor allow LOID to measure and control water discharged from the dam. Automatic controls also can adjust the gates to regulate flows into the Webb Creek pipeline and canal and maintain the forebay level.

The canal consists of a 7,800-foot-long section of 30-inch diameter pre-cast concrete pipe beginning at the diversion dam, and a 500-foot earth-lined channel at the downstream end of the pipeline.

West Fork of Sweetwater Diversion Dam, Canal, and Flume

The West Fork Diversion Dam is located adjacent to the Nez Perce Reservation in the upper reaches of the West Fork Sweetwater Creek. Water from the dam is conveyed for storage in Lake Waha by the Waha Feeder Canal. The diversion capacity of these facilities is approximately 15 cfs. The diversion dam is a small concrete structure approximately 2 feet high. The canal is comprised of a pipeline section that daylights into an open canal and rock channel before discharging into Lake Waha. Flows in the canal are measured at a Cipolletti weir at the downstream end of the pipeline section.

Lake Waha, Pump, and Pipeline

Lake Waha is a natural lake used by LOID as an off-stream reservoir. Located contiguous with the Nez Perce Reservation and approximately 1 mile southeast of the village of Waha, the lake is contained in a natural bowl created by a prehistoric landslide. It has no natural surface outlet; natural outflow from the lake is via seepage through subsurface strata that emerges in downstream springs (Sweetwater Springs – described further in Chapter 2, Hydrologic Conditions).

Because the lake has no surface outlet, LOID draws water from storage via a pump station located on a floating platform at the north end of Lake Waha. The pump intake is located approximately 13 feet below the water surface. The pump discharge is in a high density polyethylene pipe that is secured to floating blocks, which serve as alignment and flotation. The Lake Waha Pump electrical controls and transformers are located on the hillside adjacent to the lake. The discharge line continues from the lakeshore in an underground pipeline that discharges via Plum Creek to the West Fork of Sweetwater Creek.

Sweetwater Diversion Dam and Canal

The Sweetwater Diversion Dam is located adjacent to the Nez Perce approximately 12 miles southeast of Lewiston, Idaho. It diverts water from the mainstem of Sweetwater Creek into the Sweetwater Canal. The dam is a rockfill overflow weir-type structure with a structural height of 12 feet. The headworks includes a 5-by-4-foot slide gate that has a combined diversion capacity of 77cfs (although diversions are generally limited to less than 30 cfs by the design capacity of the Sweetwater Canal).

The diversion structure is equipped with a weir blade in the overflow spillway section and a Stevens Recorder that measures forebay elevation. Remote operating and measurement equipment is installed at the outlet works into the Sweetwater Canal, the bypass into Sweetwater Creek (located in the canal sluice way at the dam), and the Sweetwater Diversion Dam overflow weir.

The Sweetwater Canal begins at the Sweetwater Diversion Dam and extends for approximately 9 miles to Mann Lake. The canal begins as a 5-by-5-foot concrete box flume that is approximately 1.81 miles (9,565 feet) long. It then continues into a lined portion for approximately 1,800 feet. This section was lined between the 2006 and 2007 seasons with an impervious membrane protected on both sides by geotextile layers. The lining also is covered with a protective layer of shotcrete. The remaining 6.4 miles of the Sweetwater Canal are earth-lined, with the exception of short sections that have been lined with compacted earthfill, pipe, or membrane liners. The end of the Sweetwater Canal spills over a 4-foot Cipolletti weir into the Feeder Canal. The water is either diverted from the feeder canal to a siltation basin or it is diverted down the upper reaches of the Lindsay Creek channel before entering into Mann Lake.

Reservoir A Dam and Mann Lake

Reservoir A Dam is an embankment dam, located on the Nez Perce Reservation on Lindsay Creek, approximately 7 miles southeast of Lewiston, Idaho. The dam impounds Mann Lake, which is fed by the Sweetwater Canal. The project was originally constructed by private interests stating in 1906 on Native American trust lands owned by the United States and condemned in state court. Reservoir A Dam was built and modified in numerous stages. Information on some of the early work is vague and detailed information frequently conflicts between drawings and reports. Construction of Reservoir A Dam started in 1906 with a design consisting of two initial parallel, homogeneous, earth fill embankments, followed by placement of hydraulic earth fill material between the embankments. However, the center portion of the dam was never completed to its full height. Both embankments have a length of approximately 2,200 feet, and a structural height of approximately 60 feet.

The dam was later modified under Reclamation's SOD program in 1998. Previously, the reservoir had an active capacity of 3,000 ac-ft at an elevation of 1,808 feet, but due to dam safety concerns, a permanent reservoir restriction was imposed in conjunction with structural modifications to mitigate dam safety concerns. The reservoir is restricted to an elevation of 1,800 feet. This reduced maximum storage capacity to 1,960 ac-ft. At LOID's request, Reclamation completed a preliminary evaluation of the restriction and in late September 2009 decided to revise the restriction to elevation 1,804.0 feet, which would permit an additional 480 ac-ft of storage (maximum storage of 2,440 ac-ft). Reclamation is currently analyzing the performance of Reservoir A Dam to consider whether operations can be maintained at an elevation of 1,804.0 feet. Future elevation as part of this analysis have been suggested at 1805.5 feet, with continued operations at 1,804.0, 1,802.0, and 1,800.0 feet in elevation. This analysis is ongoing.

Future elevation restrictions are uncertain and are contingent upon final results of this analysis.

A series of small settling ponds are located at the point where Sweetwater Canal empties into Mann Lake. The small ponds function as sediment traps, collecting sediment conveyed through the Sweetwater Canal to Mann Lake. The reduction in water velocity associated with the ponds allows suspended sediments to fall out of the water, thereby reducing the sediment load that is carried into Mann Lake.

The Reservoir A Dam spillway is located 1,500 feet to the right of the dam on the north rim of the reservoir. The uncontrolled spillway channel is unlined and discharges into Soldiers Canyon Creek. A 1989 survey showed the spillway channel to be 35 feet wide and 175 feet long, with a crest elevation of 1810.0 feet. There has never been flow through the spillway channel and its discharge capacity is unknown.

The outlet works consist of a 36-inch diameter pipe through both embankments. There is an inclined concrete intake structure on the upstream face of the upstream embankment along with a 34.25-by-48-inch emergency slide gate. On the downstream side of the lower embankment is a 36-inch diameter gate valve, along with a steel fish screen tank and an 18-inch diameter butterfly valve for serving as an outlet drain to Lindsay Creek. The outlet works capacity is estimated to be 70 cfs with the reservoir at the top of the active conservation pool elevation of 1,800 feet, and with the emergency gate and the 18-inch butterfly valve fully open. Recreation facilities at Reservoir A include a restroom, parking, boat ramp, and boat dock.

Filter Plant Property

The property located at 3536 Shady Lane consists of approximately 4.6 acres. The property is located approximately 1 mile to the west of Mann Lake and 0.5 mile off of the Nez Perce Reservation. LOID's wood-stave pipelines and wooden flumes were deteriorating faster than the LOID operation and maintenance program could repair them. The system had deteriorated to the point that losses could be as high as 85 percent, which resulted in an inadequate water supply to many farm units and inadequate water pressure to many homes within the LOID service area. This resulted in the construction of a water treatment plant and storage tank. As originally constructed, the plant had a capacity of 1.5 million gallons per day (gpd). In 1977 and 1978, the capacity of the plant was increased to 2.0 million gpd by installing a rapid flow sand filter system. A 1.5 million gallon, ground-level concrete domestic storage reservoir is located adjacent to the filter plant.

Hereth Park Property

The property located at 1520 Powers Avenue consists of approximately 17 acres. The property is the location of the LOID headquarters and maintenance facilities. The property is located approximately 4 miles to the west of the filter plant. The property also contains a 2.5 million-gallon domestic reservoir, domestic wells 1 and 4, Hereth pump transfer facility, headquarters and maintenance shop of the Central Orchards Sewer District, and a city park with a playground, large picnic shelter and a lighted ballfield operated and maintained by the City of Lewiston.

Appendix B. Initial Report and Test Results for the Pilot Well

RHS Ralston Hydrologic Services, Inc.
GROUND WATER CONSULTING AND EDUCATION
1122 East B Street, Moscow, ID USA 83843
Voice 208 699 3989 FAX 208-882-3334 E-mail ralston@moscow.com

PROFESSIONAL ENGINEER REGISTERED 2004 STATE OF IDAHO DALE R. RALSTON

REGISTERED PROFESSIONAL GEOLOGIST DALE R. RALSTON STATE OF IDAHO

MEMORANDUM

To: Cory Baune and Amy Uptmor, J-U-B Engineers
From: Dale Ralston, RHS
Subject: Analysis of the yield potential of LOID Well #5
Date: July 14, 2015, 2015

The purpose of this memo is to provide a description of the construction of LOID (Lewiston Orchards Irrigation District) well #5 and a summary of the hydraulic testing results. A brief description of the hydrogeology is the area also is presented. The well was constructed by Boart Longyear Company in 2014-2015 at a site near the east end of the airport in Lewiston, Idaho (Figure 1).

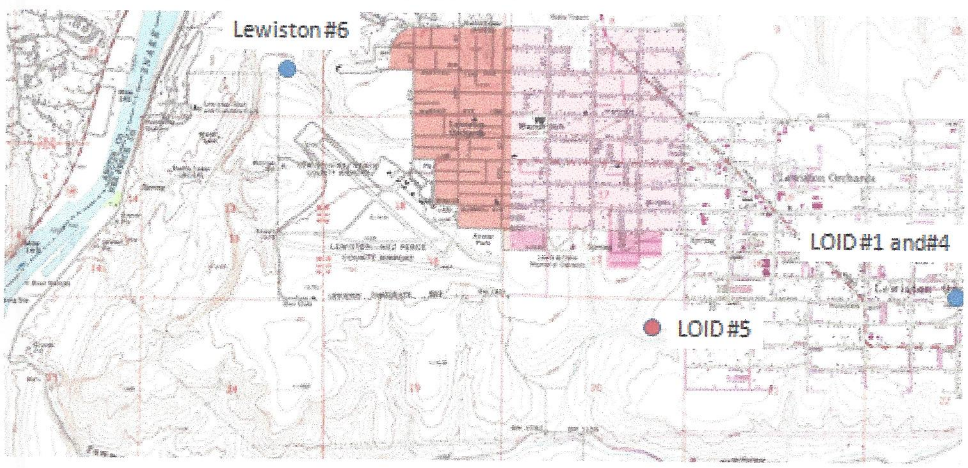

Figure 1 Well Location Map

HYDROGEOLOGIC SETTING

The Lewiston Basin is underlain by basalt flows with a few sedimentary interbeds to a depth greater than 3,000 feet. All of the basalt flows are part of the Columbia River Basalt Group. Individual formations are identified dominantly based on rock chemistry and magnetic characteristics. The drilling site is located about two miles south of the axis of a westward plunging syncline which forms the center of the basin. This means that the geologic units in the vicinity of the well site should have a small dip to the north-northwest.

The Lewiston Orchards area is underlain by basalt flows of the Saddle Mountain, Wanapum and Grande Ronde Formations. The uppermost basalt units under most of the Orchards are from the lower portion of the Saddle Mountains Formation. A relatively thick sedimentary interbed separates the lowest of the Saddle Mountains units from the uppermost of the underlying Wanapum unit. The unit, named the Sweetwater interbed, represents deposition of sediment on the basalt surface during the long time periods between eruptions of basalt for the different formations. A thinner sedimentary interbed separates the Wanapum Formation from the underlying Grande Ronde Formation, which is the target for well development.

Basalt flows of the Grande Ronde Formation host a regional aquifer in the western portion of the Lewiston Orchards area that is recharged from the Snake River. Thus, the aquifer water level is near river elevation (690 to 730 feet). All but one of the large municipal production wells for Lewiston and Clarkston are completed in this aquifer.

The regional aquifer is overlain by a series of upper aquifers that occur in the Saddle Mountains and Wanapum Formations. The upper aquifers receive recharge from precipitation and irrigation. The static water levels in the upper aquifers are lower with greater well depth but all of these upper aquifers have water levels that are higher than the water level in the regional aquifer. The upper aquifers in the Lewiston Orchards area are part of a ground-water management area administered by the Idaho Department of Water Resources because of declining ground-water levels. This management area does not include the regional aquifer.

DESCRIPTION OF WELL CONSTRUCTION

Drilling of LOID Well #5 began December 11, 2014. The contractor used a LM 175 Electric Drill Rig with 175,000 lbs of pull back, powered by a diesel generator. The following are the steps of construction:

- The first 26 feet of borehole was drilled with conventional mud rotary at a 38-inch diameter. The contractor installed a 32-inch diameter 0.375-inch thick low carbon steel conductor casing.
- The contractor drilled a 28-inch borehole from 26 feet to 810.5 in order to install a 24-inch pump chamber. Conventional mud rotary was utilized to a depth of 200 feet; then the contractor switched to flooded reverse rotary to the depth of 810.5 feet. The casing consisted of ½-inch thick 24-inch diameter A-53 steel pipe.
- A seal around the 24-inch diameter casing was installed from 810.5 feet to land surface. Grouting of the seal began on January 28, 2015 and was completed in five total lifts over three days. The first lift was to seal the bottom and was a quantity of about 0.92 cubic yards. The following three lifts were 21 cubic yards, 21 cubic yards and 14 cubic yards respectively. The final lift was a quantity of about 0.7 cubic yards to top off the seal. The calculated quantity to fill the annular space around the casing is approximately 36.3 cubic yards and a total quantity of grout installed was 57.6 cubic yards. Based on these quantities about 37% of the grout filled larger portions of the borehole and/or entered the formation.
- The contractor drilled a 19-inch diameter borehole from 810.5 to 1,705 feet using reverse air rotary. At the depth of 1705 feet the borehole size was

reduced to 12-1/4-inch and the borehole was continued using reverse air rotary to a depth of 1,900 feet.

- Fourteen-inch diameter casing was installed from 800.5 feet to 1705 feet and included 150 feet of louvered casing, and 754.5 feet of blank casing. The louvered and blank casing is made of high strength low alloy steel in accordance with ASTM A606 standard specifications. The louvered casing has a percentage of open area of approximately 13.6%. The 150 feet of louvered screen was placed accordingly in five different sections adjacent to identified water producing zones.
- The borehole was left as an open hole from 1705 feet to 1900 feet.
- The first stage of well development consisted of high pressure jetting and was completed before the installation of the screen assembly. The high pressure jetting was completed in the three highest producing zones (1,028 to 1,049 feet, 1,270 to 1,360 feet and 1,487 to 1,530 feet). The jetting tool operated at 12.5 revolutions per minute with approximately 1-inch drop or rise per revolution. The jetting tool was operated in a 10 foot section for 1 hour before moving to the next section. 50 feet of fill was produced from the jetting operation and removed from the bottom of the borehole after jetting was complete.
- The second stage of development consisting of overpumping was performed after the screen-casing assembly was installed. Early in the overpumping operations, the sand content was too high to pump into the LOID irrigation system. As a result, the water was pumped into steel tanks to settle before being pumped into the districts pressurized irrigation system. Following sufficient overpumping into the steel tanks to lower the sand content below 10 ppm, the well was pumped directly into the LOID system at up to 3,000 gpm.
- Chlorination of the well was done in three steps. The first step was to pump in 100 gallons of chlorinated water via a tremie pipe into every 100 feet of the borehole starting from the bottom up. This was done prior to installing the 14-inch diameter casing and screen. The second step was to chlorinate all casing, screen, and tools prior to being placed in the well. The third step was to dump 10 gallons of chlorine down the well from land surface after all activities including aquifer testing were done.

SUBSURFACE GEOLOGY

The following is a summary of the geologic units penetrated by LOID well #5.

0 to 80 feet	Saddle Mountains Formation basalt
80 to 295 feet	Sweetwater sedimentary interbed
295 to 505 feet	Wanapum Formation basalt
505 to 520 feet	Vantage equivalent sedimentary interbed
520 to 1,900 feet	Grande Ronde Formation basalt

The objective of LOID well #5 is to obtain water from the regional aquifer and seal out upper aquifers within the Saddle Mountains and Wanapum Formations. The surface seal around the pump chamber casing in LOID well #5 extends from land surface to a depth of 810 feet, which is almost 300 feet below the top of the Grande Ronde Formation. This ensures that operation of LOID well #5 cannot impact wells that are completed in the Saddle Mountains Formation, the Wanapum Formation and the uppermost portion of the Grande Ronde Formation.

INJECTION TESTING DURING DRILLING

A series of seven water injection tests were conducted while LOID well #5 was being constructed. The purpose of the injection testing program was to gain an understanding of the hydraulic properties of the primary water yielding zones below the bottom of the pump chamber casing.

The injection tests were conducted by connecting one or two hoses to the fire hydrant that allowed transfer of water from the potable system into the inside pipe of the drill steel. Both hoses included a flow meter and a control valve. The drilling crew installed an access pipe in the well for each test to facilitate water level measurements. A Solinst data logger with a 65-foot range in measurement pressure was attached to the end of the LOID 1,000-foot Solinst electric tape. The e-tape was used to measure the depth to water and then the line was lowered down a few feet to allow the data logger to collect temporal measurements during the test. The data logger was set to take readings on one-minute intervals. The injection tests were conducted for 30 minutes followed by a 20 minute period to measure water-level recovery.

The results of seven injection tests that were conducted during the construction of LOID well #5 are summarized below.

- The first injection test was conducted on February 4, 2015 when the borehole was at a depth of 955 feet. This test provides information on a water producing zone in the depth interval of about 905 to 937 feet. The maximum water-level rise was about 20 feet after 30 minutes of injecting about 360 gpm. This gives a specific capacity of about 18 gpm per foot of water-level rise.
- The second test was conducted on February 10, 2015 when the well was at a depth of 1,085 feet. This test provides information on the combined hydraulic properties of two water producing zones (905 to 937 feet and 1,028 to 1,049 feet). The maximum water-level rise was about 5.6 feet after 30 minutes of injecting 340 gpm. This gives a specific capacity of about 61 gpm per foot of water-level rise. The large increase in specific capacity from the first test to the second test indicates that the second water producing zone (in the depth interval of 1,028 to 1,049 feet) is two to three times more productive than the first water producing zone (in the depth interval of 905 to 937 feet).
- The third injection test was conducted on February 11, 2015 when the well was at a depth of 1,164 feet. This test provides information of the combined hydraulic properties of three water producing zones (905 to 937 feet, 1,028 to 1,049 feet and 1,140 to 1,063 feet). The plumbing was changed from one to two injection lines for the third test to allow a greater injection rate. The maximum water-level rise was about 13.9 feet after 30 minutes of injecting about 647 gpm into the well. This gives a specific capacity of about 47 gpm per foot of water-level rise. The

specific capacity from the third injection test is lower than the value of 61 gpm per foot of water-level rise calculated from the second injection test. The drop in specific capacity results from greater friction loss within and near the well (well loss) at the higher injection rate.

- The fourth injection test was conducted on February 17, 2015 when the well was at a depth of 1,374 feet. This test provides information of the combined hydraulic properties of four water producing zones (905 to 937 feet, 1,028 to 1,049 feet, 1,140 to 1,063 feet and 1,279 to 1,360 feet). This test followed the same protocol as the previous injection tests except that injection at about 346 gpm for 30 minutes was followed by a second 30 minutes injection at about 686 gpm. The purpose of the two-step injection test was to gain a better understanding of well loss characteristics and have data to compare to the second injection test (at the lower rate) and the third injection test (at the higher rate). The specific capacity at the lower injection rate was 122 gpm per foot of water level rise and the specific capacity at the higher injection rate was 133 gpm per foot of water-level rise. These results indicate that the water producing zone in the depth interval of 1,279 to 1,360 feet has high hydraulic conductivity. .

- The fifth injection test was conducted on February 23, 2015 when the well was at a depth of 1,526 feet. Additional water-producing zones had been penetrated in the depth ranges of 1,421 to 1,427 feet, 1,450 to 1,461 feet and 1,487 to 1,526 feet. The upper two water producing zones are relatively thin and thus individual injection tests were not run. The fifth injection test followed penetration of a thicker water producing zone in the depth range of 1,487 to 1,526 feet. This test followed the same protocol as the previous injection tests with a 30-minute period of injection at 640 gpm followed by a 20-minute recovery period. The specific capacity was about 173 gpm per foot of water-level rise. This increase in specific capacity indicates that the water producing zone from 1,487 to 1,526 feet has medium to high hydraulic conductivity.

- The sixth injection test was conducted on February 26, 2015 when the well was at a depth of 1,669 feet. Several possible water-producing zones had been penetrated in the depth ranges of 1,584 to 1,644 feet with small fractures and soft reddish rock. The sixth test followed the same protocol as the previous injection tests with a 30-minute period of injection of about 650 gpm followed by a 20-minute recovery period. The specific capacity was about 206 gpm per foot of water-level rise. The increase in specific capacity from the fifth test (173 gpm to 206 per foot of water level rise) to the sixth test indicates that the depth range of 1,584 to 1,644 feet yields a moderate amount of water.

- The seventh injection was conducted on March 4, 2015 when the well was at the final depth of 1,900 feet. A major water producing zone in the depth interval of 1,800 to 1,820 feet was penetrated in addition to several smaller fracture zones between 1,700 and 1,800 feet. The seventh test followed the same protocol as the previous injection tests with a 30-minute period of injection of about 650 gpm followed by a 20-minute recovery period. The specific capacity was about 455 gpm per foot of water-level rise. The large increase in specific capacity indicates that the water producing zones below about 1,700 feet are significant.

Table 1 provides a summary of the information gained from the injection testing program. The measurements of static depth to water were taken prior to the injection test and after drilling had ceased for about one hour. The low discharge (low Q) specific capacity values are when only one discharge hose was used and the high specific capacity values (high Q) are when two discharge hoses were used. The specific capacity increased with depth because of testing a larger portion of the well (below the bottom of the casing at 810 feet) with a greater number of producing zones. The depth to water values increased with depth from 955 feet to 1,164 feet and then decreased from 1,164 to 1,900 feet with the greatest rise in water level occurring after penetrating the large yield zone in the depth range of 1,800 to 1,820 feet.

Table 1 Information gained from the injection testing program

Well Depth	Static Depth to Water	Specific Capacity Low Q	Specific Capacity High Q
955 feet	597.1 feet	18 gpm/ft	
1,085 feet	597.6 feet	61 gpm/ft	
1,164 feet	599.3 feet		49 gpm/ft
1,374 feet	597.9 feet	122 gpm/ft	133 gpm/ft
1,526 feet	596.9 feet		173 gpm/ft
1,669 feet	596.8 feet		206 gpm/ft
1,900 feet	592.4 feet		455 gpm/ft

BOREHOLE GEOPHYSICAL SURVEY

Three sets of borehole geophysical logs were obtained after the borehole was constructed but before placement of screen and casing below a depth of 810 feet. The first run was after the well had been undisturbed for more than 24 hours and yielded a standard suite of logs: 1) natural gamma, 2) three point resistivity, 3) fluid resistivity and 4) fluid temperature. The second run was for caliper. The third run was conducted to obtain a temperature log after water had been injected in the borehole (about 270 gpm for 2 hours) in an attempt to obtain a clearer video log of the well. The important results from the borehole geophysical survey are presented below.

Static Water Temperature Log

The static water temperature log (Figure 2) shows that warmer water originates from the zone at about 1,820 feet and flows upward to a depth of about 1,000 feet. There appears to be very little flow within the borehole from the bottom of the pump chamber at a depth of about 810 feet to about 1,000 feet. Interestingly, the water temperature in the bottom of the borehole is lower than at a depth of about 1,820 feet. This temperature pattern supports the hypothesis that the water producing zone at a depth of about 1,820 feet is a vertically oriented fault rather than a horizontally oriented flow contact zone. There appears to be very little water production in the depth interval of about 1,820 feet to the bottom of the borehole at a depth of 1,900 feet. The line shown on Figure 2 identifies what I believe is the temperature gradient within LOID well #5 (0.8 degrees F per 100 feet). This is considerably lower than what is generally accepted as the world-wide average geothermal gradient of about 1.8 degrees F per 100 feet. The "step-wise" pattern of water temperature at the approximate depths of 1,720 feet, 1,639 feet and 1,515 feet may represent depths where water flowing up the well from the higher temperature water from about 1,820 feet entered water producing zones.

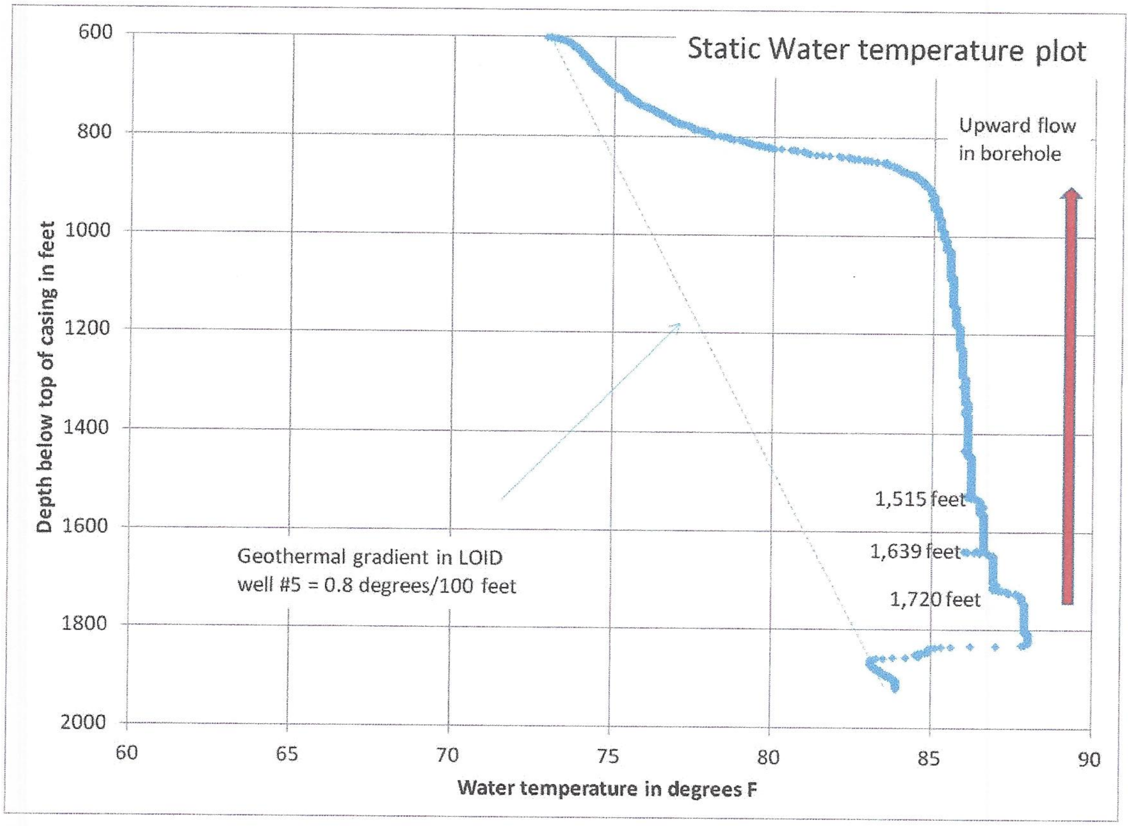

Figure 2 Borehole temperature log under static conditions

Water Temperature Log after Water Injection

The borehole temperature log run after several hours of water injection into the well (Figure 3) provides important information relative to the yielding characteristics of the water producing zones. The temperature log was run less than 30 minutes after the end of water injection. The plot shows that the injected water flowed over nearly the full depth of the borehole with some water entering the water producing zone at a depth of about 1,820 feet.

A group of significant water producing zones may be identified by the borehole temperature variations in the general depth range of about 1,200 feet to 1,500 feet on Figure 3. Higher temperature readings are evident at depths of 1,288 feet, 1,340 feet and 1,427 feet. These are zones where the warmer water from the water producing zones is entering back into the borehole after the end of water injection. Smaller zones are evident at depths of about 1,167 feet and about 1,720 feet. The large increase in water temperature near the bottom of the borehole is associated with the water producing zone at a depth of about 1,820 feet. Note that the water temperature at the bottom of the borehole at 1,900 feet is the same in both plots (Figures 2 and 3). This indicates that the borehole below about 1,820 feet did not penetrate any major water producing zones.

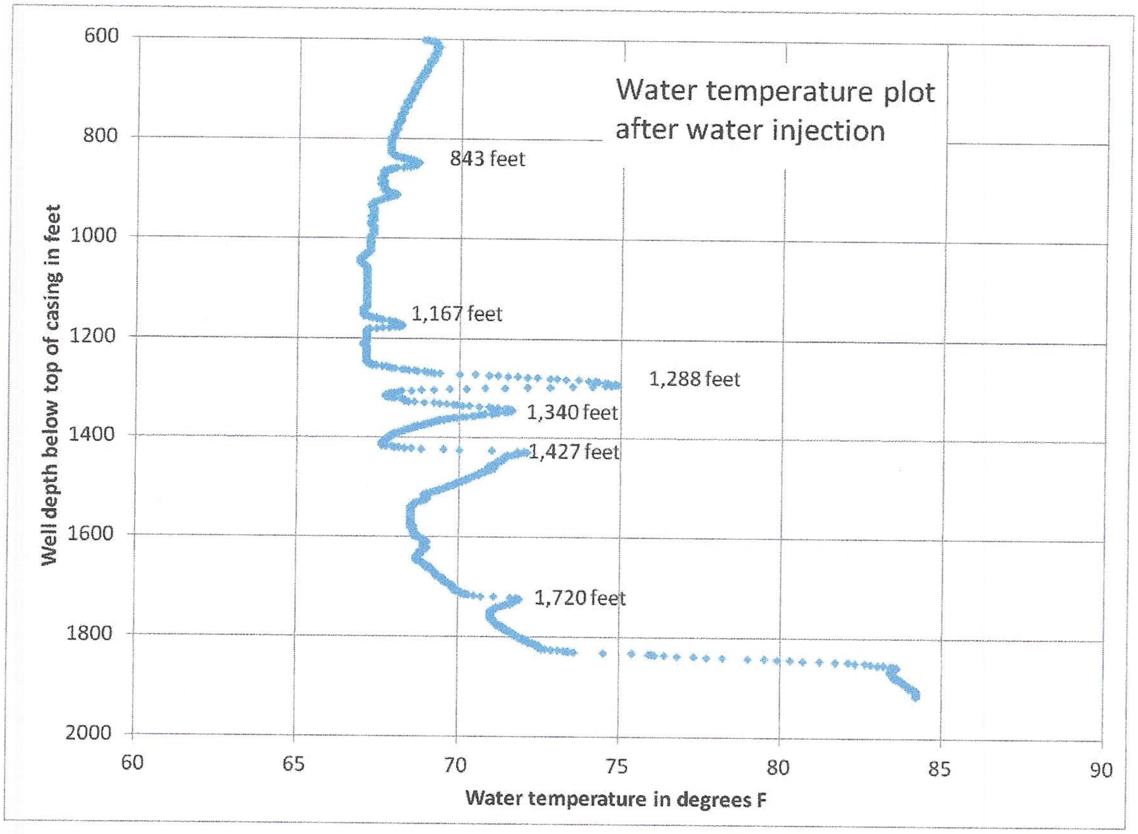

Figure 3 Borehole temperature log after water injection

Caliper Log

The caliper log provides information on the diameter of the borehole and thus on the presence or absence of fracture zones (Figure 4). A three-arm caliper tool was used for the survey. Thus, the diameter shown can represent one of the arms and not all three arms. A fracture on one side of the borehole will cause the same logged increase in diameter as a uniform larger diameter borehole.

The pump chamber casing is shown for the depth range of 600 feet to 810 feet. The nominal diameter of the drilled borehole is 19 inches in the depth range of 810 feet to 1,705 feet with a nominal diameter of 12 inches from 1,705 feet to 1,900 feet. Figure 4 shows that the diameter of the drilled hole was much larger than 19 inches at a number of depths between 810 and 1,705 feet. Depth notations are given on Figure 4 for larger diameter portions of the borehole. Some but not all of the peaks on the caliper log are associated with the water producing zones identified by the driller or from analysis of the water temperature logs.

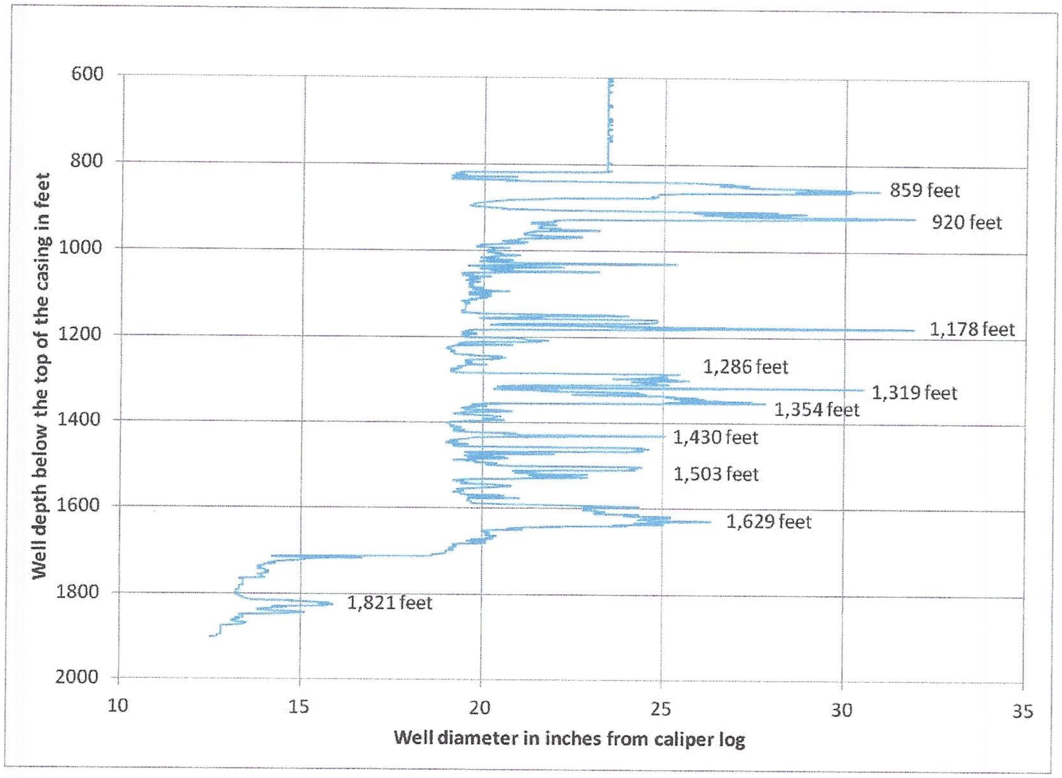

Figure 4 Caliper Log of the Borehole

HYDRAULIC TESTING

Three programs of hydraulic testing were conducted during and after the drilling of LOID well #5: 1) injection testing during drilling, 2) short-term variable rate pumping during well development and 3) a constant rate test. The injection testing program is described above. The remaining hydraulic testing programs are described in the following sections.

Aquifer Testing During Well Development

The second part of well development involved "overpumping" to remove the remaining sediment from the well. Overpumping was performed with a right angle drive pump driven by two 750 horsepower diesel engines. Early in the overpumping operations the sand contact of the discharge water was too high to pump into the LOID irrigation piping system. As a result, the water was pumped into steel tanks to settle before being pumped into the district's line. The tanks filled fast and thus the well was pumped only for five to ten minute periods depending on the pumping rate. Gradually over several days the sand content decreased enough so that the well water could be piped into the LOID system.

Water-level data were collected during the latter portion of overpumping well development. The measured drawdown was 5.3 feet after 13 minutes of pumping at a rate of 1,500 gpm. The drawdown was 9 and 16.5 feet after pumping at rates of 2,000 and 3,000 gpm respectively for two hours. This information proved to be sufficient for selection of a pumping rate for the constant rate test. Thus, the 12-hour step drawdown test that was scheduled after well development but before the constant rate test was not run. The 12-hour pumping period in the budget for the step-drawdown test was added to the planned 24-hour constant rate test to allow a longer period of constant rate pumping.

Constant Rate Test

A pumping rate of 3,000 gpm was selected for the constant rate test based on the discharge/drawdown data described above. The constant rate pumping test was conducted from April 8-10, 2015 with 36 hours of pumping at an approximate rate of 3,000 gpm. The well was allowed to recover for a period of 36 hours following the pump test before measurement tools were disturbed to facilitate pump removal. Discharge measurements were obtained using an in-line flow meter with readings taken by Boart Longyear employees. Water was discharged into the LOID irrigation piping system. Measurements of depth to water were obtained using an electric tape by Boart Longyear employees and also using a Solinst data logger. A second data logger was installed in LOID well #1 which is located about 8,700 feet away from LOID well #5 near the LOID office on Power Avenue (Figure 1). LOID well #4, located about 300 feet from LOID well #1 was not operated during the aquifer test period in order to allow LOID well #1to be an effective observation well.

Depth to water plots based on hand measurements (Figure 5) and data logger records (Figure 6) are very similar and show about 22 feet of drawdown after pumping LOID well #5 for 36 hours at an average rate of slightly less than 3,000 gpm (2,980 gpm). This gives a specific capacity value of about 136 gpm per foot of drawdown. Drawdown was very rapid at the start of the test with 7.35 of water level drawdown in the first minute of pumping and 13.72 feet of drawdown after 15 minutes of pumping (based on hand measurement data). The water level in LOID well #5 at the end of the recovery period was about one foot lower than the original static. The lack of full water-level recovery after a period of time greater than the pumping period and is addressed later in this memo.

Based on accepted aquifer hydraulics, a plot of depth to water or drawdown versus the logarithm of time since pumping started should be linear if the aquifer penetrated by the pumping well is homogeneous and isotropic (hydraulic conductivity does not change with location or direction), the aquifer has an infinite areal extent and the pumping rate is held constant. Figure 7 shows a plot of drawdown in feet versus the log of time in minutes based on data logger readings. Two straight lines are superimposed on the data plot. The first line fits the data plot from about 16 minutes to about 700 minutes of pumping and the second line fits the data plot from about 700 minutes to the end of the test at 2,160 minutes. This water-level response is typical of the presence of one or more negative aquifer boundaries. The presence and importance of aquifer boundaries are addressed in the discussions section of this memo.

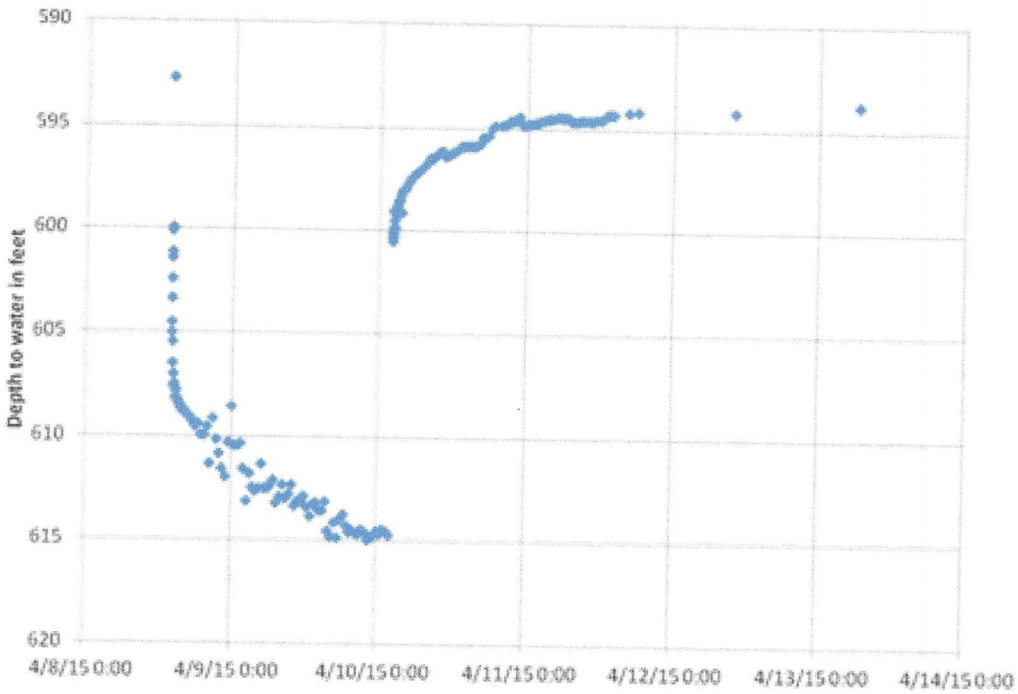

Figure 5 Hydrograph from hand measurements during the constant rate test

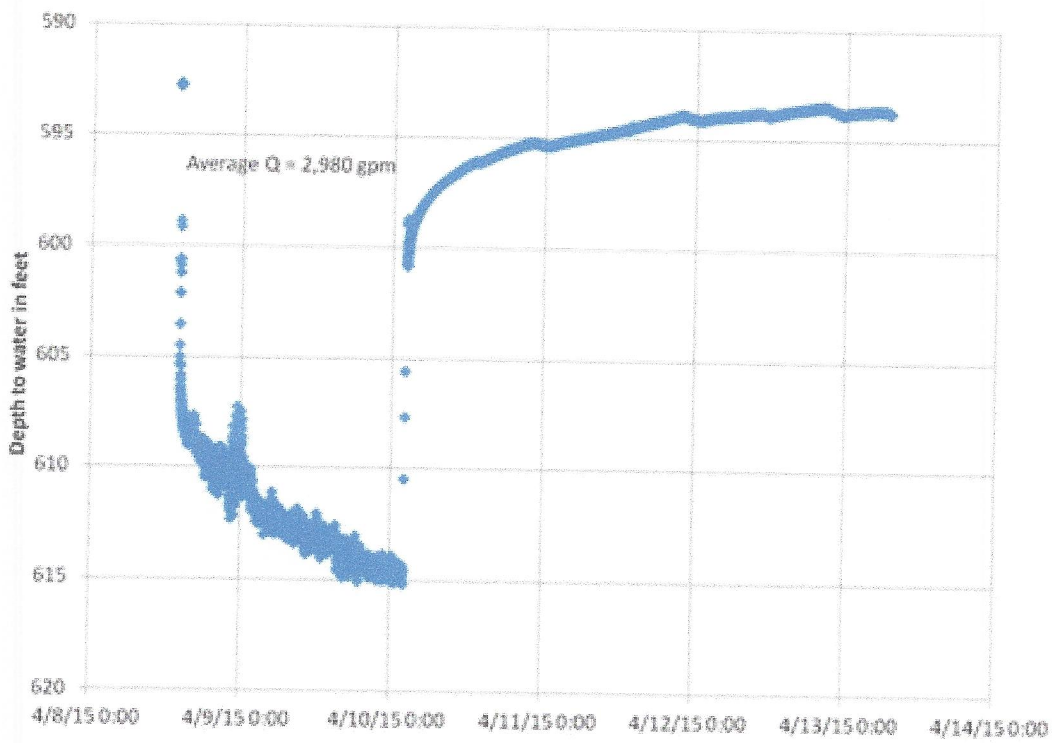

Figure 6 Hydrograph from data logger readings during the constant rate test

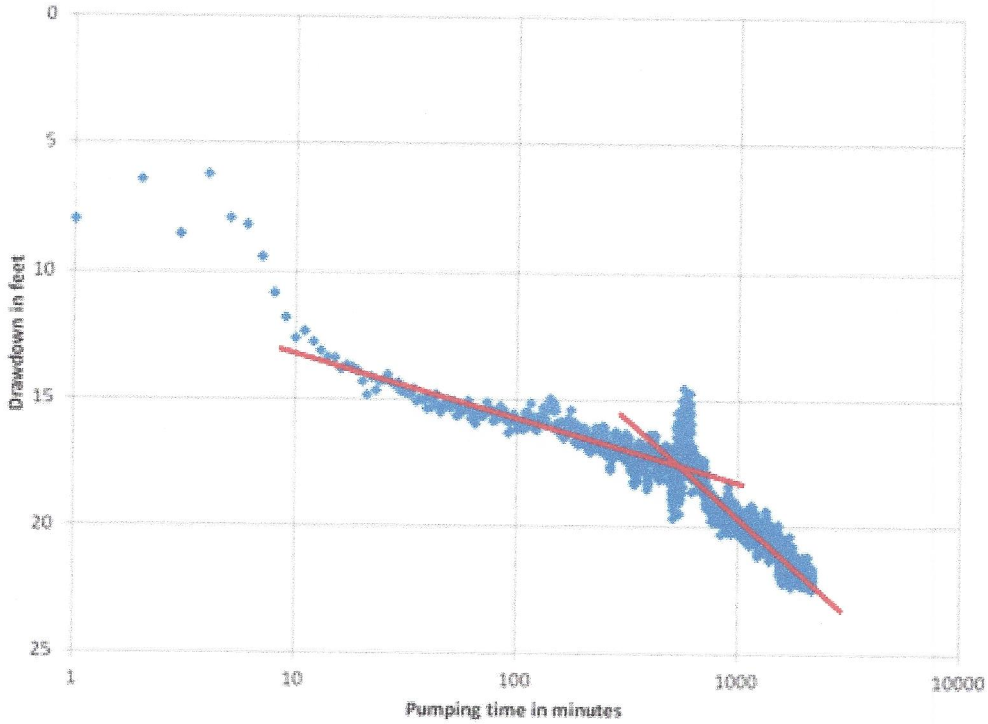

Figure 7 Semi-log drawdown plot using data logger readings

Wells completed in the regional aquifer in the area are hydraulically connected. This connection is evident in the monitoring data from LOID wells #5 and #1.The water level in LOID well #1 was impacted from the pumping of LOID well #5 during the constant rate test. Figure 8 shows about 2.5 feet of drawdown in LOID well #1 which is about 8,700 feet from LOID well #5. The hydrograph for LOID well #1 also shows about 20 feet of drawdown from operation of LOID well #4 which is located about 300 feet away. Small changes in water level (0.2 feet) in LOID well #5 during the recovery period from the constant rate test correlate with the pumping history for Lewiston well #6 which is located about 13,000 feet away (Figure 9). Figure 10 shows a hydrograph for LOID well #5 for a two-month period after the end of the constant rate test. The drawdown effects from LOID well #4, Lewiston well #6 and other wells in the basin are evident in the water-level pattern. The overall downward water-level trend reflects increased pumping from the large yield wells completed in the aquifer associated with the start of outside water use. The water levels in the regional aquifer likely are highest in the spring and lowest level in the fall. Thus, water levels in LOID well #5 probably will continue to decline until about October and then recover through the winter and into next spring. There is no historic pattern of long-term water-level decline in wells completed in the regional aquifer based on measurements taken in each spring.

DISCUSSION

Yield Characteristics of LOID well #5

LOID well #5 is capable of yielding 3,000 gpm for an extended period of time. Drawdown after 36 hours of pumping was 22 feet. The available drawdown (distance between the static water level and the lowest pump setting) is about 200 feet. The well is completed in the regional aquifer within the Grande Ronde Formation which has a history of minimal long-term water-level decline because of a hydraulic connection to the Snake River.

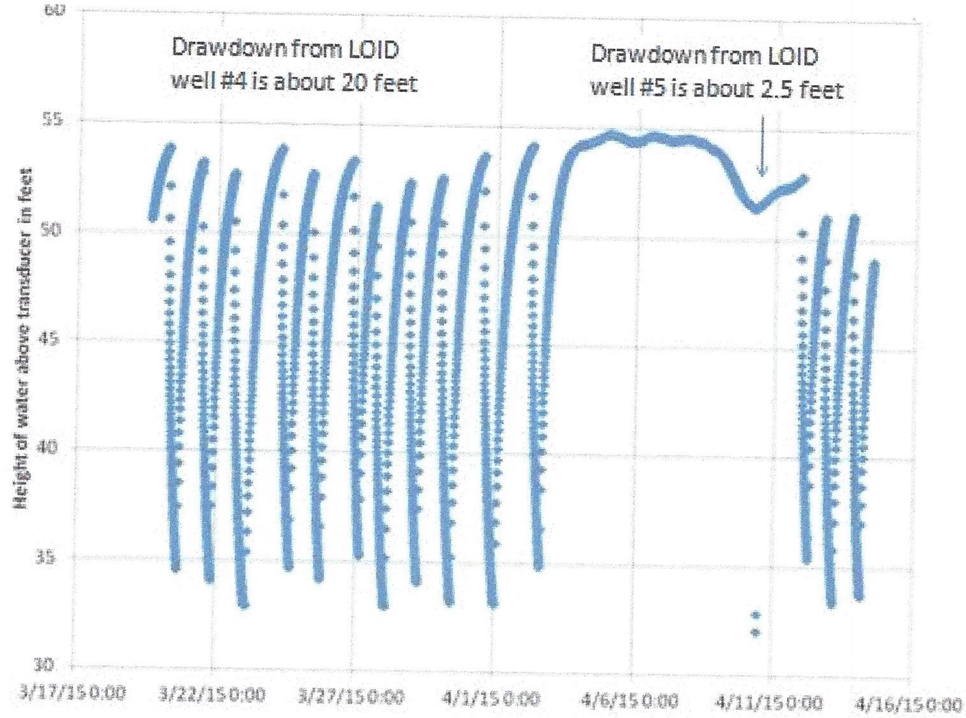

Figure 8 Hydrograph for LOID well #1 showing pumping impacts

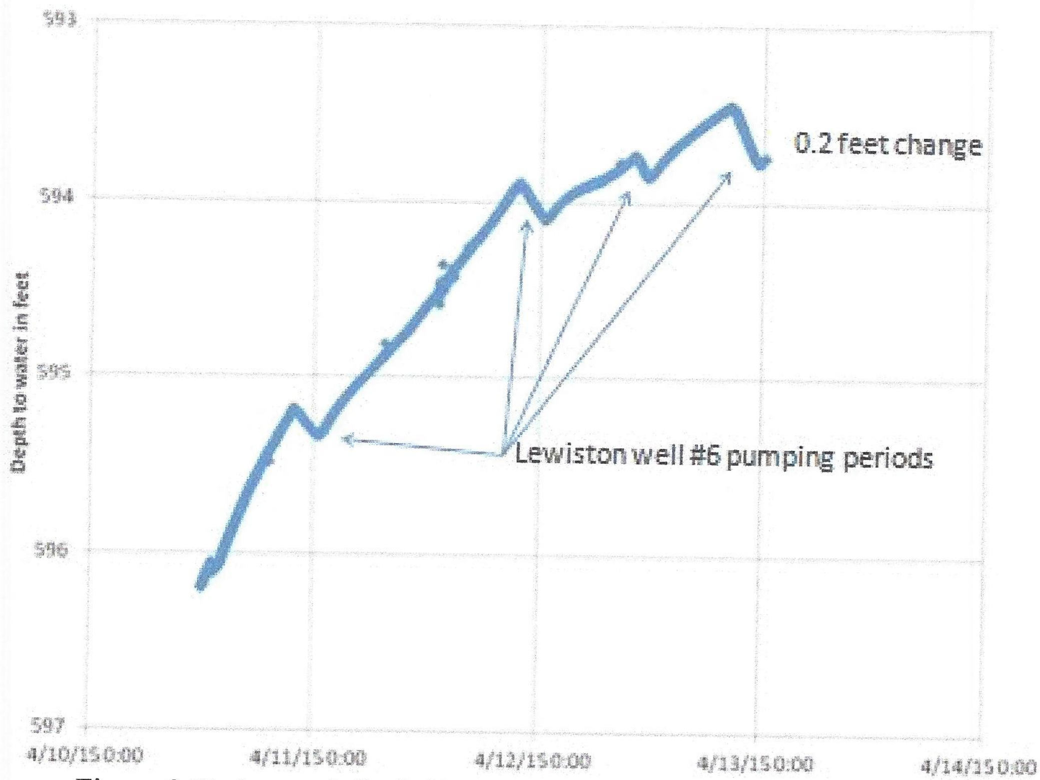

Figure 9 Hydrograph for LOID well #5 showing pumping impacts

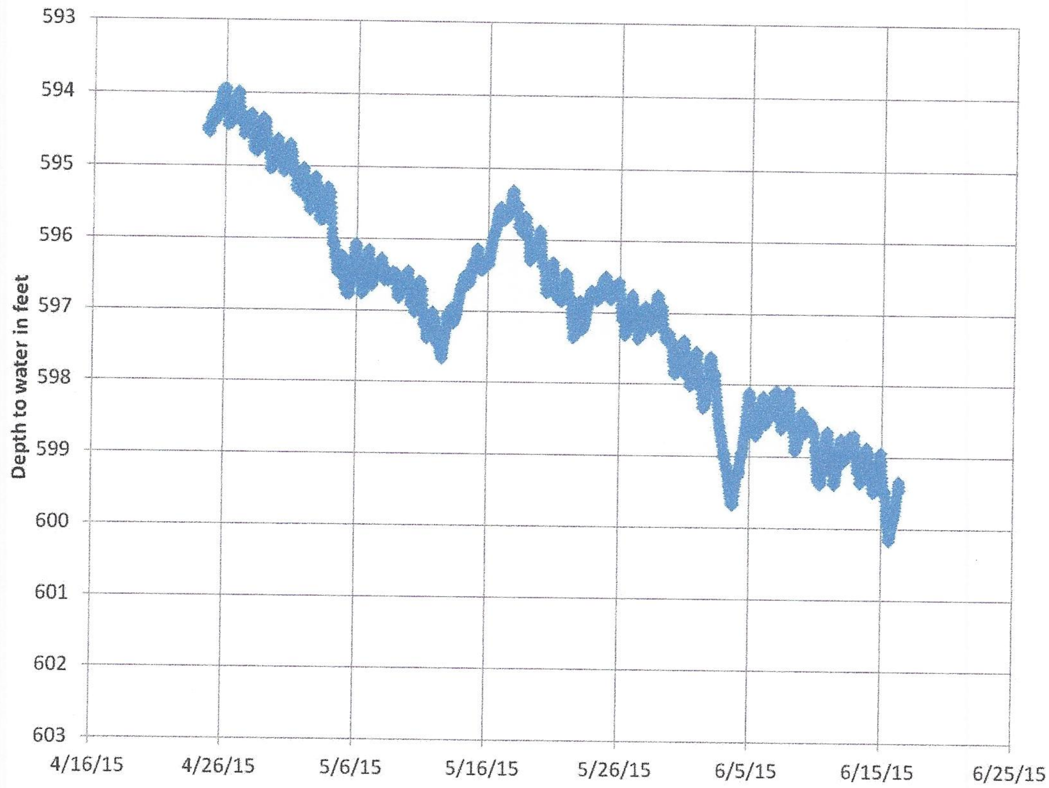

Figure 10 Hydrograph for LOID well #5 after the constant rate test

Three questions need to be addressed relative to the results of the constant rate aquifer test. 1) What caused the change in slope in the semi-log drawdown plot? 2) Why didn't the water level in LOID well #5 fully recover after the 36-hour constant rate test? 3) What are the implications relative to long-term operation of the well?

The following are three possible explanations for the increase in the slope of the semi-log drawdown plot. The second and third explanations also address the lack of full water-level recovery after the constant rate test.

- The average pumping rate was about 2,900 gpm for the first 700 minutes of the test and about 3,000 gpm for the remainder of the pumping period. Although the slope of the log-linear drawdown plot should be greater after 700 minutes of pumping because of the increased average pumping rate, the small increase in the pumping rate likely is not the primary cause for the change in slope shown on Figure 7

- The water producing zones in the Grande Ronde Formation that provide water to LOID well #5 are bounded to the north near the bottom of the Lewiston grade by a structural feature. The Grande Ronde Formation dips steeply to the south on the Lewiston grade (the slope of the grade is about the same as the dip of the rocks) and is nearly horizontal south of the Clearwater River and the east-west segment of the Snake River. A fault located near the bottom of the Lewiston grade has been postulated to explain the change in dip. This structural feature very likely forms a no-flow boundary to the aquifer on the north. Similarly, a large fault that trends approximately east-northeast by west-southwest is present about 15 miles southwest of Lewiston. The basalt is dropped down north of this fault relative to the south side of the fault. This feature likely also forms a no-flow boundary to the aquifer. The presence of these approximately parallel boundaries would result in an increase in the log-linear slope of the drawdown plot for LOID well #5 and is a likely explanation for the drawdown pattern shown on Figure 4.

- The major producing zone intercepted in LOID well #5 in the depth range of 1,800 to 1,820 feet is believed to be a fault with a significant vertical orientation rather than a flow contact zone that is approximately horizontal. This conclusion is based on the increase in water temperature from the zone from the borehole geophysical logs and the significant increase in water level as measured during the seventh injection test. The fault likely is a linear feature with nearby boundaries.

The presence of no-flow boundaries in the vicinity of a pumping well explains both the change in the slope on a semi-log drawdown plot and the less than full water-level recovery that was measured as part of the constant rate test of LOID well #5. The presence of northern and southern boundaries on the aquifer does not limit the viability of the aquifer within the Grande Ronde Formation as a long-term source for large yield production wells. This is because there is also a hydraulic connection of the aquifer with the Snake River both upstream from Lewiston and downstream of the Clarkston. The upstream aquifer connection with the river occurs because the northern dip of the rocks is steeper than the northern gradient of the Snake River. The water producing zone at a depth of 1,300 feet in LOID well #5 outcrops in the bottom of the river a few miles upstream of Asotin, Washington. The downstream aquifer connection of the river is where the fault at the base of the Lewiston grade crosses the river. The downstream connection has been confirmed by historic water-level data from deep wells in Clarkston that show a water-level rise associated with filling of the pool behind Lower Granite Dam in the late 1970's.

The role that the fault penetrated by LOID well #5 plays in long-term water supply is uncertain. The available data from the injection tests indicate that water producing zones above the postulated fault (above 1,800 feet) are capable of providing at least 2,000 gpm for well production regardless of the hydraulic constraints of the fault system.

CONCLUSIONS AND RECOMMENDATIONS

LOID well #5 has been constructed with a surface seal that extends to a depth of 810 feet around the pump chamber casing. This insures that there is no hydraulic interconnection the upper aquifers in the Saddle Mountains and Wanapum Formations with the regional aquifer in the Grande Ronde Formation.

LOID well #5 is a success because the target yield (2,000 gpm) has been exceeded and because the well has been constructed with considerable available drawdown (distance from the static water level to the lowest possible pump setting). Although pumping at 3,000 gpm was successful for a 36 hour period, I recommend that the target production rate of LOID well #5 should be about 2,000 gpm. The reasons for this recommendation are as follows.

- The postulated fault in the depth range of 1,800 to 1,820 feet is a significant source of water for LOID well #5 but may not have a hydraulic connection to the Snake River. The long-term productivity of this interval is unknown and thus the yield of LOID well #5 may be less than the 3,000 gpm determined during the aquifer test.
- Operation of LOID well #5 at a rate of 2,000 gpm rather than 3,000 gpm will result in less drawdown in the pumping well and other nearby wells. Future plans are to install LOID wells #6, #7 and #8 completed in the same aquifer. Holding LOID well #5 to a pumping rate of about 2,000 gpm may be needed because of mutual interference drawdown caused by operation of the additional production wells.

I recommend that a program of water-level monitoring be established in LOID well #5 both prior to and after installation of a pump. Hydrologic data from all of the LOID wells should be compiled and analyzed on at least an annual basis to identify any possible long-term water management problems.

Appendix C. Evaluation of Groundwater Development Potential for LOID Irrigation Water from the Regional Aquifer in the Lewiston Basin, Idaho Report

RHS **Ralston Hydrologic Services, Inc.**

GROUND WATER CONSULTING AND EDUCATION
1122 East B Street, Moscow, ID USA 83843
Voice and FAX 208-883-0533, E-mail ralston@moscow.com

EVALUATION OF GROUND WATER DEVELOPMENT POTENTIAL FOR LOID IRRIGATION WATER FROM THE REGIONAL AQUIFER IN THE LEWISTON BASIN, IDAHO

Prepared for J-U-B Engineers, Inc.

Lewiston, Idaho

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INTRODUCTION

The purpose of this report is to provide an analysis of the potential to use ground water as the supply source for irrigation water for the Lewiston Orchards Irrigation District (LOID) located in Lewiston, Idaho. This is one of the alternatives identified as part of the Lower Clearwater Exchange Project. In this alternative, ground water pumped from the regional aquifer under the Lewiston Basin would serve as the replacement of the present surface water source that includes Waha Lake and Soldier Meadows Reservoir.

Deep wells presently provide the domestic water supply for LOID, the Asotin Pubic Utilities District (APUD) in Clarkston, Washington, the City of Asotin, Washington and part of the domestic supply for the City of Lewiston, Idaho (Figure 1). A few private wells are completed in the regional aquifer with the majority completed in shallower water producing zones.

Three primary questions are addressed in this report. First, what impacts on the aquifer, such as water-level decline, could be anticipated with the development and operations of LOID irrigation wells in the regional aquifer? Second, what is the potential for successful development of the LOID irrigation wells? Third, where should the LOID irrigation wells be located and what are the primary construction issues? Additional questions, such as water rights and the economic feasibility of well development, are not addressed in this report.

Information for this report has been drawn from published reports and maps and from well operational data from LOID, APUD and the City of Lewiston. The references of particular importance are the Ralston Hydrologic Services reports pertaining to the design and construction of the existing LOID wells (#1, #2, #3 and #4) and the planned construction of LOID well #5, all used for the LOID domestic supply system. These reports plus support geologic and hydrologic documents are cited where necessary. The University of Idaho thesis prepared by Gary Stevens in 1994 under the direction of Dr. Ralston is of particular importance because the appendices include well discharge and water-level data on LOID, APUD and Lewiston wells from the 1960's into the early 1990's. The data from obtained from LOID, APUD and the City of Lewiston are used to update the Stevens water level and well discharge data from the early 1990's to the present.

HYDROGEOLOGIC SETTING

The LOID service area is located within the Lewiston Basin, which is a broad synclinal trough underlain to considerable depth by layers of basalt and sediments of the Columbia River Basalt Group. The geologic units extend into eastern Washington including the Clarkston and Asotin areas and Chief Timothy Park which is located west of Clarkston along the Snake River. The Lewiston Hill is the northern boundary of the basin; this feature includes the steep northern flank of the syncline and several small faults. A northeast-southwest trending fault separates the basin from the uplifted Craig Mountain to the south. The structural basin is dominated by an east-west trending syncline that forms a shallow bowl. The confluence of the Snake and Clearwater Rivers is near the lowest portion of the structural basin.

The primary formations of interest within the Columbia River Basalt Group in the Lewiston Basin are the Saddle Mountains Formation, the Wanapum Formation and the Grande Ronde Formation. A geologic analysis of cutting samples from LOID well #4 resulted in the following stratigraphic interpretation.

Depth range in feet	Geologic Unit
0 to 423	Saddle Mountains Formation
423 to 456	Sweetwater Interbed
456 to 640	Priest Rapids Member of the Wanapum Formation
640 to 680	Vantage Interbed equivalent
680 to 1625	Grande Ronde Formation

The Grande Ronde Formation, which is the host geologic unit for the regional aquifer, has been divided into four stratigraphic units based on residual magnetic polarity in the rock. From bottom to top these are R1 (Tgr1 – lower reversed polarity unit), N1 (Tgn1 – lower normal polarity unit), R2 and N2. The N2 unit is not present in the Lewiston basin. Outcrop areas for the remaining three units in Idaho are shown on Figure 2. The R2 (Tgr2) unit includes the uppermost portion of the Grande Ronde Formation. As is shown on Figure 2, this unit outcrops along the lower reach of Lapwai Creek, along the Clearwater River for some distance below the confluence with Lapwai Creek and along the Snake River above Asotin. Unit N1 (Tgn1) underlies R2 and outcrops along Sweetwater Creek, Lapwai Creek above the confluence with Sweetwater Creek, along the Clearwater River near and above the mouth of Lapwai Creek and along the Snake river south of Asotin. The R1 unit underlies N1 and also outcrops along the Snake River further south from Asotin. The R1 (Tgr1) outcrops along the Snake River near the confluence of the Grande Ronde River and in a short reach of the upper portion of Lapwai Creek.

The regional ground-water flow system in the Grande Ronde Formation within the Lewiston basin has been well documented for much of the area (Cohen and Ralston, 1980; Stevens, 1994). The dominant area of recharge for the regional ground-water flow system within the Grande Ronde Formation is believed to be located south of Asotin along the Snake River. The northward dip of the rocks is greater than the gradient of the Snake River thus resulting in the three Grande Ronde units outcropping in the river with the lowest unit further south than the upper two units. Figure 2 shows the outcrop areas of the three units near the river. The primary discharge area for the aquifer is believed to be west of Clarkston near Chief Timothy Park where the geologic structures that form the Lewiston grade cross the Snake River.

All of the larger production wells in the Lewiston Basin penetrate and obtain ground water from the Grande Ronde Formation. Ground water is obtained from zones of fracturing located primarily at contacts between individual basalt flows. The total yield of a given well is the sum of the yields of each of the flow contact aquifers penetrated by the screened or open-hole portions of the well. Most of the private wells are shallower and are completed in either the Saddle Mountains or the Wanapum Formations. The general pattern is that deeper wells have lower ground-water levels than shallow wells.

Information on the deep public supply wells that penetrate and obtain ground water from the Grande Ronde Formation of the Columbia River Basalts is presented in Table 1. Not all of the wells are presently in use. The table was created based on information from Stevens (1994) and from the water supply entities. Table 1 includes wells for LOID, APUD and the City of Lewiston. Locations of the wells are shown on Figure 1. The majority of the listed in Table 1 have ground-water levels approximately at the elevation of the Snake and Clearwater Rivers (680 to 740 feet). The static water levels in these wells are near the elevation of the Snake and Clearwater River because the regional aquifer within the Grande Ronde Formation is hydraulically connected to the Snake and probably the Clearwater River.

Table 1 Information on Selected Wells in the Lewiston Basin

Well No.	Discharge	Static Depth to Water	Pumping Depth to Water	Surface Elevation	Well Depth	Well Bottom Elevation	Specific Capacity	Water Level Elevation
	(gpm)	(ft)	(ft)	(ft)	(ft)	(ft)	(gpm/ft)	(ft)
APUD #1	2950	186	241	850	970	-120	54	711
APUD #2		69		793	1958	-127		724
APUD #3	3500	266	414	999	1100	-104	24	733
APUD #4		155		876	840	36		721
APUD #5	2235	420	525	1147	1330	-183	21	707
APUD #6	3225	287	333	993	1069	-76	70	731
APUD #7	2900	450	567	1180	1340	-160	25	716
LOID #1		851		1554				703
LOID #2	500	501	900	1742	1957	-215	1	1241
LOID #3	660	695	1312	1419	2617	-1198	1	724
LOID #4	1100	847	870	1566	1625	-59	47	719
Lew #1A		42		730	735	-5		688
Lew #2		20		735	275	460		715
Lew #3		108		837	600	237		729
Lew #4		15		743	358	385		728
Lew #5		128		855	600	255		727
Lew #6	1330	565	572	1306	1791	-485	190	741

One of the wells listed in Table 1 has a water-level elevation that is higher than the normal range for the regional aquifer. Well LOID #2 is almost 2,000 feet deep and is completed in the Grande Ronde Formation but has a water level elevation that is about 500 feet higher than wells that obtain water from the regional aquifer. The available information indicates that the aquifer that provides water for LOID #2 well is structurally isolated from the regional aquifer system to the west (Stevens, 1994).

A large number of private wells exist within the Lewiston basin. Most of these wells are considerably shallower than the wells that penetrate the regional aquifer. The wells also have higher ground-water elevations than the typical range for the regional aquifer in the Grande Ronde Formation.

Cohen and Ralston (1980) have identified a hydraulic boundary within the regional aquifer in the Clarkston area. They found that APUD wells #5 and #6 did not respond within one day to the pumping of well APUD #1. Cohen and Ralston postulate that a northwest-southeast trending, near vertical dike in the layered basalt isolates wells #5 and #6 from the remaining APUD wells. As is demonstrated in a later section, all of the APUD wells including #5 and #6 show a water-level response to the 1975 filling of the reservoir behind Lower Granite Dam.

WATER BALANCE OF THE REGIONAL AQUIFER

Introduction

All ground-water systems, prior to well development, are in a state of dynamic equilibrium with natural recharge approximately equal to natural discharge. Ground-water levels are relatively stable with small changes associated with changes in recharge amounts. The withdrawal of water from wells creates an in-balance in the ground-water system. Water levels within the aquifer decline with the initiation of pumping until the amount of withdrawal from wells is balanced by a decrease in the natural discharge rate and/or an increase in natural recharge rate.

The regional aquifer within the Lewiston Basin would have been in a state of dynamic equilibrium prior to well development. As described above, the primary recharge area for the regional aquifer is believed to be located south of Asotin where the dipping flow contact zones within the Grande Ronde basalt outcrop in the channel of the Snake River. The primary discharge area for the aquifer is believed to be west of Clarkston near Chief Timothy Park where the geologic structures that form the Lewiston grade cross the river and provide a higher vertical hydraulic conductivity zone for water movement. The hydraulic connection between the regional aquifer and the discharge area along the Snake River was demonstrated by Cohen and Ralston (1980) by identifying a water level change in APUD wells associated with the filling the reservoir above Lower Granite Dam in February 1975. The water-level records from deep wells during this period are presented in a later section of the report.

In the case of the Lewiston basin, the cone of water-level depression within the regional aquifer from operation of the pumping wells would have grown until the area of water-level decline reached the discharge area along the Snake River near Chief Timothy Park and/or the recharge area along the Snake River south of Asotin. The decreased ground-water levels in the Chief Timothy area would have decreased discharge to the river whereas the decreased ground-water levels near the recharge reach of the river south of Asotin would have resulted in increased recharge to the aquifer. If the water-level decline in the Chief Timothy Park area is sufficient, this ground-water discharge area would become a ground-water recharge area.

Analysis of Ground-Water Withdrawal Data

Ground-water withdrawal data are available from a number of sources. Stevens (1994) includes monthly pumping amounts for the period of 1961-1991 for individual wells operated by APUD, LOID and the City of Lewiston. Additionally, data were obtained from the individual water supply entities.

Annual pumpage data were provided for APUD wells for the period of 1960 through 2010 by Tim Simpson of APUD (personal communication, 2011). Stevens (1994) presents withdrawal data for LOID well #1 during the period of from 1982 to 1992. Pumpage from LOID well #2 are not included because this well is not completed in the regional aquifer. LOID pumpage data for wells #3 and #4 for 2008 and 2009 were provided by Amy Uptmor of J-U-B Engineers (personal communication, 2011). Well LOID #1 has not been used since the 1990's. Annual ground-water withdrawal data were obtained from the City of Lewiston wells for the years 2000 through 2010 (Bill Ingram, personal communication, 2011). Pumpage data from Lewiston well #4 are not included since this well is not believed to be completed in the regional aquifer.

A plot of total annual withdrawal from the APUD wells for the period of 1960 through 2010 is shown on Figure 3 along with LOID and City of Lewiston data for years for which data are available. Several observations from a review of Figure 3 are presented below.

- APUD has been and continues to be the largest pumper from the regional aquifer in the Lewiston Basin followed by LOID and the City of Lewiston. Withdrawal data from 2008 and 2009 indicate that APUD pumped about 71 and 73 percent respectively of the total of APUD, LOID and Lewiston. LOID pumpage was about 12 percent for both years while Lewiston pumpage was 17 and 15 percent of the total withdrawal for 2008 and 2009 respectively. Prior to 1980, APUD pumped more than 90 percent of the total withdrawal from the regional aquifer.
- Ground-water withdrawal from the regional aquifer by APUD has decreased from the 1960's to the 2010's. The highest annual pumpage by APUD was at 3,199 million gallons (MG) in 1961 and the lowest was 1,261 MG in 1993. Tim Simpson of APUD describes the reason for the decrease as follows (email, March 1, 2011). *"The land use during those decades (1960's and 1970's) was much different. There were a lot of orchards and truck farms up until the early 1980's. Our peak day in the late 70's was 22 to 27 mgd (million gallons per day). Now our peak is almost half at 13 mgd. With more development and more homes came less water use."* The average annual withdrawal by APUD from the regional aquifer during the period of 2000 through 2010 was 1,563 MG.
- The combined withdrawal from the regional aquifer by APUD LOID and the City of Lewiston in 2008 and 2009 is about 30 percent less than the maximum pumpage by APUD in 1961.

<u>Analysis of Water-Level Data</u>

The water-level data from wells completed in the regional aquifer are analyzed to respond to several questions. First, is there evidence that long-term water-level decline has occurred associated with the relatively large withdrawals from the aquifer? Second, is there evidence of a ground-water response to the filling of the pool behind Lower Granite Dam on the Snake River in February 1975? Third, is there a response pattern associated with the decrease in the withdrawal from the aquifer from a high in the early 1960's to a lower combined pumping rate starting in the 1980's?

Water-level data are available for production wells completed in the regional aquifer for varying periods of time. Most of the historic water-level data were taken by employees of the water supply entities, generally using airlines, as part of normal weekly operational activities. The accuracy of the water-level data is about plus or minus about 5 feet because of the precision of the pressure gages used to collect the air line readings. More recent data from LOID are based on transducer readings and are more accurate. Most of the water level data are for APUD wells with a smaller array of data for the LOID and City of Lewiston wells. Additionally, a few water-level measurements were obtained for area production wells by the U.S. Geological Survey. These measurements were obtained using a steel take or an electric tape and are accurate to about 0.1 feet. The data were taken from the U.S. Geological Survey web site.

APUD Wells

Measurements of ground-water levels for the APUD wells are available starting in 1961. Stevens included water-level data from the APUD production wells for the period of 1961 into 1992 as an appendix to his 1994 report. Tim Simpson of APUD provided tabulated water-level data from 1993 into 2011 (personal communication, 2011). All of these data were input into a spreadsheet and hydrographs were constructed. Hydrographs for APUD wells are presented as follows: well #1 as Figure 4; well #2 as Figure 5; well #3 as Figure 6; well #4 as Figure 7; well #5 as Figure 8; and well #7 as Figure 9. There are insufficient data points to prepare a hydrograph for well #6 because it was not included in the Stevens (1994) data set and because a limited number of measurements have been taken since 1993. The highest water levels shown on the figures represent static or non pumping conditions. The lower levels represent measurements taken during pumping or shortly after the pump was turned off. All of the hydrographs are for the time period of 1960 through 2010. The vertical scale on all of the figures is the same with a range in water-level elevations from 610 feet to 750 feet. Discussion of each APUD well includes water-level measurements obtained from the U.S. Geological Survey website when available.

Water-level data are available for well #1 except for the time period of about 1966 to 1975 (Figure 4). Except for two early measurements, the static water-level elevation of well #1 has been below 720 feet. Reasons why the measurements in February and May of 1961 are higher than the remainder of the record are not known. Non-pumping water-level measurements in the early 1960's are lower than for the remainder of the record. APUD pumping was greatest in 1961 and the 1960's decade was prior to filling of the reservoir behind Lower Granite Dam on the Snake River. The static water levels appear to be the slightly higher in the late 1970's and early 1980's than after about 1990. This sort of observation is limited because of the relative inaccuracy of the air-line measurements. There does not appear to be any long-term rate of decline evident in the hydrograph for well #1.

Water-level data are available for well #2 for the period from late 1961 into 1980 (Figure 5). Ground-water levels prior to 1975 appear to show a decline pattern from a high of 723 feet elevation in 1962 to a high of 717 feet in 1972. However, this observation is limited because of the accuracy of the air-line measurements. Ground-water levels increased starting in 1975 to with the last measurements in 1980 higher than the any prior measurements. Cohen and Ralston (1980) interpreted this change to represent the filling of the reservoir behind Lower Granite Dam. The water-level increase in this period could have also been related to reduced ground-water withdrawal by APUD.

Limited water-level data are available for well #3 for the period from late 1961 into 2005 with major time gaps from 1964 to 1971, from 1972 to 1988 and from 1992 to 2001 (Figure 6). The reported water-level elevations after August 2003 do not appear to be valid and likely represent problems with the airline in this well. The only conclusion that can be drawn from the well #3 hydrograph is that static water-levels in the period from 1988 to 1992 were higher than in the 1960's or 1970's when data are available. Possible reasons for this include the filling of the reservoir behind Lower Granite Dam and the reduced pumping after the 1960's by APUD.

The well #4 water-level record is reasonably complete for the period of July 1961 into November 2001 (Figure 7). Ground-water levels are approximately uniform prior to 1975 then show a rise from 1975 to about 1980 with perhaps a slight decline rate after 1980. There is no detectable change in water level in well #4 reflecting the decreased pumping amounts from the 1960's into the 1970's. The water-level rise from 1975 to 1980 likely reflects filling the pool behind Lower Granite Dam on the Snake River. Two water-level measurements were obtained from the U.S. Geological Survey website for APUD well #4. These have been converted to water-level elevation and are as follows: a water-level elevation of 721 feet on August 22, 1961and a water-level elevation of 724 feet on February 24, 1984. These measurements tend to fit the water-level elevation data based on air line measurements presented in Figure 7.

Water-level data are available for well #5 for the period from late 1961 into 2011 with data gaps from November of 1974 to June of 1977 and from September of 1988 to November of 1995 (Figure 8). The hydrograph for well #5 has a stair-step pattern with lowest water levels prior to 1975. The higher water levels starting in 1977 may be the combined effect of filling the reservoir and a decrease in the APUD pumping rate. There appears to be an additional increase in water levels in the mid 1980's. Possible reasons for this are unknown. Two water-level measurements were obtained from the U.S. Geological Survey website. These have been converted to water-level elevation and are as follows: a water-level elevation of 700 feet on February 2, 1961 and a water-level elevation of 727 feet on February 24, 1984. These measurements tend to fit the water-level elevation data based on air line measurements presented in Figure 8.

While APUD data are not available for well #6, there are two depth- to-water measurements that were obtained from the U.S. Geological Survey website. These measurements have been converted to water-level elevation and are as follows: a water-level elevation of 724 feet on March 16, 1961 and a water-level elevation of 732 feet on February 18, 1983. The water level was about 8 feet higher in 1983 than in 1961 probably because of the reduced pumpage of APUD in 1983 relative to 1961 and also the filling of the pool behind Lower Granite Dam in 1975.

Well #7 water-level data start in 1977 with intermittent measurements into 1981, a data gap until 1987 and then frequent measurements into 2011 (Figure 9). There is little to be learned from the hydrograph except that the few static measurements in 1978 and 1980 are lower than static measurements after about 1990.

Asotin Wells

The U.S. Geological Survey website included several measurements each for the two wells that provide water for the City of Asotin. Both of these wells are believed to be completed in the regional aquifer. Water-level elevation data from the first well are as follows: a water-level elevation of 726 feet on March 3, 1961 and a water-level elevation of 752 feet on February 17, 1983. Similar data for the second well are as follows: a water-level elevation of 727 feet on May 18, 1961 and a water-level elevation of 735 feet on February 17, 1983. In both cases, the water-level elevation in the regional aquifer under the City of Asotin was higher in 1983 than in 1961.

Lewiston Wells

Stevens (1994) includes water level data for City of Lewiston wells. Well #1A is completed in the regional aquifer. The hydrograph for well #1A (Figure 10) shows a water-level pattern similar to the APUD wells with a significant rise between 1974 and 1976, likely related to the filling of the reservoir behind Lower Granite Dam. With the exception of well #4, the other Lewiston wells have limited water-level data that generally follow the pattern of the APUD wells. Lewiston well #4 shows water-level decline from the 1960's into the early 1980's and is not believed to be completed in the regional aquifer.

LOID Wells

A hydrograph is presented for LOID well #2 regardless of the fact that this well is not completed within the regional aquifer. Water-level data are available for the LOID well #2 from 1986 to 1993 from Stevens (1994) and starting in 2007 as provided by Amy Uptmor of J-U-B Engineers (personal communication, 2011). The hydrograph for LOID well #2, presented in Figure 11, is based on airline data prior to 1993 and pressure transducer data after 2007. The graph shows a rapid decline in ground-water levels in from 1986 to 1989, a large data gap and then mostly readings taken when the pump was operating after 2007. The water-level decline shown for well #2 reflects that this well is not completed in the regional aquifer.

The hydrograph for LOID well #3 illustrates the very large amount of drawdown that occurs when the well is being operated (Figure 12). There appears to be an annual fluctuation in static ground-water levels but no pattern of water-level decline.

Water-level data for LOID well #4 show a varying static water level and the much smaller drawdown than well #3 (Figure 13). No pattern of water-level decline is evident in the several year time period when data are available.

Water-Level Contour Map

A water-level contour map was constructed by Stevens (1994) using static levels in 1988. The map, presented as Figure 14, shows a cone of depression is present just south of the confluence of the Snake and Clearwater Rivers as a result of withdrawal of water from production wells completed in the regional aquifer. The locations of specific contours are somewhat in question because water-level elevations based on airline measurements were used in construction of the map. However, the water-level depiction is logical in that it shows a lowering of ground-water levels near the center of pumpage.

LOID Irrigation Demand

J-U-B Engineers provided an estimate of the annual and monthly demand for the LOID irrigation system (Amy Uptmor, personal communication, 2011). The annual estimated demand is 8,500 acre-feet with monthly demand ranging from 14 acre-feet (February) to 1,295 acre-feet (summer months). These monthly estimates include consideration of use of Mann Lake for temporary storage to meet peak demand periods. The annual demand of 8,500 acre-feet per year is equal to 2,769 MG per year.

The estimated LOID irrigation demand needs to be compared to present and historical withdrawals from the regional aquifer to be meaningful. Table 2 is a summary of historical withdrawal from the regional aquifer as compared to the addition of an LOID irrigation demand on the aquifer. City of Asotin pumpage data are missing from the table but are not believed to be large enough to impact conclusions from the analysis. Total withdrawal from the aquifer for 1961, 1971 and 1991 include data taken from Stevens (1994) for LOID domestic wells and Lewiston wells and from Tim Simpson (personal communication, 2011) for the APUD wells. Total withdrawal numbers for 2008 and 2009 are based on data provided by APUD, LOID and the City of Lewiston. The table shows that the total withdrawal in 2009 is about 30 percent less than the withdrawal by APUD in 1961. The line in Table 2 entitled “Future with 2009” provides an estimate of total including the estimate for LOID irrigation. Initiation of LOID irrigation pumping from the aquifer will be more than a doubling of the current (2009) pumping rate and about a 57 percent increase from the withdrawal rate that occurred in 1961.

Table 2 Comparison of Withdrawals from the Region Aquifer

Year	APUD	LOID Domestic	Lewiston	Asotin	LOID Irrigation	Total
1961	3199 MG	0	0		0	3201 MG
1971	1849 MG	0	126 MG		0	1975 MG
1991	1411 MG	181 MG	30 MG		0	1622 MG
2008	1608 MG	281 MG	381 MG		0	2270 MG
2009	1664 MG	266 MG	334 MG		0	2264 MG
Future with 2009	1664 MG	266 MG	334 MG		2769 MG	5033 MG

Water Balance Discussion

Two factors are of particular importance to a discussion of the water balance for the regional aquifer within the Lewiston Basin associated with the potential initiation of withdrawal of LOID irrigation water from wells.

- First, water-level data from wells completed in the regional aquifer under the City of Clarkston and the western portion of the City of Lewiston provide proof that aquifer is hydraulically connected to the Snake River. Hydrographs from numerous wells show a rise in water level that is associated with the filling of the reservoir behind Lower Granite Dam in February of 1975. The hydraulic connection of the aquifer to the river serves to minimize long-term water-level decline associated with present pumpage or anticipated future increases in withdrawal. LOID well #2 is not completed in the regional aquifer and the hydrograph for this well shows considerable water-level decline.
- Second, historic withdrawals from the aquifer in 1961 by APUD were about 30 percent higher than the combined 2009 withdrawal by APUD, LOID domestic and the City of Lewiston. This means that historic water-level data can be used to infer the magnitude of water-level change that would occur if the LOID irrigation demand was supplied by wells completed in the regional aquifer.

Ground-water levels in the regional aquifer in the Lewiston Basin have remained approximately stable during the last 10 years. This indicates that the regional aquifer is in a state of dynamic equilibrium; natural recharge is equal to withdrawals by wells plus natural discharge. The amount of recharge to the aquifer system under current pumping conditions has not been determined.

The more than doubling of the pumping rate by the initiation of LOID withdrawal for irrigation will necessarily result in some water-level decline. Increasing ground-water withdrawals would result in sufficient water-level decline to bring the system back into balance by either increasing the rate of natural recharge and/or decreasing the rate of natural discharge. The limited data on water-level patterns in the early 1960's suggests that the additional water-level decline would be in terms of tens of feet. It is unlikely that the additional water-level decline would be more than 30 feet.

LOCATION AND DESIGN OF LOID IRRIGATION WELLS

Introduction

A group of wells will be needed to supply the LOID irrigation demand. Amy Uptmor (personal communication, 2011) indicated that a design maximum flow rate of 9,450 gpm will be needed to meet the demand. The target yield per well would be 3,150 gpm if three wells are used, 2,365 gpm if four wells are used and 1,890 gpm if five wells are used. In addition, the approach should include some redundancy. Placement of the wells likely would be along a pipeline with well spacing determined by hydraulic interference effects.

Problems have occurred with the use of submersible pumps in deep, large yield production wells, such as the existing LOID wells. The operation of the LOID irrigation wells would be simpler and less costly if line-shaft turbine pumps could be installed. To this end, construction of the wells at lower elevation where the static and pumping water levels would be higher is a major consideration. In addition, special effort should be extended to improve the alignment of the boreholes or install larger diameter pump chamber casing to allow installation of line-shaft turbine pumps

Location Criteria

The location criteria for the LOID irrigation well field are as follows.

1) The wells should penetrate the regional aquifer within the Grande Ronde Formation. The regional aquifer underlies the western portion of the LOID service area and extends across the Snake River into the Clarkston and Asotin area. The eastern boundary of the regional aquifer exists between LOID #4 and LOID #2 but the exact location is not known. The northern boundary of the regional aquifer is approximately the Clearwater River. The southern aquifer boundary is not known but likely is south of the Tammany area. The yield characteristics of new wells completed in regional aquifer should be good if formation damage caused by drilling is minimized. The yield obtained by the new well will depend upon the number of basalt flow contact zones that are penetrated by the well and the fracture characteristics of each zone. The new LOID irrigation wells drilled in the regional aquifer should have a specific capacity that exceeds 20 gpm/ft (gallons per minute per foot of drawdown). This means that drawdown within the well would be about 100 feet at a pumping rate of 2,000 gpm.
2) The LOID irrigation wells should be located at sufficient distances from each other and from existing LOID or other production wells to minimize well interference effects (water-level decline caused by operation of another production well). Some well interference will occur regardless of where the LOID irrigation wells are located within the regional aquifer. The amount of well interference that occurs between wells depends on the distance between wells, the aquifer characteristics and the individual pumping rates. The available information indicates that well interference should be less than 20 feet if the new well is located at least 400 to 500 feet away from another production well.
3) To the extent possible, lower elevation drill sites should be selected for the LOID irrigation wells. Selection of lower elevation drill sites serves several purposes. Since the water producing zones are approximately horizontal, drilling at lower elevations tends to minimize the required well depth. This results in lower well construction costs. For example, the surface seal and the pump chamber casing would not need to extend as deep because the ground-water level would be closer to land surface. The static depth to water is minimized at lower elevation drill sites. This allows the more efficient use of line-shaft turbine pumps in the wells.
4) Issues associated with well construction are important relative to selection of drilling sites. The drilling sites need to be large enough to accommodate the drilling rig, support equipment, a waste-water control pond and must have a means to dispose of water generated during drilling. The discharge amount during drilling can exceed several thousand gallons per minute if a direct air rotary rig is used. The site also needs to have a water supply source for drilling

operations. The distance to homes and businesses need to be sufficient to allow drilling to occur without exceeding noise restrictions.

5) The drill sites need to be selected to fit into the overall plan for development of a well field for the LOID irrigation supply.

Well Field Location

The best general area for the LOID irrigation well field is along the west end of the Tammany Creek Valley, generally south of the airport (Figure 15). This area was selected for the following reasons. First, the valley allows access to lower elevation land which will result in less drilling depth and a static water level that is closer to land surface. Second, water producing zones in the Grande Ronde basalt at this site occur at higher elevations than at locations to the north because the area is located on the southern limb of the syncline. This means that the wells will not need to be as deep because the elevation of any specific flow contact zone is higher at this locale that at sites to the north. Third, the selected area is relatively distant from other major production wells. The closest production wells are City of Lewiston well #6 and LOID well #4. Both of these wells are more than 1.5 miles away from the selected area. Fourth, the target has a low density of development with few homes that might be impacted from well construction activities. Also, the existing drainages offer opportunity for disposal of wastewater generated during well drilling.

The LOID irrigation wells should be located at sites where the land elevation is approximately 1,200 feet or lower (Figure 15). The floor of Tammany Valley ranges in elevation from about 1,160 along the east margin to about 1,000 feet along the west margin of the target area. The approximate static depth to water would be about 500 feet if the wells were drilled at an elevation of 1,200 feet and about 400 feet if the wells were drilled at an elevation of about 1,100 feet.

Well Design Factors

The design of wells included in the LOID irrigation supply system depends on the subsurface geology, the anticipated hydraulic characteristics of the water producing zones, the anticipated static depth to water and the target well yield. These topics are explored in the following paragraphs.

Subsurface Geology

Knowledge of the sequence of geologic units through which the wells must penetrated aids in selection of a well design. Well construction is much more complex if hard units, such as basalt, are underlain by soft or perhaps caving units such as sand. Information on the subsurface geology within the target area for the LOID irrigation wells is available from logs from several nearby wells.

- City of Lewiston well #6 is located west of the airport with a surface elevation of about 1,306 feet. The location of this well is shown on Figure 1. The well driller's report indicates that basalt was penetrated over most of the borehole depth. Sedimentary zones were penetrated in the depth ranges of 300 to 420 feet (logged as clay, sand and broken basalt) and 484 to 510 (logged as sand or sand with broken basalt). The sedimentary zones are in the elevation intervals of 796 to 822 feet and 886 to 1,003 feet.

- The well driller's report for a domestic well drilled in the NW NE of section 19 for David Van Buren in 2004 provides additional geologic information for the target area selected for the LOID irrigation well field. This well appears to penetrate the upper portion of the Grande Ronde basalt and has a reported depth to water of 574 feet. The well elevation would be about 1,294 feet if the water-level elevation is about the same as the other regional aquifer wells (about 720 feet). If this is correct, then the sedimentary interbed (logged as shale and sandstone) would be in the elevation interval of 897 to 1,126 feet. This agrees in general with the data from Lewiston well #6.
- Information from several domestic wells drilled in section 20 shows that the sedimentary interbed is present at land surface in the Tammany Valley. For example, the Bud English well penetrated what is logged as overburden to a depth of 140 at the location described as the NW SE of section 20. Based on an estimated well elevation of 1,100 feet, the elevation of the bottom of the sedimentary interbed would be about 960 feet.

The available information suggests that wells drilled at an elevation of about 1,200 feet would penetrate basalt underlain by a sedimentary interbed which is in turn underlain by basalt. Drill sites at elevations less than 1,100 feet might start in the sedimentary interbed, which lessens the complexity of construction of the well.

Aquifer Characteristics

Production wells completed within the regional aquifer typically have been drilled down until a suitable yield has been obtained. The APUD wells extend to an average elevation of about 100 feet below sea level. These wells are all highly productive with discharge rates ranging from 2,200 to 3,500 gpm (Table 1). LOID well #4 extends to an elevation of approximately 60 feet below sea level and presently yields about 1,100 gpm. LOID wells #2 and #3 extend down to elevations of -215 and -1,158 feet, yet have relatively low yields. The poor yield characteristics of LOID wells #2 and #3, as shown on Table 1, is in part due to formation damage caused by invasion of drilling mud into the fractures in the basalt.

The hydraulic characteristics of the aquifer at each individual well site can vary considerably. However, experience within the regional aquifer has proven that production wells that yield thousands of gallons per minute can be drilled at a number of locations within the regional aquifer.

A yield between 2,000 and 3,000 gpm per well can be anticipated at the target site if the correct drilling techniques are used and the borehole extends to a depth at least to sea level or possibly several hundred feet below sea level. Thus, a well constructed a drill pad at about 1,200 feet elevation would need to 1,200 to 1,400 feet deep.

Well Construction Components

Well construction consists of installing the three main components of a well: 1) the pump chamber casing; 2) the seal on the outside of the pump chamber or other casing;

and 3) the screen or open-hole portion which allows water to enter the well. These components are discussed in the following paragraphs.

The pump chamber casing is designed to hold the pump. The diameter of the pump chamber casing is selected based on the pump to be used, which in turn in controlled by the desired and attainable yield. The Ground-Water Manual (Bureau of Reclamation, 1995) provides the following guidance for the selection of the pump chamber diameter. The recommended casing diameters are based on the typical diameter of pump bowls used for the given ranges in yield. Larger diameter pump chamber casing may be used if alignment of the well is an issue, particularly if line-shaft turbine pumps are to be used.

Well Yield (gpm)	Pump Chamber Diameter (inches)
300 to 1,500	12
1,500 to 3,000	16
2,000 to 5,000	20
3,000 to 5,000	24
4,000 to 8,000	28

The depth of the pump chamber normally is controlled by the maximum anticipated location of the pump. A pump chamber which allows 200 feet of drawdown has been sufficient for most of the APUD wells and for LOID well #4. This means that the pump chamber would extend to 200 feet below the static water level. Assuming a static level elevation of 720 feet, the pump chamber casing would extend to an elevation of 520 feet. For a site where the well head elevation is 1,200 feet, the length of the pump chamber casing would be 680 feet.

A seal is installed surrounding the upper casing in a well in order to keep surface and near-surface contaminants from entering the well and to eliminate any hydraulic connection of shallow and deeper aquifers. The best approach is to install the grout seal to the full depth of the pump chamber casing.

A production well should be designed to allow the entry of water with the minimum friction loss. The most efficient well completion is a stable, uncased hole. The next most efficient completion is placement of a wire wrapped or louvered screen opposite the producing zones. The percent open area for the wire-wrapped screen can be as great as 35 percent with a maximum of about 20 percent for louvered screen. Factory or field slotted casing typically provides less than three percent open area for water entry to the well and should not be used. The LOID irrigation wells should be open hole or completed with wire-wrapped, stainless steel screen.

Additional strings of casing may be needed to accommodate site geologic conditions. The presence of sedimentary interbeds within the sequence of basalt flows is a typical problem within the Lewiston Basin. For example, LOID well #4 has 20-inch diameter casing to 457 feet and 18 inch diameter casing from 444 feet to 866 feet. A section of 16-inch diameter casing and screen was placed in the well in the depth range of 853 feet to 1,267 feet. The lower portion of the well from 1,267 feet to the bottom at 1,625 feet was left open hole. The grout seal was placed around the 20-inch diameter casing from 0 to 265 feet with an additional grout seal around the 18-inch diameter casing in the depth range of 856 to 866 feet to prevent interconnection of water producing zones that have considerably different water levels. Part of the need for extra strings of casing was because of the presence of sedimentary interbeds between basalt flows.

Alternative Well Designs

Two aspects of well field site selection will reduce the construction and operating costs of the LOID irrigation wells. First, construction of the wells at lower elevation reduces the required well depths and reduces the complexity of the drilling process. It also allows use of line-shaft turbine pumps which likely will result in lower operating costs. Second, placement of the wells at a low enough elevation to start the drilling directly in the sedimentary interbed simplifies the sequence of drilling and/or the selection of drilling methodology used on the wells. The target area for well construction identified above allows the wells to be constructed at an elevation of 1,200 feet or lower. Selection of well sites on the floor of Tammany Valley below about 1,100 feet elevation may allow the wells to penetrate directly into the sedimentary interbed without the overlying basalt layer.

Construction of a well at about 1,200 feet elevation within the target area would involve the following steps. The example given is for placement of a 16-inch diameter pump chamber casing. Placement of 20 or 24 inch diameter pump chamber casing would require that all drill hole and casing dimensions be increased by 4 or 8 inches respectively.

- Construct a 20-inch diameter borehole to approximately 680 feet. If an air rotary drilling rig is used, temporary casing may have to be installed to penetrate the sedimentary interbed. This may require that the upper portion of the well be drilled at 22 or 24 inches in diameter to facilitate the placement of 20-inch diameter casing through the sediments. This portion of the well can be drilled using direct mud drilling technology.
- Place a 16-inch diameter casing to full depth equipped with a cement float shoe.
- Install the cement-bentonite grout outside of the 16-inch casing to land surface using the cement float shoe. Pull any temporary casing that was installed.
- Drill a nominal 16-inch diameter open hole in basalt using an air rotary drilling rig to a depth of about 1,200 to 1,400 feet depending on the productivity of the aquifers penetrated in the basalt.
- Install wire-wrapped, stainless steel screen and associated blank casing in the well from 10 feet above the bottom of the 16-inch diameter casing to the full well depth. About 100 feet of screen would be installed opposite water-producing zones. The casing/screen diameter can be 10 or 12 inch.
- Develop and test pump the completed well.

Construction of a well along the floor of Tammany Valley at an elevation of about 1,100 feet would involve the following steps. Again, the example involves placement of a 16-inch diameter pump chamber casing.

- Construct a 20-inch diameter borehole to approximately 580 feet. If an air rotary drilling rig is used, temporary 20-inch diameter casing would need to be installed down to the bottom of the sedimentary interbed. A nominal 20-inch diameter borehole would be drilled in basalt to the target depth of 580 feet.
- Place a 16-inch diameter casing to full depth equipped with a cement float shoe.
- Install the cement-bentonite grout outside of the 16-inch casing to land surface using the cement float shoe. Pull any temporary casing that was installed.
- Drill a nominal 16-inch diameter open hole in basalt using an air rotary drilling rig to a depth of about 1,100 to 1,300 feet depending on the productivity of the aquifers penetrated in the basalt.
- Install wire-wrapped, stainless steel screen and associated blank casing in the well from 10 feet above the bottom of the 16-inch diameter casing to the full well depth. About 100 feet of screen would be installed opposite water producing zones. The casing/screen diameter can be 10 or 12 inch.
- Develop and test pump the completed well.

The peak demand of the LOID irrigation system probably will require construction of five to six wells. Some of the wells likely would yield more than 2,500 gpm. Thus, it is possible that four wells would meet the peak demand under most circumstances. The fifth and sixth wells would provide some degree of redundancy.

CONCLUSIONS AND RECOMMENDATIONS

Three primary questions are posed in the introduction to this report. First, what impacts on the aquifer, such as water-level decline, could be anticipated with the development and operations of LOID irrigation wells in the regional aquifer? Second, what is the potential for successful development of the LOID irrigation wells? Third, where should the LOID irrigation wells be located and what are the primary construction issues? Answers to these questions are provided below.

Aquifer Impacts

The regional aquifer in the Lewiston Basin is the target for development of irrigation wells for LOID. The available hydrologic information indicates that there is a hydraulic connection between the aquifer and the Snake River. The ground-water levels in 2011 in the aquifer are higher than they were in 1961 shortly after the initiation of pumping by APUD. This is mostly because the filling of the reservoir behind Lower Granite Dam resulted in a general increase in ground-water levels.

Ground-water withdrawal from the aquifer peaked at about 3,200 MG/year. Present (2009) withdrawals are about 2,300 MG/year. Development of the LOID irrigation supply from ground water, combined with existing uses, would result in a total withdrawal of about 5,000 MG/year. More than doubling of the present pumping rate by the initiation of LOID withdrawal for irrigation will necessarily result in some water-level decline. Increasing ground-water withdrawals would result in sufficient water-level decline to bring the system back into balance by either increasing the rate of natural recharge and/or decreasing the rate of natural discharge. The limited data on water-level patterns in the early 1960's suggests that the additional water-level decline would be in terms of tens of feet. It is unlikely that the additional water-level decline would be more than 30 feet.

Well Development Potential

Information from existing wells indicates that there is a high probability that LOID irrigation wells in the yield range of 2,000 to 3,000 gpm each can be constructed within the target area identified. The wells would need to extend down to sea level or possible 100 to 200 feet below sea level to be successful. Also, formation damage caused by drilling would have to be minimized. Specifically, a mud rotary rig should not be used to drill the lower portions of the wells. A well field that includes five or six wells will be needed to meet the anticipated peak demand for the LOID irrigation system.

Well Location and Construction Issues

Two aspects of well field site selection will reduce the construction and operating costs of the LOID irrigation wells. First, construction of the wells at lower elevation reduces the required well depths and reduces the complexity of the drilling process. It also allows use of line-shaft turbine pumps and lower operating costs. Second, placement of the wells at a low enough elevation to start the drilling directly in the sedimentary interbed simplifies the sequence of drilling and/or the selection of drilling methodology used on the wells. The target area for well construction identified in the Tammany Valley allows the wells to be constructed at an elevation of 1,200 feet or lower. Selection of well sites on the floor of Tammany Valley at about 1,100 feet elevation or lower may allow the wells to penetrate directly into the sedimentary interbed without the overlying basalt layer.

The best general area for the LOID irrigation well field is along the west end of the Tammany Creek Valley, generally south of the airport. This area was selected for the following reasons. First, the valley allows access to lower elevation land which will result in less drilling depth and a static water level that is closer to land surface. Second, producing zones in the Grande Ronde basalt at this site occur at higher elevations than at locations to the north because the rocks dip to the north since the area is located on the southern limb of the syncline. Third, the selected area is relatively distant from other major production wells. Fourth, the target has a low density of development with few homes that might be impacted from well construction activities. Also, the existing drainages offer opportunity for disposal of wastewater generated during well drilling.

REFERENCES CITED

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Stevens, G. R., 1994, Evaluation of the Groundwater Resources within the Lewiston Basin: M.S. Thesis, University of Idaho.

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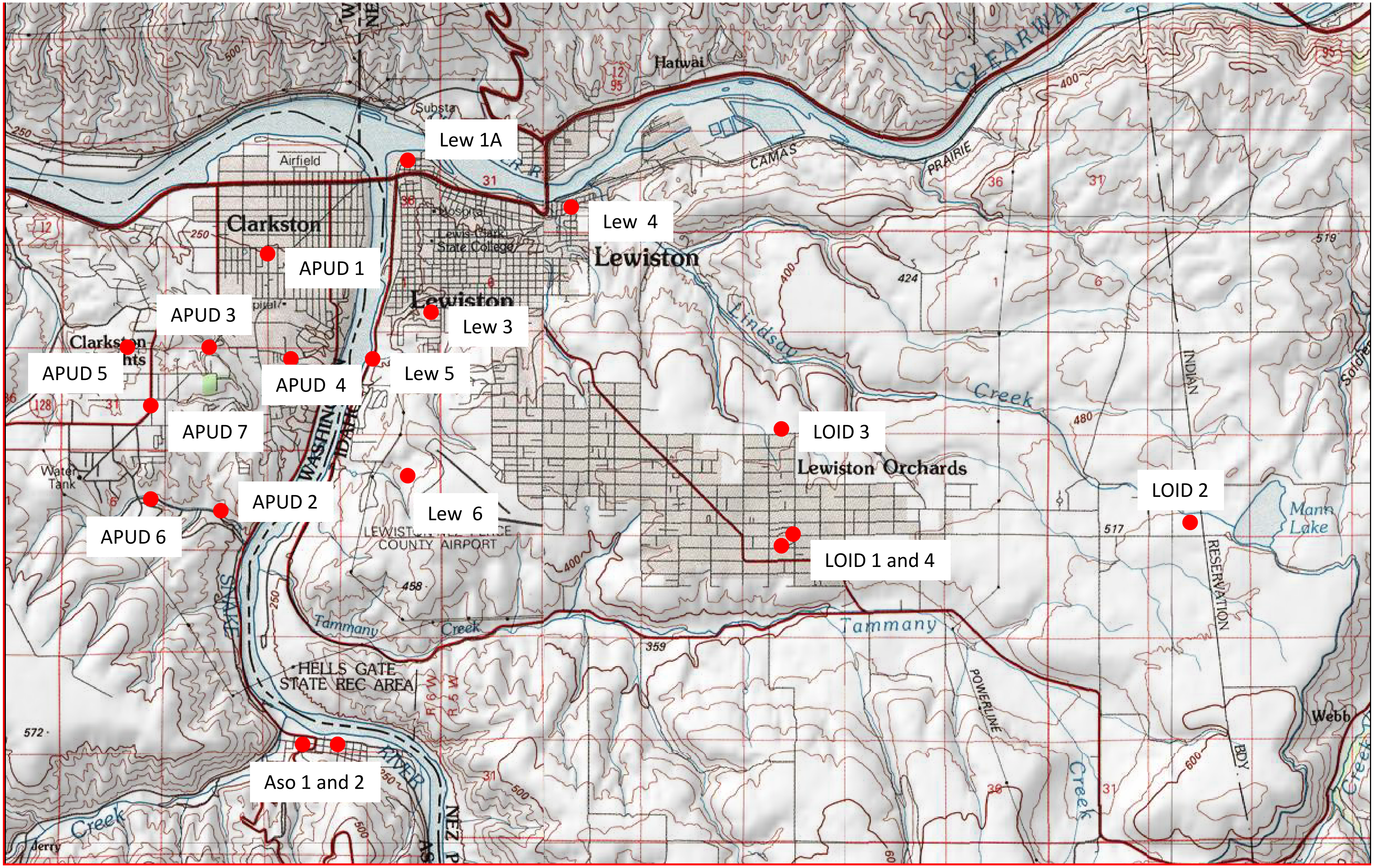


Figure 1 Map Showing Locations of Major Production Wells

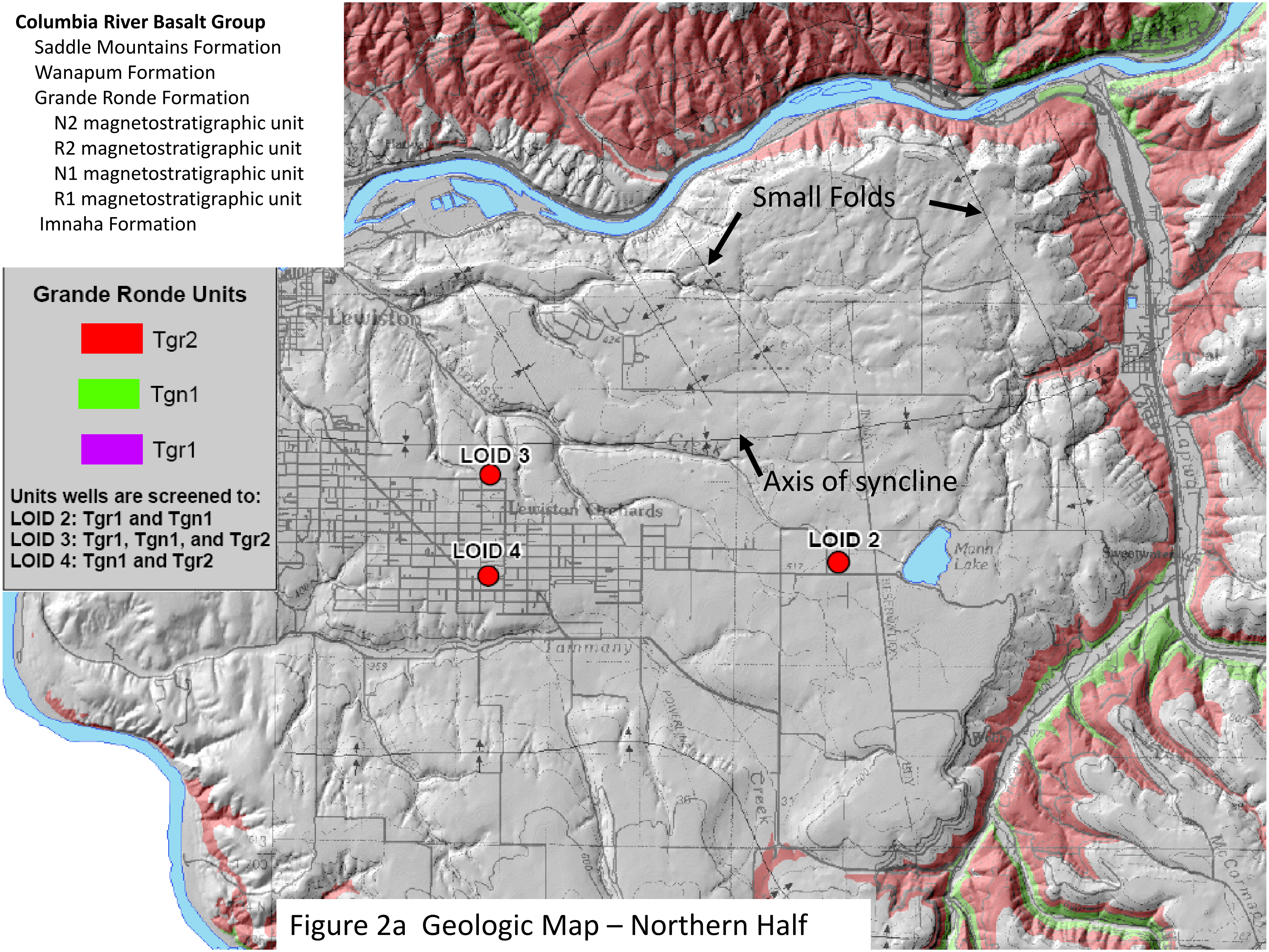


Figure 2a Geologic Map – Northern Half

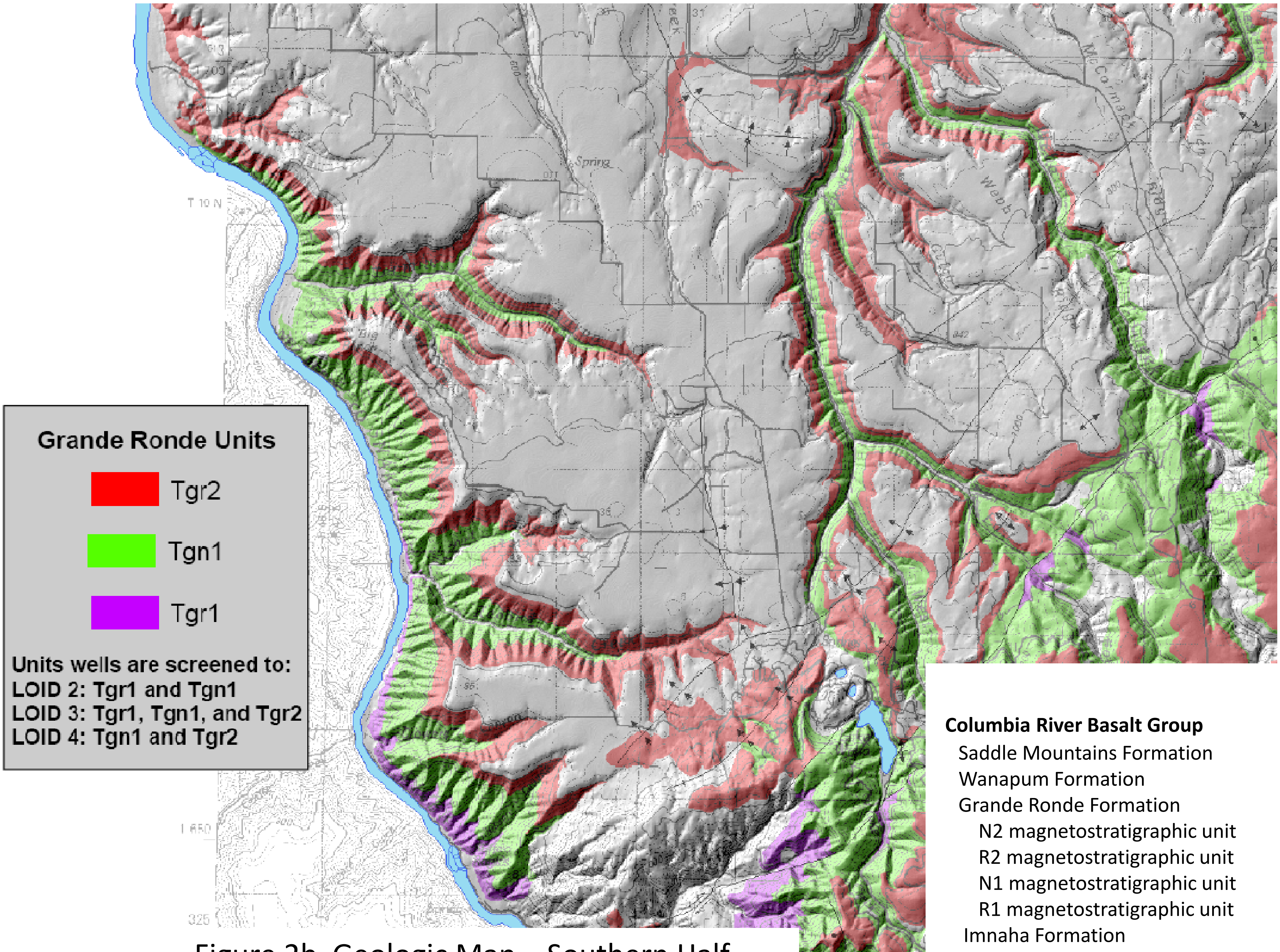


Figure 2b Geologic Map – Southern Half

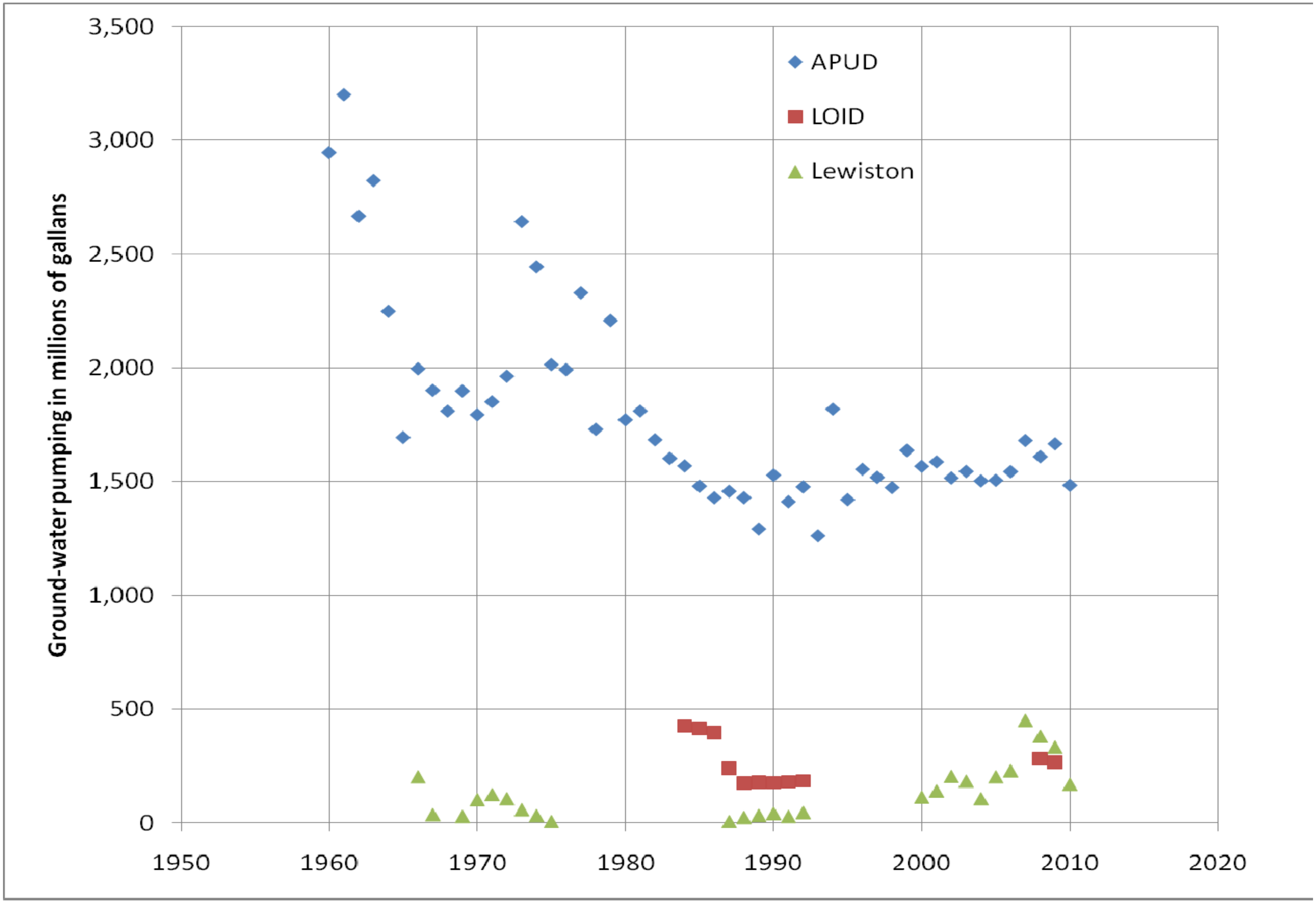


Figure 3 Annual Pumping of APUD, LOID and the City of Lewiston from the Regional Aquifer

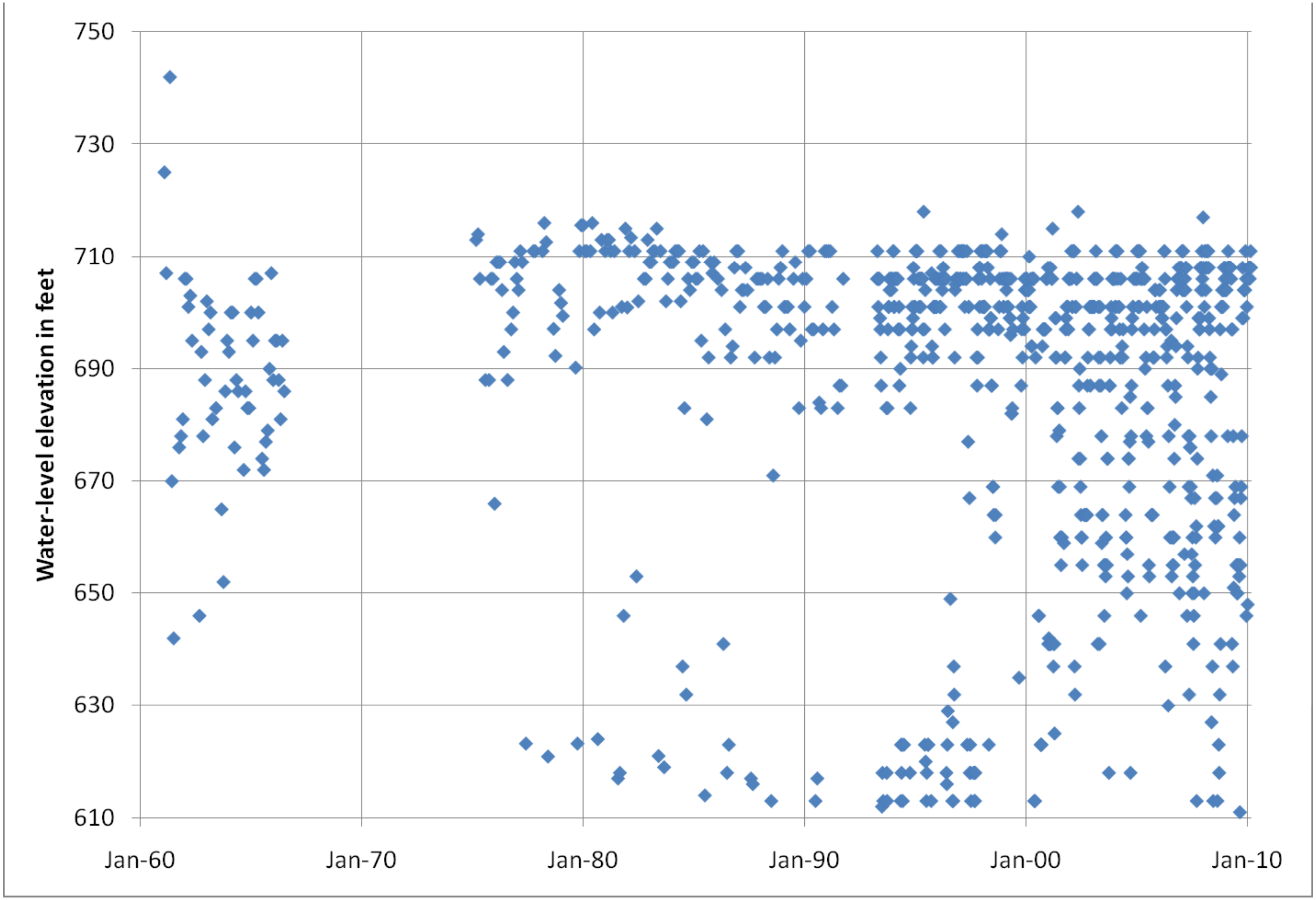


Figure 4 Hydrograph for APUD Well #1

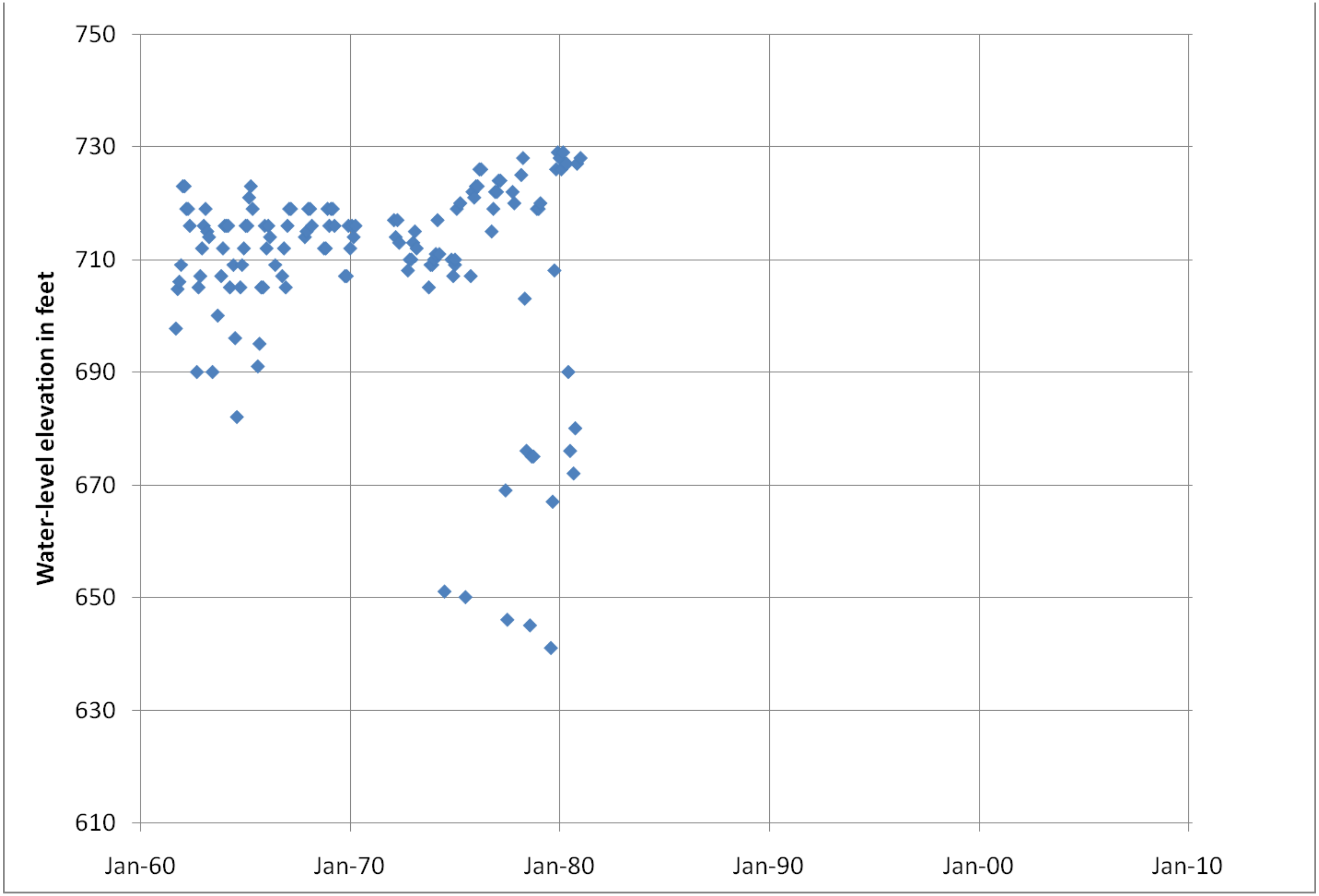


Figure 5 Hydrograph for APUD Well #2

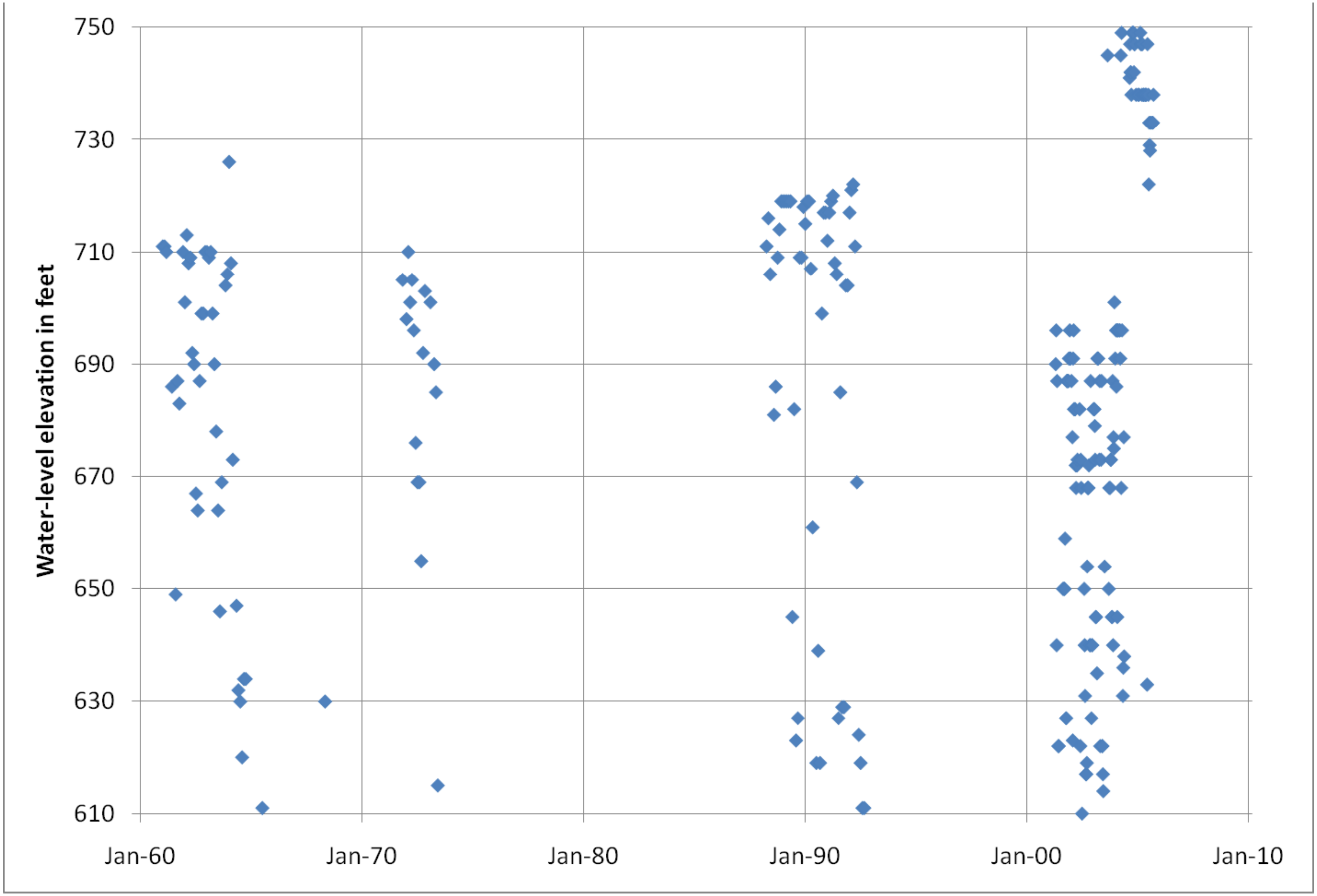


Figure 6 Hydrograph for APUD Well #3

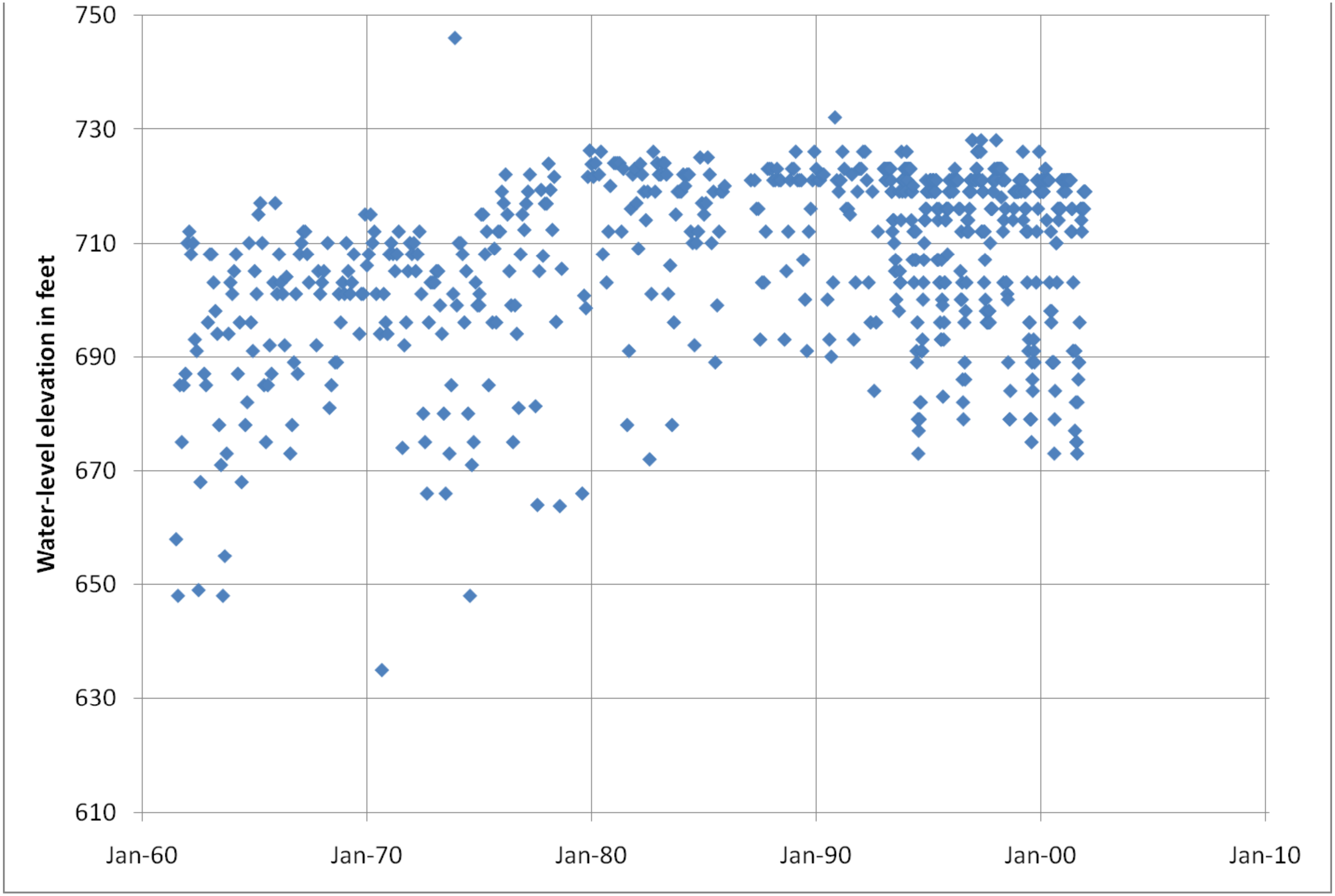


Figure 7 Hydrograph for APUD Well #4

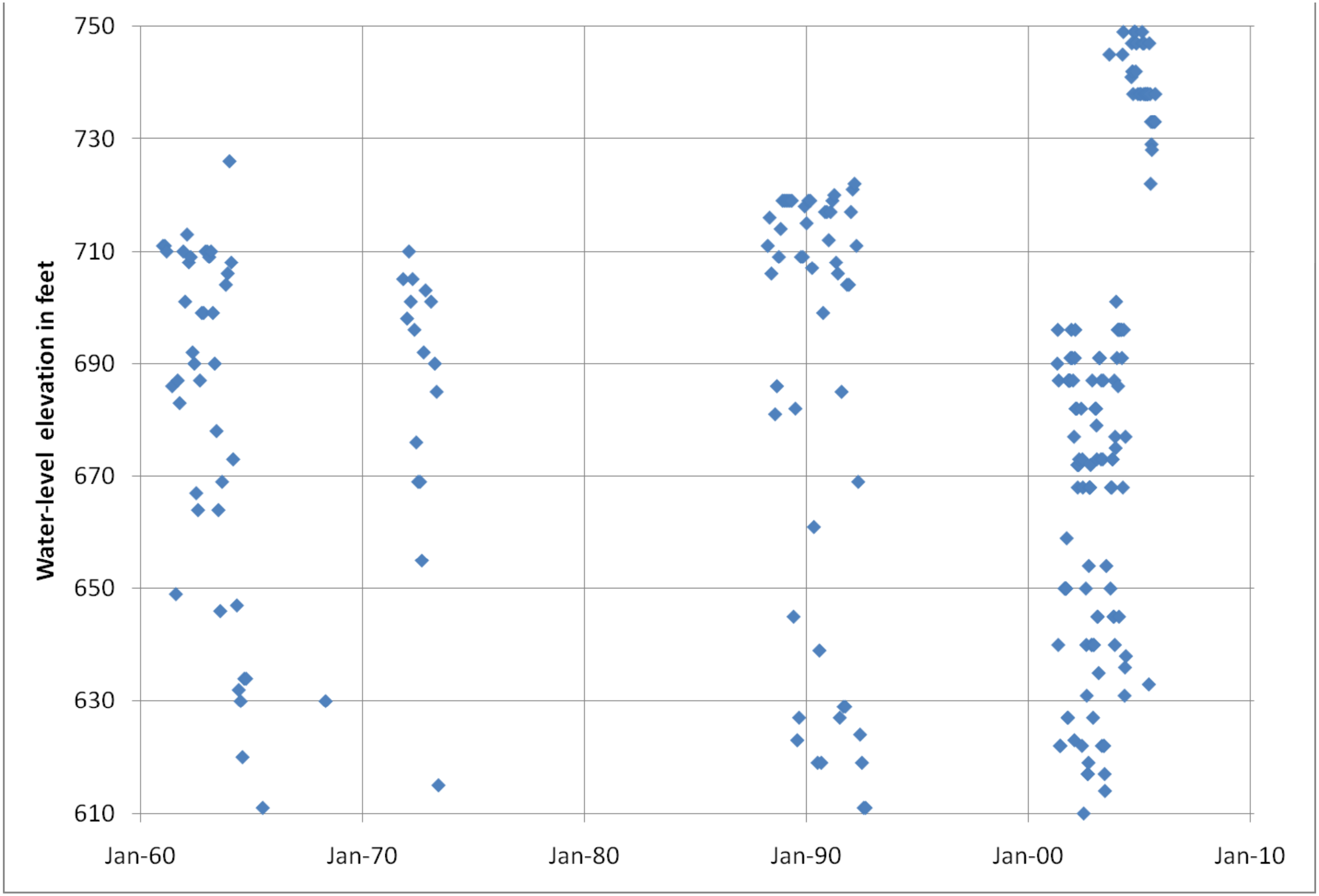


Figure 8 Hydrograph for APUD Well #5

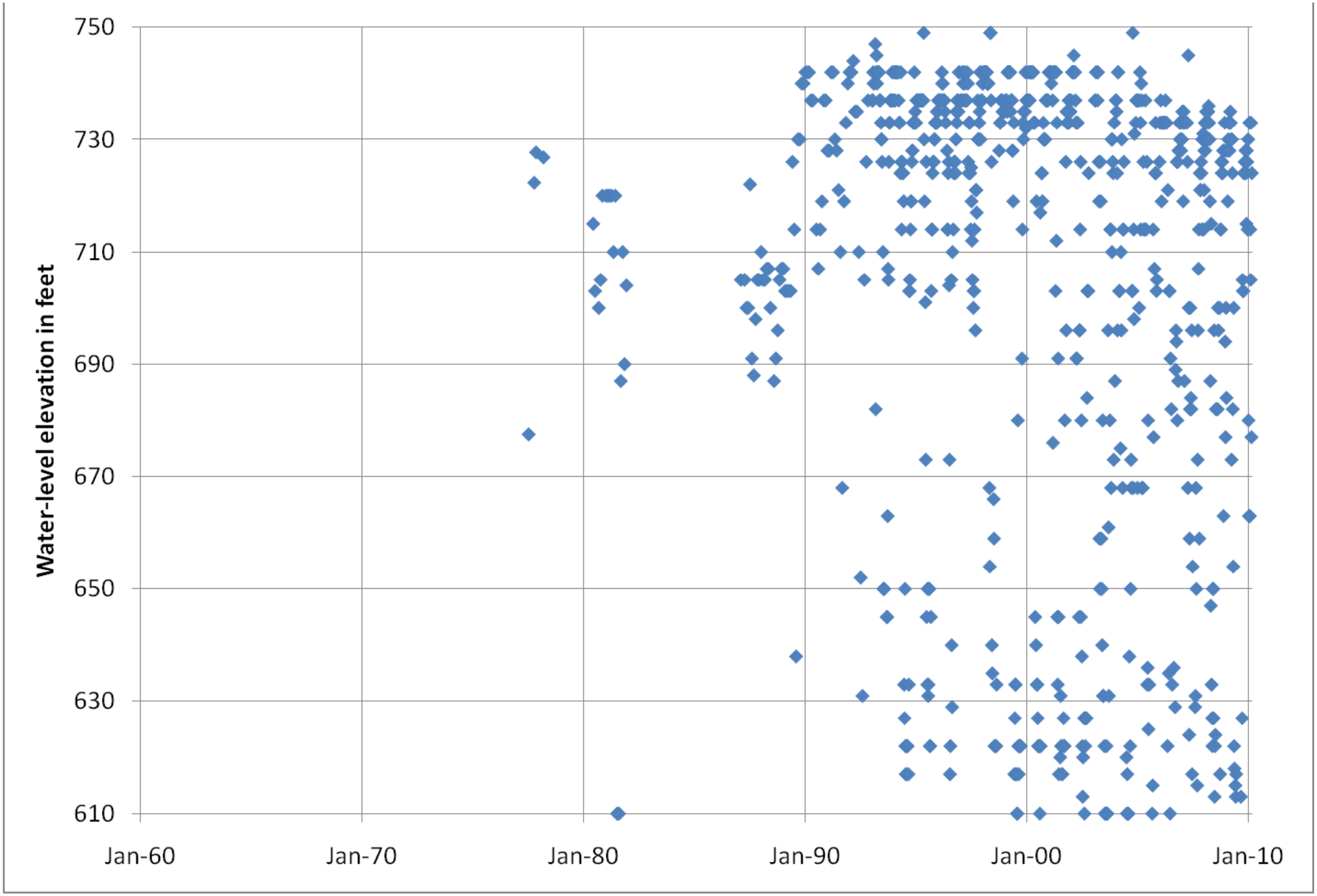


Figure 9 Hydrograph for APUD Well #7

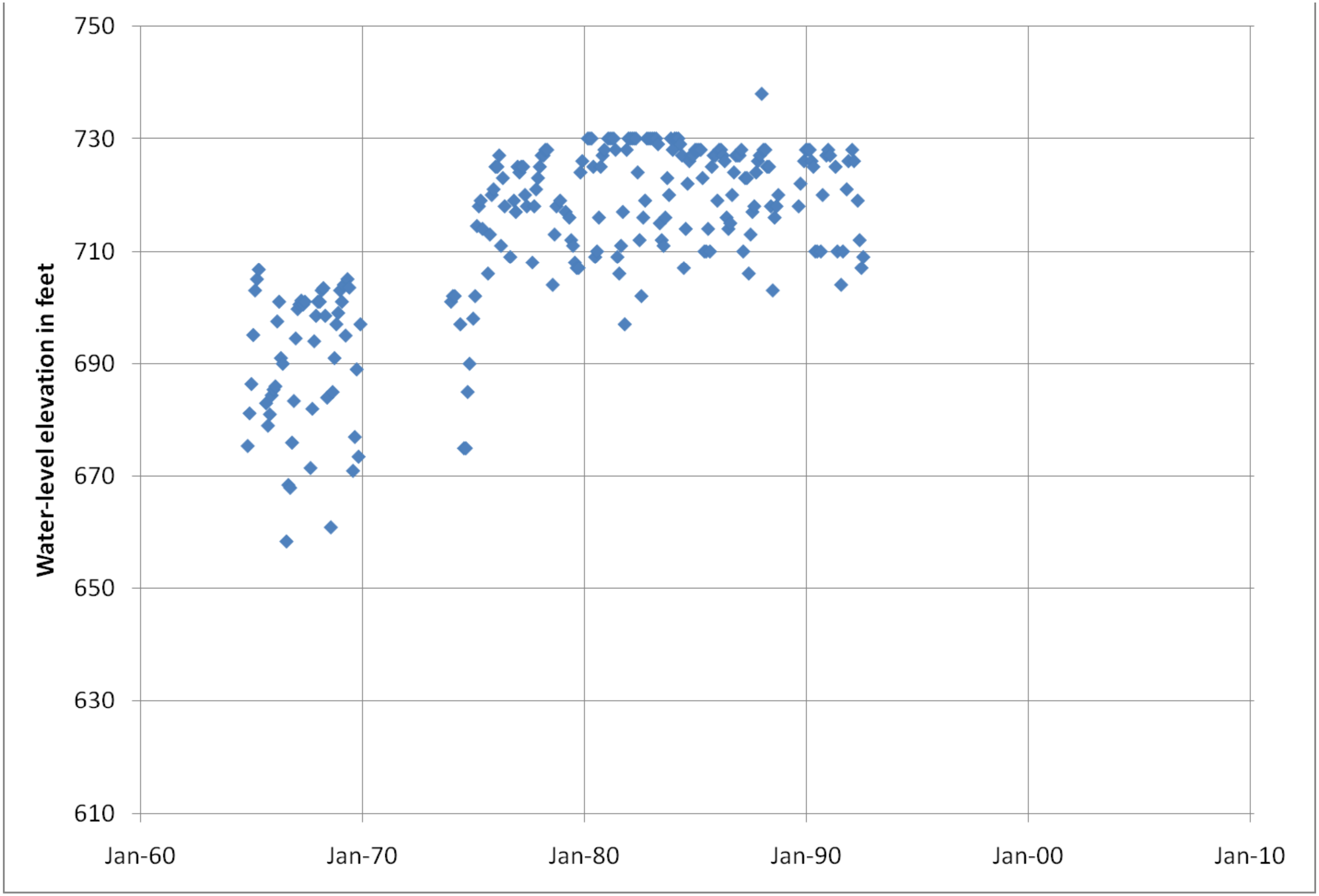


Figure 10 Hydrograph for Lewiston Well #1A

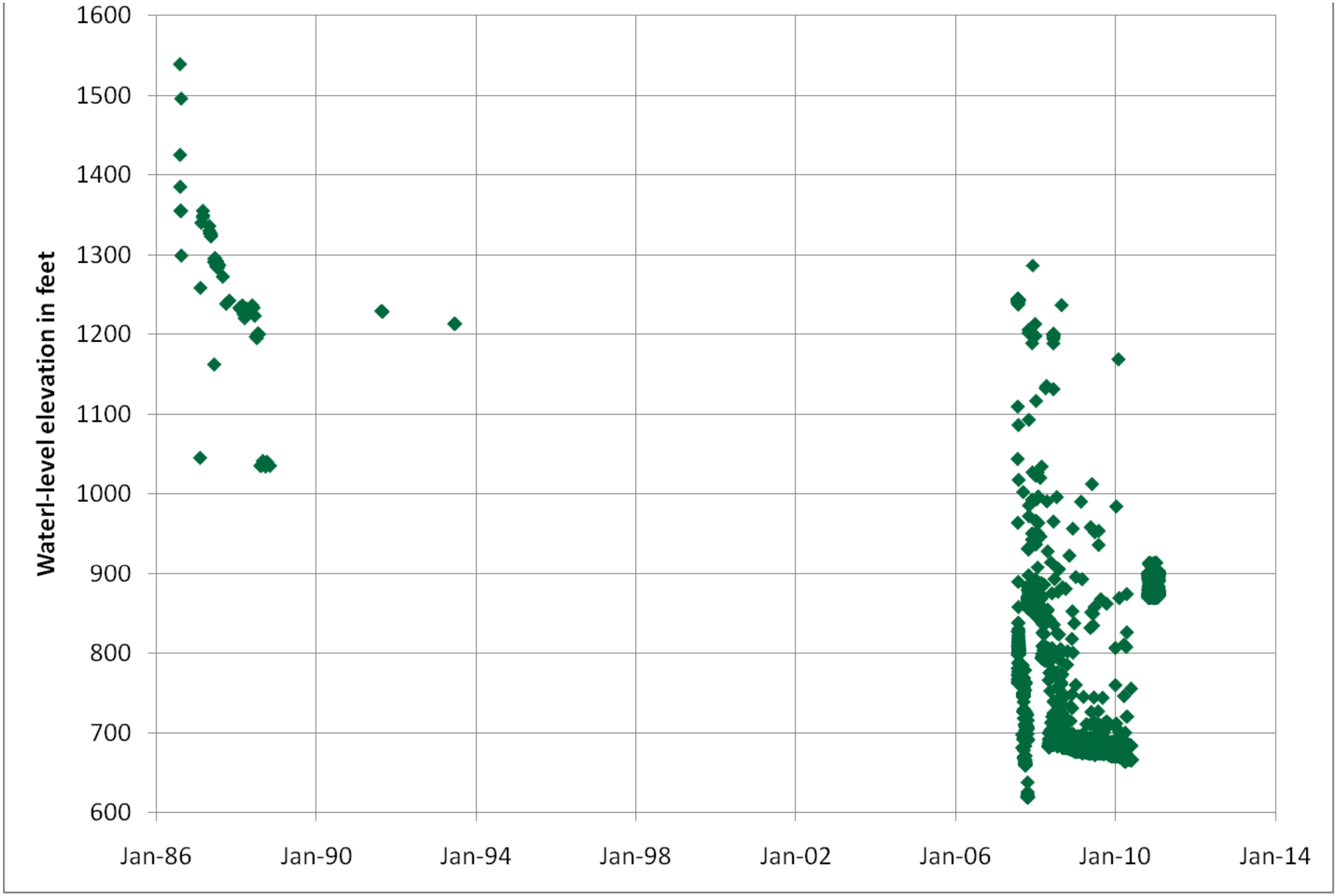


Figure 11 Hydrograph for LOID Well #2

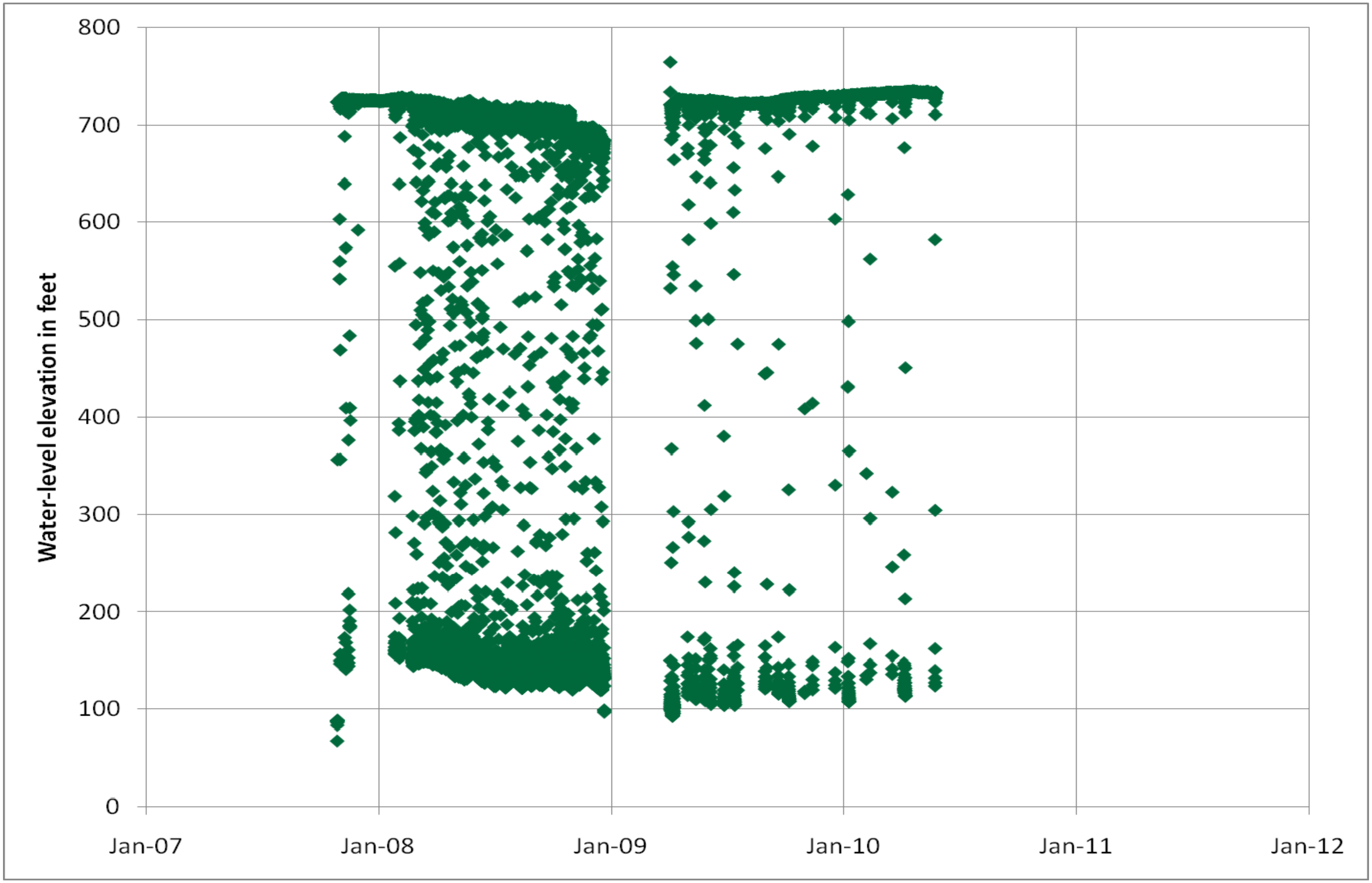


Figure 12 Hydrograph LOID Well #3

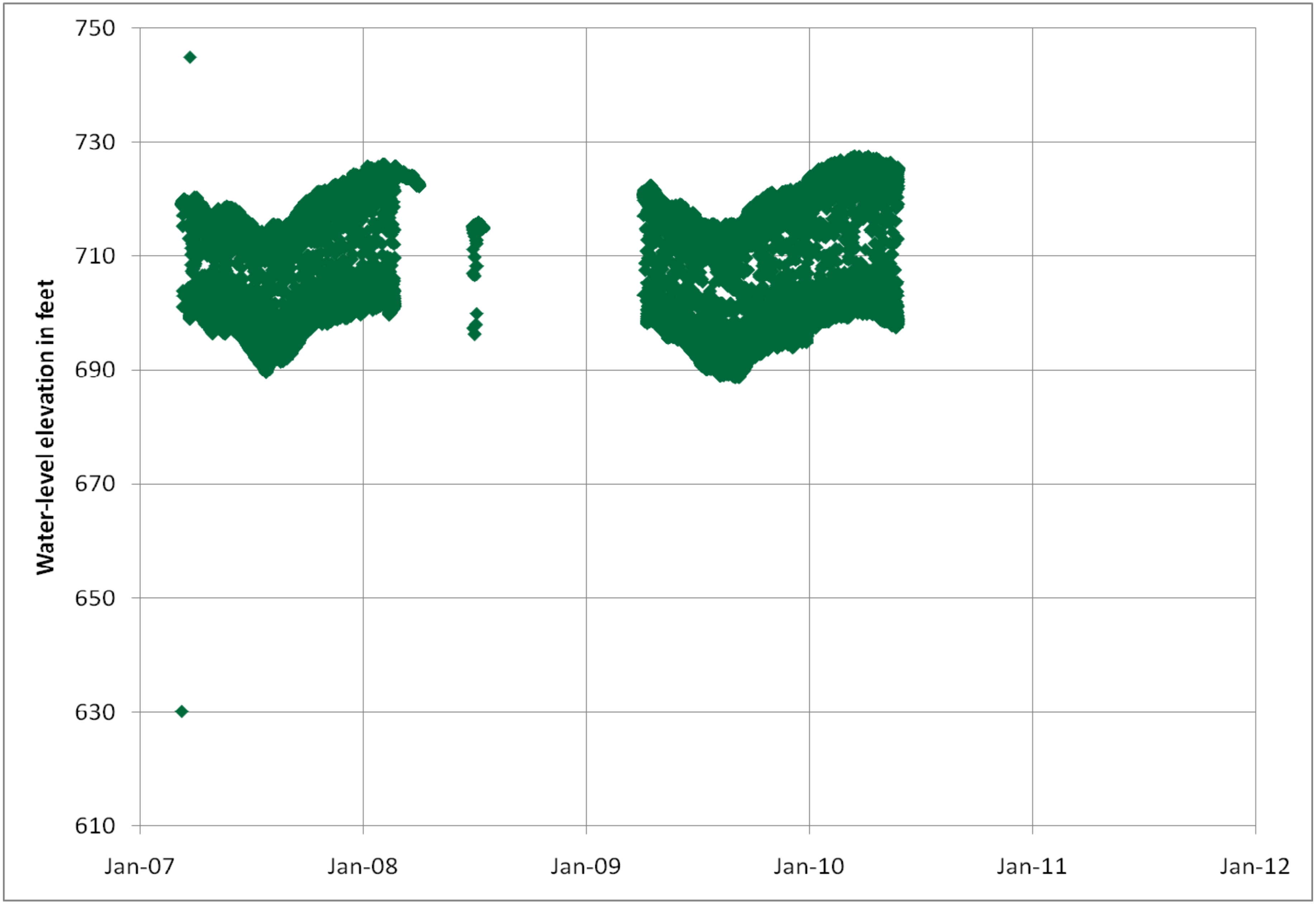


Figure 13 Hydrograph for LOID Well #4

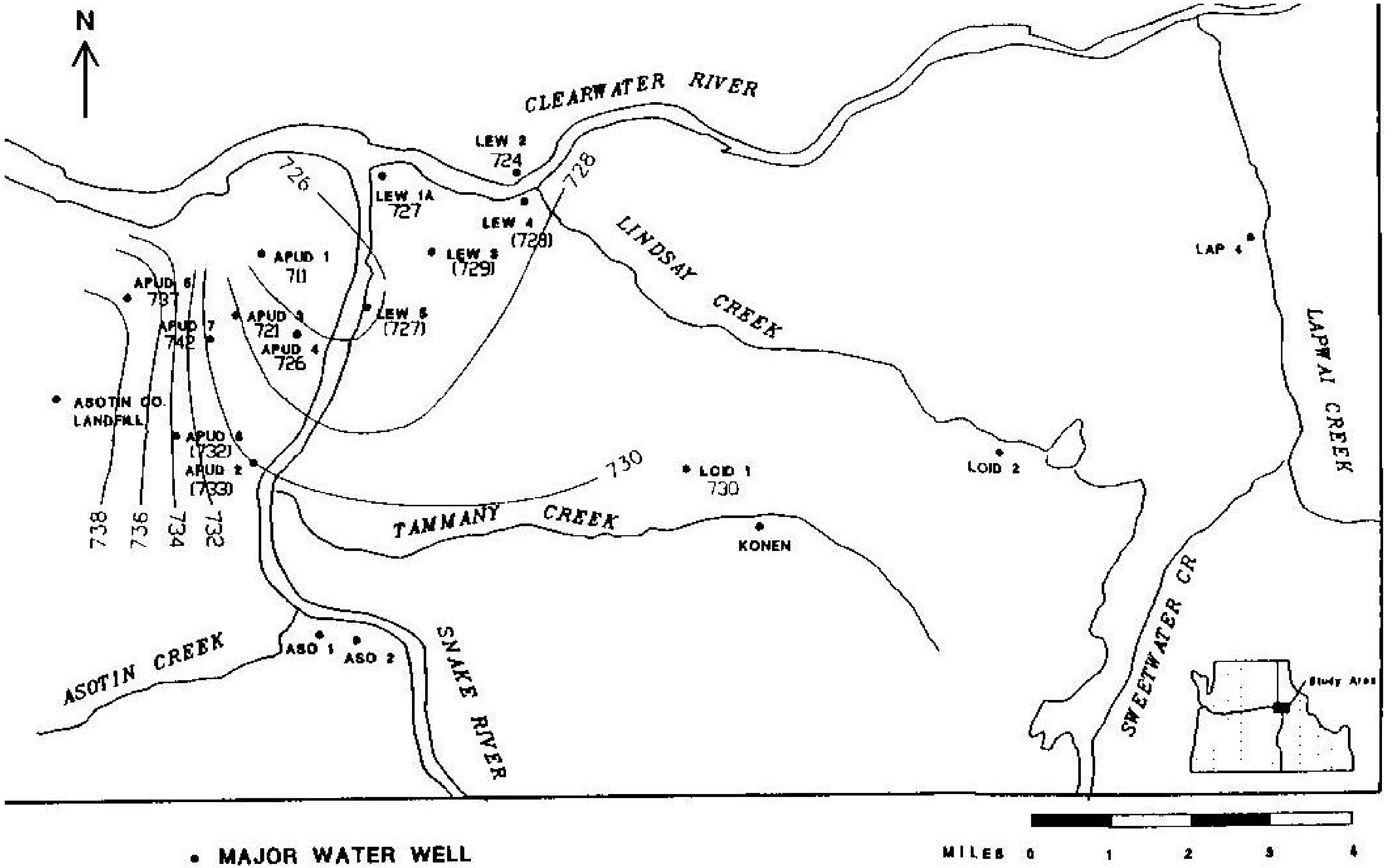


Figure 14 Water-Level Contour Map of Static Levels in 1988 (Stevens, 1994)

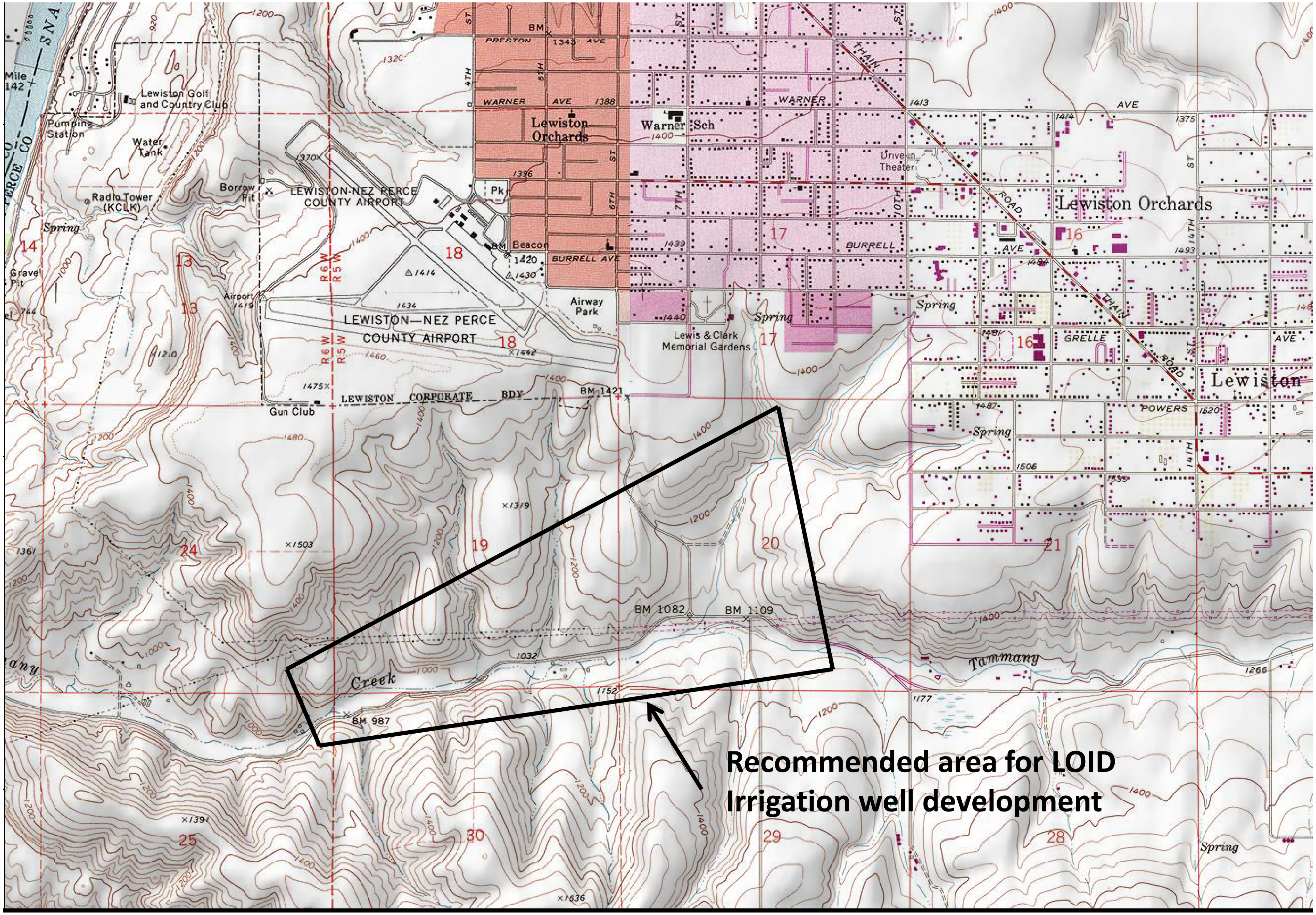


Figure 15 Location Map Showing Recommended Area for Construction of LOID Irrigation Wells

Appendix D. LOID Water Rights Back File

State of Idaho
Department of Water Resources

Permit to Appropriate Water

NO. 85-15755

Priority: May 08, 2014

Maximum Diversion Rate: 18.00 CFS
Maximum Storage Volume: 11,543.0 AF

This is to certify, that LEWISTON ORCHARDS IRRIGATION DISTRICT
1520 POWERS AVE
LEWISTON ID 83501

has applied for a permit to appropriate water from:

Source: GROUND WATER

and a permit is APPROVED for development of water as follows:

BENEFICIAL USE	PERIOD OF USE	RATE OF DIVERSION	ANNUAL VOLUME
DIVERSION TO STORAGE	01/01 to 12/31	18.00 CFS	
MUNICIPAL	01/01 to 12/31	18.00 CFS	
MUNICIPAL STORAGE	01/01 to 12/31		11,543.0 AF
MUNICIPAL FROM STORAGE	01/01 to 12/31		8,500.0 AF
FIRE PROTECTION	01/01 to 12/31	18.00 CFS	
FIRE PROTECTION STORAGE	01/01 to 12/31		3,043.0 AF

LOCATION OF POINT(S) OF DIVERSION:

GROUND WATER, NE1/4NW1/4, Sec. 22, Twp 35N, Rge 05W, B.M., NEZ PERCE County
GROUND WATER, SW1/4SW1/4, Sec. 17, Twp 35N, Rge 04W, B.M., NEZ PERCE County
GROUND WATER, SE1/4SW1/4, Sec. 10, Twp 35N, Rge 05W, B.M., NEZ PERCE County
GROUND WATER, NE1/4NW1/4, Sec. 22, Twp 35N, Rge 05W, B.M., NEZ PERCE County
GROUND WATER, NW1/4NE1/4, Sec. 20, Twp 35N, Rge 05W, B.M., NEZ PERCE County
GROUND WATER, NE1/4NE1/4, Sec. 20, Twp 35N, Rge 05W, B.M., NEZ PERCE County
GROUND WATER, NE1/4NE1/4, Sec. 20, Twp 35N, Rge 05W, B.M., NEZ PERCE County
GROUND WATER, SW1/4NE1/4, Sec. 20, Twp 35N, Rge 05W, B.M., NEZ PERCE County

PLACE OF USE: MUNICIPAL STORAGE & FIRE PROTECTION STORAGE

Twp Rge Sec	NE				NW				SW				SE				
	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	Totals
35N 04W 16							X L10	X L11	X L22	X L23 L24	X L25 L26	X L27					
35N 04W 17													X L11			X L18 L19	
35N 04W 20	X L16 L17																
35N 04W 21						X L7 L8											

State of Idaho
Department of Water Resources

Permit to Appropriate Water

NO. 85-15755

PLACE OF USE: FIRE PROTECTION

Twp Rge Sec	NE				NW				SW				SE				Totals
	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
35N 04W 17										X	X	X L 4			X L 16 L 17	X L 18	
35N 04W 18									X	X L 3	X L 4	X	X	X		X	
35N 04W 19		X															
35N 04W 20		X L 1			X												
35N 05W 7			X	X	X		X L 2	X	X	X L 3	X L 4	X	X	X	X	X	
35N 05W 8			X	X			X	X	X	X	X	X	X	X	X	X	
35N 05W 9										X	X	X			X	X	
35N 05W 10											X	X			X		
35N 05W 11											X						
35N 05W 13							X	X	X	X	X	X	X	X	X	X	
35N 05W 14			X	X	X	X	X	X	X	X	X	X	X	X	X	X	
35N 05W 15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
35N 05W 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
35N 05W 17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
35N 05W 18	X	X	X	X	X			X					X	X			
35N 05W 20	X			X									X				
35N 05W 21	X	X	X	X	X	X	X	X	X	X			X	X			
35N 05W 22	X	X	X	X	X	X	X	X	X	X							
35N 05W 23	X	X	X	X	X	X											
35N 06W 12				X													

State of Idaho
Department of Water Resources

Permit to Appropriate Water

NO. 85-15755

CONDITIONS OF APPROVAL

1. Proof of application of water to beneficial use shall be submitted on or before **August 01, 2019.**
2. Subject to all prior water rights.
3. This right does not grant any right-of-way or easement across the land of another.
4. Project construction shall commence within one year from the date of permit issuance and shall proceed diligently to completion unless it can be shown to the satisfaction of the Director of the Department of Water Resources that delays were due to circumstances over which the permit holder had no control.
5. Right holder shall comply with the drilling permit requirements of Section 42-235, Idaho Code and applicable Well Construction Rules of the Department.
6. Prior to the diversion and use of water under this approval, the right holder shall comply with applicable county zoning and use ordinances.
7. Water shall not be diverted for fire protection use under this right except to fight or repel an existing fire.
8. Water shall not be diverted from fire protection storage except to fight or repel an existing fire.
9. After specific notification by the Department, the right holder shall install a suitable measuring device or shall enter into an agreement with the Department to use power records to determine the amount of water diverted and shall annually report the information to the Department.
10. Place of use for municipal and municipal from storage is within the service area of the Lewiston Orchards Irrigation District as provided for under Idaho law.
11. In connection with the proof of beneficial use submitted for this permit, the permit holder shall also submit a report showing the total annual volume, the maximum daily volume, and the maximum instantaneous rate of flow diverted from the point of diversion authorized for this permit during the development period. The report shall also show the maximum instantaneous rate of diversion, either measured or reasonably estimated by a qualified professional engineer, geologist, or certified water rights examiner, for the entire Lewiston Orchards Irrigation District municipal water system. The report shall also describe and explain how water diverted under this permit provides an additional increment of beneficial use of water for the Lewiston Orchards Irrigation District municipal water system as opposed to an alternative point of diversion for prior water rights already held and used by the Lewiston Orchards Irrigation District for its municipal water system.
12. Prior to or in connection with the proof of beneficial use statement to be submitted for municipal water use under this right, the right holder shall provide the department with documentation showing that the water supply system is being regulated by the Idaho Department of Environmental Quality as a public water supply and that it has been issued a public water supply number.
13. This right authorizes the diversion of an annual total of 11,543 acre-feet to be used for the initial filling of the pond or reservoir, for the replacement of losses caused by seepage and evaporation from the pond or reservoir and for the storage of water for municipal and fire protection purposes.
14. The pond or reservoir established by the storage of water under this right shall not exceed a total capacity of 2,440 acre-feet or a total surface area of 90 acres.
15. This right when combined with surface water rights 85-16, 85-4483, 85-2049, 85-2063, 85-2065, 85-2147, 85-11087, 85-7638, 85-7146, 85-7428 and 85-15356 shall not exceed a total diversion rate of 118.84 cfs or a total storage volume of 13,808.5 acre-feet.

This permit is issued pursuant to the provisions of Section 42-204, Idaho Code. Witness the signature of the Director, affixed at Coeur d'Alene, this 18 day of July, 2014.

Keith L. Franklin

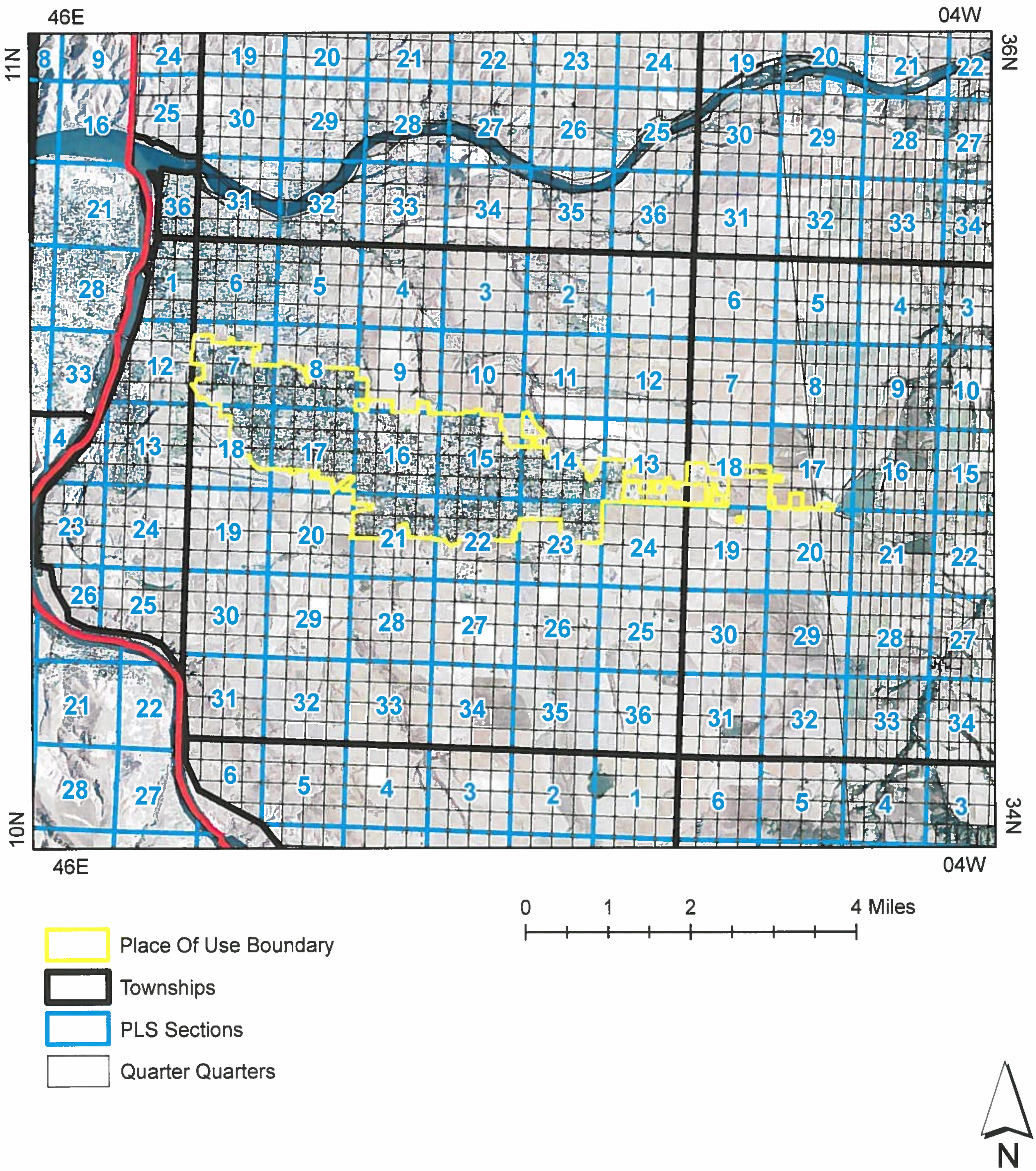
For, GARY SPACKMAN, Director

Lewiston Orchards Irrigation District

Attachment To Permit to Appropriate Water

85-15755

This map depicts the MUNICIPAL, MUNICIPAL FROM STORAGE & FIRE PROTECTION place of use boundary for this water right at the time of this approval and is attached to the approval document solely for illustrative purposes.

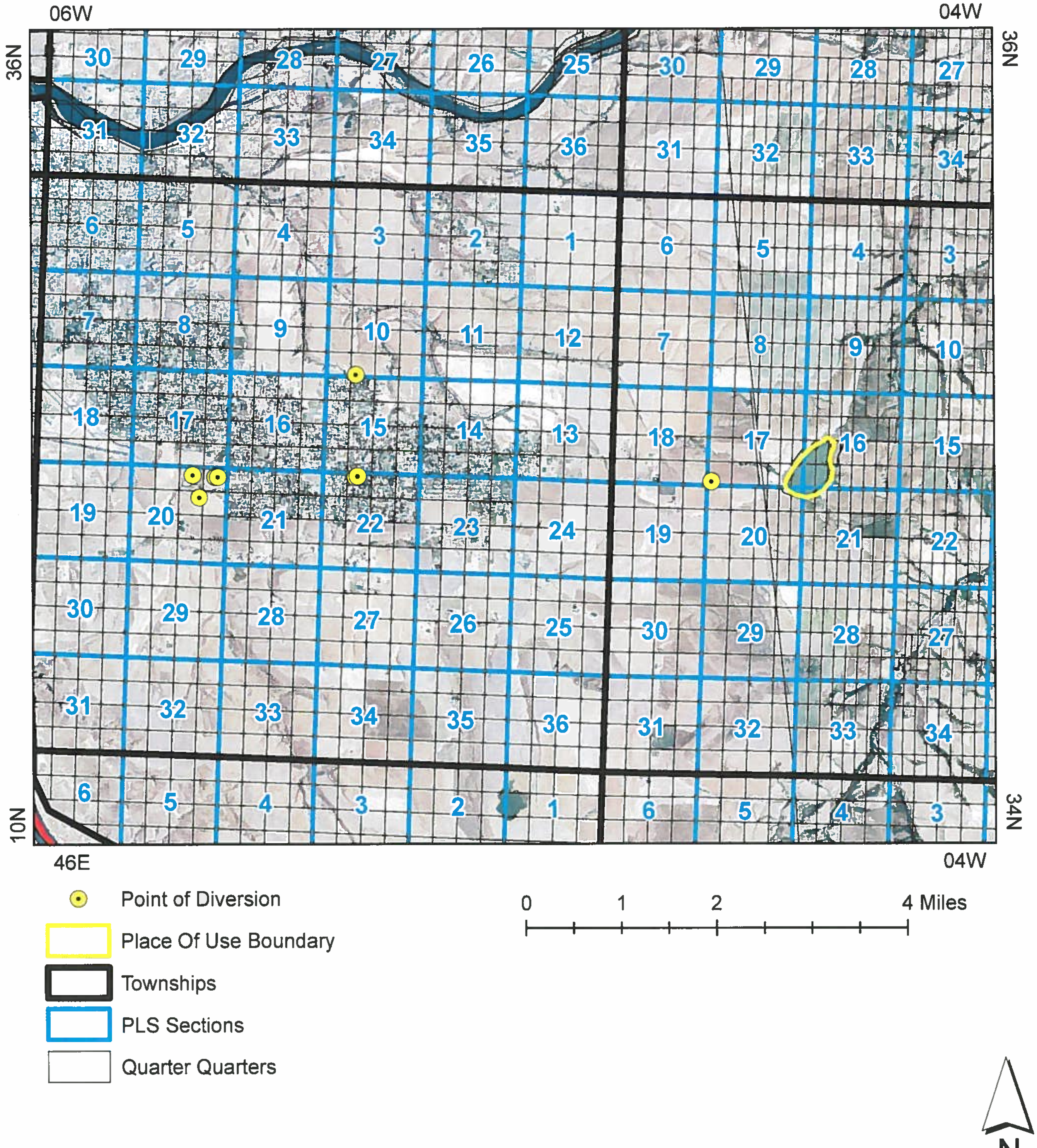


State of Idaho
Department of Water Resources

Attachment To Permit to Appropriate Water

85-15755

This map depicts the MUNICIPAL STORAGE & FIRE PROTECTION STORAGE place of use boundary for this water right at the time of this approval and is attached to the approval document solely for illustrative purposes.



State of Idaho
DEPARTMENT OF WATER RESOURCES
Northern Region, 7600 Mineral Drive. Suite 100, Coeur d'Alene, Idaho 83815
Phone: (208) 762-2800 FAX: (208) 762-2819 www.idwr.idaho.gov

C.L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Director

July 22, 2014

LEWISTON ORCHARDS IRRIGATION DISTRICT
1520 POWERS AVE
LEWISTON ID 83501

RE: Permit No.85-15755

Permit Approval Notice

Dear Permit Holder:

The Department of Water Resources has issued the enclosed permit authorizing you to establish a new water right. Please be sure to thoroughly review the conditions of approval and remarks listed on your permit.

The permit is a PRELIMINARY ORDER issued by the Department pursuant to Section 67-5243, Idaho Code. It can and will become a final order without further action by the Department unless a party petitions for reconsideration or files an exception and/or brief within fourteen (14) days of the service date as described in the enclosed information sheet.

As a permit owner you must commence the excavation or construction of the diverting works within one year of the date the permit was issued, and you must proceed diligently until the project is completed. The date shown under condition no. 1 is the date when the project must be completed.

The Department will send you a 'Proof Due Notice' approximately 60 days prior to the above referenced date requesting you to file either a Proof of Beneficial Use form or a Request for Extension of Time form.

The right to drill a well is not a part of this permit to appropriate water. Beginning in July of 1987, a statute was enacted which requires a drilling permit for new well construction and deepening of existing wells. If the well(s) proposed for use under this water right permit were drilled or deepened after July 1, 1987, a separate drilling permit must be obtained from this Department. Please contact the Ground Water Protection Section located here at this office or our regional office nearest you.

Also, please note that water right owners are required to report any change of water right ownership and/or mailing address to the Department within 120 days of the change. Failure to report these changes could result in a $100 late filing fee. Contact any office of the Department or visit the Department's homepage on the Internet to obtain the proper forms and instructions.

If you have any questions, please contact me at 208 762-2800.

Sincerely,

Eric J. Davis

Eric J. Davis
Sr. Water Resource Agent

Enclosure(s)

CERTIFICATE OF SERVICE

I hereby certify that on July 22, 2014 I mailed a true and correct copy, postage prepaid, of the foregoing PRELIMINARY ORDER(Approved Permit) to the person(s) listed below:

RE: WATER RIGHT NO. 85-15755

LEWISTON ORCHARDS IRRIGATION DISTRICT
1520 POWERS AVE
LEWISTON ID 83501

Carolyn S. Monitz

Carolyn S. Monitz
Technical Records Clerk

EXPLANATORY INFORMATION TO ACCOMPANY A PRELIMINARY ORDER

(To be used in connection with actions when a hearing was **not** held)

(Required by Rule of Procedure 730.02)

The accompanying order or approved document is a "**Preliminary Order**" issued by the department pursuant to section 67-5243, Idaho Code. **It can and will become a final order without further action of the Department of Water Resources ("department") unless a party petitions for reconsideration, files an exception and brief, or requests a hearing as further described below:**

PETITION FOR RECONSIDERATION

Any party may file a petition for reconsideration of a preliminary order with the department within fourteen (14) days of the service date of this order. **Note: the petition must be received by the department within this fourteen (14) day period.** The department will act on a petition for reconsideration within twenty-one (21) days of its receipt, or the petition will be considered denied by operation of law. See Section 67-5243(3) Idaho Code.

EXCEPTIONS AND BRIEFS

Within fourteen (14) days after: (a) the service date of a preliminary order, (b) the service date of a denial of a petition for reconsideration from this preliminary order, or (c) the failure within twenty-one (21) days to grant or deny a petition for reconsideration from this preliminary order, any party may in writing support or take exceptions to any part of a preliminary order and may file briefs in support of the party's position on any issue in the proceeding with the Director. Otherwise, this preliminary order will become a final order of the agency.

REQUEST FOR HEARING

Unless a right to a hearing before the Department or the Water Resource Board is otherwise provided by statute, any person aggrieved by any final decision, determination, order or action of the Director of the Department and who has not previously been afforded an opportunity for a hearing on the matter may request a hearing pursuant to section 42-1701A(3), Idaho Code. A written petition contesting the action of the Director and requesting a hearing shall be filed within fifteen (15) days after receipt of the denial or conditional approval.

ORAL ARGUMENT

If the Director grants a petition to review the preliminary order, the Director shall allow all parties an opportunity to file briefs in support of or taking exceptions to the preliminary order and may schedule oral argument in the matter before issuing a final order. If oral arguments are to be heard, the Director will within a reasonable time period notify each party of the place, date and hour for the argument of the case. Unless the Director orders otherwise, all oral arguments will be heard in Boise, Idaho.

CERTIFICATE OF SERVICE

All exceptions, briefs, requests for oral argument and any other matters filed with the Director in connection with the preliminary order shall be served on all other parties to the proceedings in accordance with IDAPA Rules 37.01.01302 and 37.01.01303 (Rules of Procedure 302 and 303).

FINAL ORDER

The Director will issue a final order within fifty-six (56) days of receipt of the written briefs, oral argument or response to briefs, whichever is later, unless waived by the parties or for good cause shown. The Director may remand the matter for further evidentiary hearings if further factual development of the record is necessary before issuing a final order. The department will serve a copy of the final order on all parties of record.

Section 67-5246(5), Idaho Code, provides as follows:

> Unless a different date is stated in a final order, the order is effective fourteen (14) days after its service date if a party has not filed a petition for reconsideration. If a party has filed a petition for reconsideration with the agency head, the final order becomes effective when:
>
> (a) The petition for reconsideration is disposed of; or
> (b) The petition is deemed denied because the agency head did not dispose of the petition within twenty-one (21) days.

APPEAL OF FINAL ORDER TO DISTRICT COURT

Pursuant to sections 67-5270 and 67-5272, Idaho Code, if this preliminary order becomes final, any party aggrieved by the final order or orders previously issued in this case may appeal the final order and all previously issued orders in this case to district court by filing a petition in the district court of the county in which:

i. A hearing was held,
ii. The final agency action was taken,
iii. The party seeking review of the order resides, or
iv. The real property or personal property that was the subject of the agency action is located.

The appeal must be filed within twenty-eight (28) days of this preliminary order becoming final. See section 67-5273, Idaho Code. The filing of an appeal to district court does not itself stay the effectiveness or enforcement of the order under appeal.

Appendix E. Public Scoping Summary for the Lewiston Orchards Water Exchange and Title Transfer Project

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Snake River Area Office
230 Collins Road
Boise, ID 83702-4520

IN REPLY REFER TO:
SRA-1207
ENV-1.00

AUG 2 1 2015

Subject: Request for Public Comments Regarding the Proposed Lewiston Orchards Project Water Exchange and Title Transfer

Dear Interested Party:

The Bureau of Reclamation is asking for your help in identifying issues and concerns associated with the proposed Lewiston Orchards Project (LOP) Water Exchange and Title Transfer. Reclamation will use this information to help develop alternatives to address issues associated with the LOP. For nearly a decade, the operation and maintenance of the LOP has been the subject of litigation between the Nez Perce Tribe (Tribe), NOAA Fisheries and Reclamation regarding effects to Snake River steelhead listed under the Endangered Species Act. Likewise, the Tribe has long-standing concerns over impacts of LOP operations on the Tribe's cultural, natural, and spiritual resources. Additionally, the current water supply system is insufficient to meet the needs of the Lewiston Orchards Irrigation District (LOID) and is in need of substantial repair.

To resolve these issues, Reclamation is evaluating alternatives to replace the current surface-water system with a groundwater source and allow for the exchanged surface water to be protected instream. Following successful implementation of a water exchange, Reclamation proposes to transfer title of its assets associated with the LOP to the Bureau of Indian Affairs and the LOID.

Reclamation has determined that an Environmental Assessment (EA) is required under the National Environmental Policy Act in order to undertake this action. The EA will evaluate the impacts of each alternative on the human and natural environments and consider this evaluation in the decision-making process. Reclamation is asking for your assistance in identifying issues and concerns, developing and refining a range of alternatives, and evaluating potential impacts of implementing the alternatives.

Reclamation is organizing two public meetings to provide further information regarding the project and receive comments on this proposal. The information for each meeting is as follows:

- September 2, 2015, from 5:00 p.m. to 8:00 p.m. PST, at the Williams Conference Center located at 500 8th Avenue, Lewiston, Idaho
- September 3, 2015, from 5:00 p.m. to 8:00 p.m. PST, at the Pi-Nee-Waus Gym, located at 102 Agency Road, Lapwai, Idaho

Please help us identify important issues and concerns, by attending the public meetings and sending your written comments by October 2, 2015, to: Mr. Ryan Newman, Natural Resource Specialist, Bureau of Reclamation, Snake River Area Office, 230 Collins Road, Boise, Idaho 83702 or by email at sra-lop-comments@usbr.gov.

Also, please fill out and return the form below to Mr. Newman's address above or notify us via Mr. Newman's e-mail address if you wish to remain on the mailing list to receive a copy of the Environmental Assessment. If Reclamation does not receive notification, we will assume you do not wish to be on the mailing list.

For questions concerning the environmental process, please contact Mr. Ryan Newman, Natural Resource Specialist, at 208-678-0461, extension 38, or via e-mail at rnewman@usbr.gov.

Sincerely,

Jerrold D. Gregg
Area Manager

cut along this line

☐ Please keep my name on the mailing list for the LOP Water Exchange and Title Transfer

☐ Please change my address on your mailing list to:

NAME

ADDRESS

CITY, STATE, ZIP CODE

Appendix F. Letter to SHPO Initiating Consultation

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Snake River Area Office
230 Collins Road
Boise, ID 83702-4520

IN REPLY REFER TO:

SRA-1218
LND-1.10

VIA FEDERAL EXPRESS

Ms. Mary Anne Davis
Associate State Archaeologist
Idaho State Historical Society
210 Main Street
Boise, ID 83702-7264

Subject: Invitation to Consult on the Proposed Lewiston Orchards Project Water Exchange and Title Transfer – Lewiston Orchards Project, Idaho

Dear Ms. Davis:

The Bureau of Reclamation is proposing a water exchange and title transfer of the Lewiston Orchards Project (LOP) facilities and associated irrigation responsibilities, effectively divesting all portions of Reclamation's interest in the LOP to the Lewiston Orchards Irrigation District (LOID) and the Bureau of Indian Affairs (BIA) on behalf of the Nez Perce Tribe. The project, which is linear in nature, is located over a large portion of Nez Perce County, Idaho, and partially within the boundary of the Nez Perce Reservation (Figure 1). The U.S. Geological Survey 7.5' topographic map quadrangles involved include Clarkston, Lewiston Orchards North, Lapwai, Lewiston Orchards South, Sweetwater, Waha, and Winchester West. The proposed action constitutes an undertaking according to the definition in the National Historic Preservation Act of 1966, as amended, triggering the Section 106 process.

As required at 36 CFR Part 800.5(b), enclosed please find documentation in support of a finding of "No Historic Properties Affected," including that specified in §800.11(d): (1) A description of the undertaking, specifying the Federal involvement, and its area of potential effects (APE), including photographs, maps, drawings, as necessary; (2) a description of the steps taken to identify historic properties; and (3) the basis for determining that no historic properties are present or affected.

Description of the Undertaking

The LOP is located primarily within the Lapwai Creek watershed, tributary to the Clearwater River, predominantly on and adjacent to the Nez Perce Reservation. It is owned by

Reclamation and operated and managed by LOID. A number of issues have been identified with the LOP that require resolution. These issues include the following:

- LOP facilities and operations are in conflict with the Nez Perce Tribe's resource interests.
- The system is aging and facilities are in need of substantial repair or replacement to continue operation.
- Water availability is insufficient to meet system demands, resulting in regular use restrictions for district patrons.
- LOP surface diversions result in adverse effects to ESA-listed steelhead.

In an effort to solve these issues, Reclamation has developed the LOP Water Exchange and Title Transfer concept, which involves incrementally exchanging the existing surface water system with an off-reservation, groundwater-pumped system consisting of multiple wells. This concept uses the Fish and Wildlife Coordination Act authority and can be constructed in phases as funding becomes available. Individual wells would be constructed and incorporated into the LOID water distribution system and would be connected to the LOP system in exchange for relinquishment of an incremental amount of surface water for instream flow use as an ESA Section 7.a.1 voluntary action. Exact well locations have not yet been identified, so Section 106 consultation for cultural clearance on each of those will either happen on a case-by-case basis, or through a programmatic agreement.

Once the full LOP surface water supply is exchanged, title transfer of LOP facilities would take place. LOID would acquire title of the Reclamation property interests located below Mann Lake and satisfy irrigation needs through use of an alternate water source. The remaining Reclamation property interests would be transferred to the BIA to be held in trust for the Nez Perce Tribe for future management and administration.

For this undertaking, the APE closely encompasses the involved facilities themselves, and includes the existing right-of-ways alongside the canals (which varies between 25 or 50 feet on either side of the canal's center line). This tight APE is justifiable because the transfer of title of these facilities will not produce or cause effects that are visual, audible, or ground disturbing.

History of the Lewiston Orchards Project

Many of the facilities involved in the current LOP were originally constructed by private interests, beginning in 1906, to provide irrigation water to agricultural developments in the Lapwai Creek and Captain John Creek Basins. The initial irrigation system provided a timber flume and a canal to carry water from the Sweetwater Creek to Reservoir A. From Reservoir A, water was distributed through a system of wood-stave pressure pipelines to project lands. The water supply was augmented in 1915, 1922, 1934, and 1939, by making new diversions and by increasing the storage capacity. However, the wood-stave pipe system had a limited economic life and when the pipes were 30 years old and the flume was 20 years old, the water distribution system had become unreliable. System losses ranged from 12 to 85 percent from section to section with the result that pressures were inadequate for satisfactory delivery of domestic water to many homes. In addition, portions of farm units were left dry because of the inadequate water supply.

In 1939, LOID, aided by the Works Projects Administration, launched a program for replacing the wooden flumes with concrete bench flumes. This program continued during 1940-1941 but was not completed. Following these years, extensive maintenance and repairs were necessary to keep the Webb Creek Diversion in operation as the timber-crib diversion dam was in dire need of replacement. Water delivered through the single-pipe system was unsafe for domestic use, which caused a number of residents in the area to transport drinking water from the city of Lewiston.

Federal involvement was necessary to prevent the system from failing. The LOP was found to be feasible by the Acting Secretary of the Interior on May 31, 1946, pursuant to the Reclamation Project Act of August 4, 1939 (53 Stat. 1187, Public Law 76-260). However, before the Acting Secretary's report was submitted to Congress, the Act of July 31, 1946 (60 Stat. 717, Public Law 79-569) specifically authorized construction of the project. The authorized project purposes are for irrigation, municipal supply, and industrial water supply. Following a full investigation by Reclamation engineers, construction and rehabilitation of the system was started on September 15, 1947. All construction was completed on March 15, 1951.

The project facilities include four diversion structures (Webb Creek, Sweetwater, West Fork, and Captain John), feeder canals, three small storage reservoirs (Soldiers Meadow, Reservoir A, and Lake Waha), a domestic water system including a water filtration plant which is no longer in use, and a system for distribution of irrigation water. Most of the project features have been extensively rehabilitated or rebuilt by Reclamation over the years. The domestic water supply which initially was provided by surface water resources now comes entirely from groundwater resources developed by LOID. A full irrigation water supply is delivered to project lands totaling over 3,900 acres, and a domestic water system is now provided for some 16,000 residents.

The LOP is located primarily within the Lapwai Creek watershed, tributary to the Clearwater River, predominantly on and adjacent to the Nez Perce Reservation. The LOP collects drainage from the Craig Mountain watersheds and alters the stream hydrology in Captain John Creek, Webb Creek, Sweetwater Creek, and Lapwai Creek. These streams run though the Nez Perce Reservation and are among the treaty-reserved fishing areas of the Nez Perce Tribe. The species listed in the Endangered Species Act (ESA), Snake River steelhead, is located within the Lapwai Basin, along with its ESA-designated critical habitat, and is directly impacted by annual LOP operations. The Tribe does not receive LOP water and its position is that the LOP impacts tribal natural, cultural and spiritual resources.

Steps Taken to Identify Historic Properties

Brief Synopsis of Previous Consultation

In a consultation letter dated 8/12/1998 from Reclamation to the Idaho State Historic Preservation Office (SHPO), the agency presented its determination that the majority of the LOP facilities did not meet any of the eligibility criteria for being significant historic properties as defined in the National Historic Preservation Act of 1966. In a response letter dated 10/19/1998, the SHPO concurred with the finding of "Not Eligible" for Reservoir "A" Dam and the associated facilities outlined in the initial consultation letter (both letters are enclosed). As a result, the following facilities of the LOP were determined and concurred as being "Not Eligible" for Listing in the National Register of Historic Places (NRHP):

- Reservoir "A" Dam
- Sweetwater Creek Diversion Dam
- Webb Creek Diversion Dam
- West Fork (Waha) Diversion Dam
- Main Pipeline
- Sweetwater Canal
- Webb Creek Canal
- Waha Feeder Canal
- Lake Waha Dike
- Lake Waha Pump Plant and Pipeline

During the 1998 consultation effort, four facilities were not evaluated for NRHP eligibility, including Soldiers Meadow Dam, Captain John Creek Diversion Dam, Captain John Canal, and the abandoned Water Treatment Plant. No determinations were made on the eligibility of those properties at that time.

In 2004, a proposed project that would affect the Sweetwater Creek Diversion Dam and Canal prompted Reclamation to draft a letter (dated 5/6/2004) seeking verification from the SHPO that the Sweetwater Creek Diversion Dam and Canal were considered "Not Eligible." The SHPO responded in a letter dated 5/31/2004 supporting the continued ineligibility of Sweetwater Creek Diversion Dam, and asked Reclamation to complete an Idaho Historical Sites Inventory (IHSI) form documenting the property, to be placed on file in the SHPO cultural resources clearinghouse (both letters are enclosed).

However, it seems that Reclamation did not submit a completed site form for the Sweetwater Creek Diversion Dam and Canal at that time. In 2010, Bionomics performed a survey for the proposed widening of Webb Road that included a portion of the Sweetwater Creek Canal and determined that the length of the canal within their project's APE was "Eligible", not having the benefit of a site form on file to inform them that a determination of "Not Eligible" for the entire canal had already taken place. That survey report is labeled 2010-45 Mitchell Webb Road in SHPO's files. Reclamation, the owner of the canal, was not contacted or involved during the Bionomics efforts and did not have the opportunity to provide input prior to their determination.

In 2011, Reclamation contracted with the Nez Perce Tribe to perform a comprehensive literature review and conduct an archaeological survey that included the entire LOP, including the 25- or 50-foot right-of-way on either side of each canal's centerline, and within the high water line of each reservoir (essentially covering the APE of the current proposed project, except for the water treatment plant building), as well as additional areas of proposed pipelines to, and pump plants at, the Snake and Clearwater Rivers (which were never built). The results of that survey were negative for archaeological sites or other cultural resources within what would be this project's APE. Part of that contract also provided for the development of an ethnographic study to identify Traditional Cultural Places (TCPs). Several TCPs and areas of legend were identified and documented in an appendix to that report. The identified TCPs will not be affected by the current proposed project. Because the Nez Perce Tribe wishes that information to remain confidential, only the archaeological portion of the report is submitted here (enclosed).

On February 18, 2016, Reclamation archaeologist Jenny Huang met with you to begin consultation on the subject project and to present all of the above information. During that meeting, the ineligibility of the facilities previously consulted upon was reviewed, and the need to evaluate the four remaining facilities and an additional Operator's Residence at the Water Treatment Plant was identified. In addition, IHSI documentation needed to be completed for all involved facilities. It was noted that recent research conducted to discover information about the alleged dike at Lake Waha, mentioned in the 1998 consultation letter to SHPO, resulted in no evidence of its actual existence, and it is thought that a confusion in terminology may have led to the incorrect identification of that non-existent feature. Thus, no site form for a dike was prepared. The IHSI site forms for the other 13 facilities are enclosed in both hard copy and electronic format on DVD.

Evaluation of Potential Historic Properties

Five additional facilities in the LOP that were not previously evaluated are evaluated during this current process, including Soldiers Meadow Dam, Captain John Creek Diversion Dam, Captain John Canal, the abandoned Water Treatment Plant, and the plant's Operator's Residence. Each facility is briefly described here, with more in-depth information provided on the completed site forms, which are enclosed.

Soldiers Meadow Dam (USBR-LOP-9) is an embankment dam located on the headwaters of Webb Creek, approximately 26 miles southeast of Lewiston and two miles south of the Nez Perce Reservation. This dam was originally constructed as a random earthfill embankment by the Puget Sound Bridge and Dredging Company for LOID in 1922, with ownership transferred to Reclamation in 1947. The dam was modified in 1986 under the Safety of Dams program when the top 25 feet was replaced, and the crest was raised 7 feet. The dam is a zoned earthfill structure with a structural height of 68 feet and a crest length of 630 feet at crest elevation 4529.0 (Figure 2). The upstream face of the dam is protected by a riprap blanket above elevation 4500.0, and the downstream face is seeded with native grasses. The spillway is located approximately 300 feet east of the right abutment of the dam, and has a discharge capacity of 7,040 cfs at reservoir water surface elevation 4526.0.

Captain John Creek Diversion Dam (USBR-LOP-11) at the head of Captain John Canal supplements the water supply for Soldiers Meadow Reservoir. It was originally built by LOID in 1934 of log cribs following a simple, standard design. In 1980, the facility was entirely rebuilt of concrete (Figure 3).

Captain John Canal (USBR-LOP-10) conveys water from Captain John Creek Diversion Dam (USBR-LOP-11) into the headwaters of Webb Creek in the Sweetwater Basin and was built by LOID in 1934. In 1966, the District completely re-dug the canal and built a new access road along the side of it to ease maintenance and inspection work. Today, the first half mile of the canal has a 36-inch half-round corrugated steel liner that was installed during 1991-92 (Figure 4). At the end of the steel liner, the canal enters an excavated earthen section that discharges into Soldiers Meadow Reservoir.

The Water Treatment Plant (USBR-LOP-12) was constructed in 1950 to rectify the quality problem created by an aging water conveyance system. It was reported that the water running through that system "varied in color from a light gray in the winter to a chocolate brown during the seasons of heavy rain or runoff." When the water became really dark in color, it is reported that people of the area said it was "too thick to drink, too thin to plow." As originally constructed, the plant had a capacity of 1.5 million gallons per day. In 1977-1978, the capacity of the plant was increased to 2.0 million gallons per day by installing a rapid flow sand filter system. A 1.5 million-gallon, ground-level concrete domestic storage reservoir is located adjacent to the filter plant, as well as an outside circular clariflocculator (55 feet in diameter). A metal building covering the clariflocculator was constructed at an unknown date. The 1978-1979 Lewiston Orchards Project History volume reported that portions of the water treatment plant were in the process of being rectified; activities included the interior of the steel storage tank being sand blasted and repainted, and a new addition being added to the existing building to make room for a larger water sump. Changes to the building's windows resulted in reframing that would not meet the Secretary of Interior's Standard for Treatment of Historic Buildings today. Use of the water treatment plant was discontinued in 1985 due to the conversion of the domestic water system from a surface to a groundwater supply. The building has not been in use except for equipment storage since that time (Figure 5).

The Operator's Residence (USBR-LOP-13) was constructed during 1951-1952. This two-story, four-room residence was built to accommodate the water treatment plant operator as the plant was in an isolated location at the time. Very little information is available about this building's design, but from photographs it can be deduced that it was a rectangular plan on a concrete foundation with no basement. The house originally had white, horizontal siding and asphalt shingles on its simple side-gabled roof. No records were found of renovations, but from photographs it can be discerned that by 1961, a covered front entry had been added over the concrete steps leading into the front door. A photo from 2007 revealed that a low, attached garage addition was constructed on the west side of the house, and that it and the house had been painted brown (Figure 6). It also appeared that window screens had been installed over the first floor windows at some point. Research of other Reclamation housing revealed that the LOP Operator's house was built from a Denver-standard design used throughout the agency's projects in the mid-twentieth century. The house has seen a number of changes and updates since its construction, and is still utilized as employee housing today.

When evaluated against the NRHP's criteria, none of the five facilities exhibit qualities that qualify them as individually eligible, and none can be considered a contributing element of an historic district because the vast majority of LOP facilities were determined ineligible in 1998, so no potentially eligible historic district is involved. None of the facilities meet the following considerations: (A) Associated with events important in the defined historic context; (B) associated with the lives of persons significant in our past; (C) embodies the distinctive characteristics of a type, period, or method of construction (due to drastic modifications over the years and an overall lack of historic integrity); and (D) does not yield, or may be likely to yield, information important in prehistory or history. Reclamation has thus determined that the five facilities evaluated are "Not Eligible" for listing in the NRHP.

No Historic Properties Present or Affected

In light of the information included here, Reclamation requests verification of earlier SHPO concurrence that the facilities of the LOP listed in the "Brief Synopsis of Previous Consultation" section above continue to be "Not Eligible" for listing in the NRHP, and that the Bionomics eligibility determination for a portion of Sweetwater Creek Canal does not stand in light of the existing documentation. In addition, Reclamation requests concurrence that the Soldiers Meadow Dam, Captain John Creek Diversion Dam, Captain John Canal, the Water Treatment Plant, and the Operator's Residence are all "Not Eligible" for listing in the NRHP due to the reasons identified above. And finally, in accordance with procedures specified in 36 CFR Part 800, Reclamation requests your concurrence that the current proposed undertaking will result in "No Historic Properties Affected."

Please direct any questions to Ms. Jenny Huang, Archeologist, at 208-383-2257 or by email at jhuang@usbr.gov.

Sincerely,

Roland K. Springer
Area Manager

Enclosures

Appendix G. Spalding’s Catchfly Survey

Idaho Natural Heritage Program

Wildlife Bureau

Idaho Department of Fish and Game
Boise, Idaho

Survey for Spalding's catchfly (*Silene spaldingii* S.Watson):
Pilot Groundwater Well Project, Lewiston Orchards Irrigation District, Lewiston, Idaho

Janice Hill
2016

Report prepared for:

U.S. Fish and Wildlife Service

U.S. Bureau of Reclamation

and

Lewiston Orchards Irrigation District

ABSTRACT
Spalding's catchfly (*Silene spaldingii* S.Watson) is a rare plant endemic to the bunchgrass, sagebrush-steppe, and open pine communities of the inland Pacific Northwest. Large portions of these habitats have been eliminated by cultivation or degraded by livestock grazing and non-native plant invasion. Spalding's catchfly was listed as Threatened by the U.S. Fish and Wildlife Service in 2001; the Recovery Plan for this species stipulates that surveys be conducted to obtain information needed for its conservation and management. In cooperation with the U.S. Bureau of Reclamation and the Lewiston Orchards Irrigation District, a survey for Spalding's catchfly was conducted by Idaho Natural Heritage Program botanists at a pilot groundwater well project area on south edge of Lewiston Orchards, Lewiston, Idaho, in June 2016. The canyon grasslands that cover the slopes of the un-cropped drainage system at the site were the focus of the survey. No Spalding's catchfly plants were found and the mesic Idaho fescue habitat types that typically support Spalding's catchfly in canyon grasslands were not encountered. Two plant species of concern were observed during the survey: 1) green-band mariposa lily (*Calochortus macrocarpus* var. *maculosus*) and 2) showy milkweed (*Asclepias speciosa*). The native canyon grasslands have been largely displaced by a number of non-native, invasive plant species.

SUGGESTED CITATION
Hill, J. 2016. Survey for Spalding's catchfly (*Silene spaldingii* S.Watson): Pilot Groundwater Well Project, Lewiston Orchards Irrigation District, Lewiston, Idaho. Idaho Natural Heritage Program, Idaho Department of Fish and Game, Boise, Idaho. 11 pp.

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Introduction

Spalding's catchfly (*Silene spaldingii* S.Watson) is a rare plant endemic to the bunchgrass, sagebrush-steppe, and open pine communities of the inland Pacific Northwest. Large portions of these habitats have been eliminated by cultivation or degraded by livestock grazing and non-native plant invasion. Spalding's catchfly was listed as Threatened by the U.S. Fish and Wildlife Service (USFWS) in 2001 (USFWS 2001). The largest known populations of Spalding's catchfly in Idaho occur in the Craig Mountain area in the canyon grasslands that cover the slopes of the river canyons along the Snake and Salmon Rivers. These populations occur on northerly aspects (northeast to north to northwest) in the following habitat types: Idaho fescue-snowberry (*Festuca idahoensis-Symphoricarpos albus*), Idaho fescue-Nootka rose (*Festuca idahoensis-Rosa nutkana*) (Daubenmire 1970) and Idaho fescue-prairie junegrass (*Festuca idahoensis-Koeleria macrantha*) (Tisdale 1986) from 397 to 1,159 m (1,300 ft to 3,800 ft) (Hill and Gray 1999; Hill and Gray 2004).

The Recovery Plan for Spalding's catchfly stipulates that surveys be conducted to obtain information needed for its conservation and management (USFWS 2007). With Section 6 funding from the USFWS, the Idaho Natural Heritage Program (IDNHP) has been conducting surveys for Spalding's catchfly in Idaho. In cooperation with the U.S. Bureau of Land Reclamation and the Lewiston Orchards Irrigation District (LOID), a survey for Spalding's catchfly was conducted by IDNHP botanists at a pilot groundwater well project area on south edge of Lewiston Orchards, Lewiston, Idaho, in June 2016. The well project is being developed to provide irrigation water for landowners in Lewiston Orchards. A major goal of the project is to ensure that operations do not jeopardize species listed under the Endangered Species Act (ESA) or their critical habitats. The closest known Spalding's catchfly populations to this project area occur within a few miles to the south of Lewiston Orchards and few miles to the north of Lewiston.

Species Description

Spalding's catchfly is a deep-rooted, long-lived, herbaceous, perennial forb in the Pink Family (Caryophyllaceae). Foliage is covered with sticky hairs that can entrap insects, giving the species its common name, 'catchfly'. Aboveground portions of the plant die back completely over winter. Plants emerge in late May/early June as either rosette plants or stemmed plants; ~ 10% of plants remain alive belowground each year in prolonged dormancy. Stemmed plants are capable of reproduction, but can remain vegetative; rosette plants do not bolt into stemmed plants or reproduce. Flowering occurs from late July into September. Most rosette plants and many stemmed plants can disappear or become undetectable by flowering time, and surveys conducted at flowering time have high potential to underestimate population size, therefore, surveys should be conducted early in the season before plants disappear (Hill and Garton 2015).

Survey Area

The LOID well project area, located south of Grelle Drive and west of 10th Street in Lewiston Orchards, consists of 89 ha (220 acres) of cropland dissected by a drainage system of Tammany Creek (Figure 1). The drainage system is the focus of the survey and was divided into five major segments for reference. Segment #s 1, 2, 3, and 4 each have a small side drainage, 1a, 2a, 3a, and 4a. Segment #5 has two small side drainages, 5a and 5b. The drainage survey area consists of the un-cropped slopes of the drainage segments that support canyon grasslands and comprise

~35%, 31 ha (77 acres), of the project area (Figure 2). The drainage segments are moderately deep, broad canyons, 9-30 m (30-100 ft) deep and 0.05-0.21 km (0.03-0.13 mi) wide. The lower end of segment #5 is much narrower and flatter: 1.5-3.0 m (5-10 ft) deep. The drainage system flows south 0.4-0.8 km (0.25-0.50 mi) into Tammany Creek which then flows into the Snake River 6.4 km (4 mi) to the west. Elevations within the drainage survey area range from 424 m (1,390 ft) at the northeast end of drainage segment #2 to 345 m (1,130 ft) at the southwest end of drainage segment #5. Four areas within the drainage survey area have northerly aspects that have high potential to support habitat for Spalding's catchfly (Figure 2):
1) the northwest slope of the small side canyon 1a
2) northwest slope of drainage segment #2,
3) the northerly slopes of drainage segments #3 and #4
4) the northeast slope of the small side canyon 3a.

Methods
The project area was examined on Google Earth (date of imagery: 6/30/2015) and canyon grassland habitat and areas with high potential to support Spalding's catchfly were delineated. Hard copies of the map area were printed from the Google Earth image and taken into the field as reference. One IDNHP botanist and a volunteer, each with 15 years of experience surveying for and monitoring Spalding's catchfly, systematically surveyed the drainage survey area for this species on the 22, 23 and 25 June 2016. Standard NatureServe protocol was followed, i.e., photographs were taken of the survey area and several plant species, size and location (latitude/longitude coordinates) of any plants of concern were recorded, data were collected on site characteristics, associated species, habitat condition, and existing disturbances.

Results
No Spalding's catchfly plants were found. The mesic Idaho fescue habitat types that typically support Spalding's catchfly in canyon grasslands were not encountered. Idaho fescue, a dominant species in these habitat types, was seldom observed. Other plant species that indicate the presence of these habitat types and are common associates of Spalding's catchfly, i.e., prairie junegrass, red besseya (*Besseya rubra*), white-stem frasera (*Frasera albicaulis*), field chickweed (*Cerastium arvense*), western hawkweed (*Hieracium albertinum*), prairie smoke (*Geum triflorum*), and twin arnica (*Arnica sororia*), were not found. The survey area is at the lower end of the known elevational range for Spalding's catchfly and its canyon grassland habitat and may be too dry to support these communities. Additionally, the large infestations of non-native, invasive plant species currently present may have displaced these communities. Our degree of certainty that Spalding's catchfly is not present at the site is very high; however, it is difficult to have 100% confidence because this species has major detectability difficulties, i.e. some plants remain alive belowground during a growing season (prolonged dormancy) and plants that have emerged aboveground early in the growing season often disappear or become undetectable over the growing season.

Two plant species of concern were encountered in the survey area: 1) green-band mariposa lily (*Calochortus macrocarpus* var. *maculosus*) in drainage segments # 1 and # 2, and 2) showy milkweed (*Asclepias speciosa*) [ASSP] in segment # 3 (Figure 3/Photos). Neither of these plant species are ESA-listed species. Green-band mariposa lily is an at-risk species that is tracked by IDNHP (2016); it has a Natural Heritage global rank of G5T2 and a state rank of S2, meaning that although the species *Calochortus macropcarpus* is widespread, abundant and secure, this variety of the species is imperiled both at the global level and at the state level. This variety is a local endemic found in canyon grasslands in tri-state area of Idaho, Oregon and Washington. Within the survey area, approximately 800-1000 plants occurred in ten clusters in drainage segment #1 and five clusters in drainage segment #2; the total area covered was 4.6 acres (Figure 3; Table 1). Showy milkweed is not an at-risk, tracked species; however, it is of particular interest to USFWS and Idaho Department of Fish and Game (IDFG) because it is a host for the monarch butterfly (*Danaus plexippus plexippus*). The USFWS initiated a review to determine if the monarch butterfly should be listed under the Endangered Species Act (USFWS 2014). Monarch butterflies are of increasing conservation concern and the IDFG is currently studying monarchs and the milkweeds (*Asclepias* spp.) on which they depend. The USFWS is working with IDNHP to develop a field guide to the milkweeds of Idaho. In the survey area, four to five clumps of showy milkweed totaling 100-150 plants were encountered in one area of 0.4 ha (0.1 acre) (Figure 3; Table 1). Information on the location, extent, and condition of Idaho native milkweed populations will aid in conservation efforts for monarch butterflies. The primary threats to these plant species of concern in the survey area are large infestations of non-native, invasive plant species and ground disturbance from ATV use (Photos).

Slopes of the drainage survey area support canyon grassland communities (Tisdale 1986); however, only a few native species remain, including a few small patches of bluebunch wheatgrass (*Pseudoroegneria spicata*) and Nootka rose and occasional rabbitbrush (*Chrysothamnus* sp.) plants. These native canyon grassland communities have largely been displaced by a number of non-native, invasive plant species (Photos), including Scotch thistle (*Onopordum acanthium*), bur chervil (*Anthriscus caucalis*), vetch (*Vicia villosa*), cheatgrass (*Bromus tectorum*), Japanese brome (*Bromus japonicus*), Jim Hill mustard (*Sisymbrium altissimum*), yellow starthistle (*Centaurea solstitialis*), prickly lettuce (*Lactuca serriola*), teasel (*Dipsacus sylvestris*), rush skeletonweed (*Chondrilla juncea*), kochia (*Kochia scoparia*), field bindweed (*Convovulus arvensis*), bulbous bluegrass (*Poa bulbosa*), Kentucky bluegrass (*Poa pratensis*), Canada thistle (*Cirsium arvense*), dog rose (*Rosa canina*), sweet briar (*Rosa rubiginosa*), blue lettuce (*Lactuca pulchella*), ventenata (*Ventenata dubia*), jointed goatgrass (*Aegilops cylindrica*), and St. Johnswort (*Hypericum perforatum*). These non-native species comprise at least 80-90% of the vegetation in the survey area. Rush skeletonweed was only observed at two locations and could possibly be eradicated (Figure 3; Table 1; Photo).

The riparian area in the canyon bottoms was a mix of native and non-native species. The over-story consists primarily of ash (*Fraxinus* sp.) trees with occasional Russian olive (*Elaeagnus angustifolia*), black walnut (*Juglans nigra*), apple (*Malus* sp.), maple (*Acer* sp.), poplar (*Populus* sp.), and cottonwood (*Populus trichocarpa*) trees. The understory consists of cat-tails (*Typha latifolia*), hard-stem bulrush (*Schoenoplectus acutus*), Nootka rose, water-cress (*Rorippa nasturtium-aquaticum*) and non-native invasive plant species, poison hemlock (*Conium maculatum*), stinging nettle (*Urtica dioica*), curly dock (*Rumex crispus*), and sweet briar.

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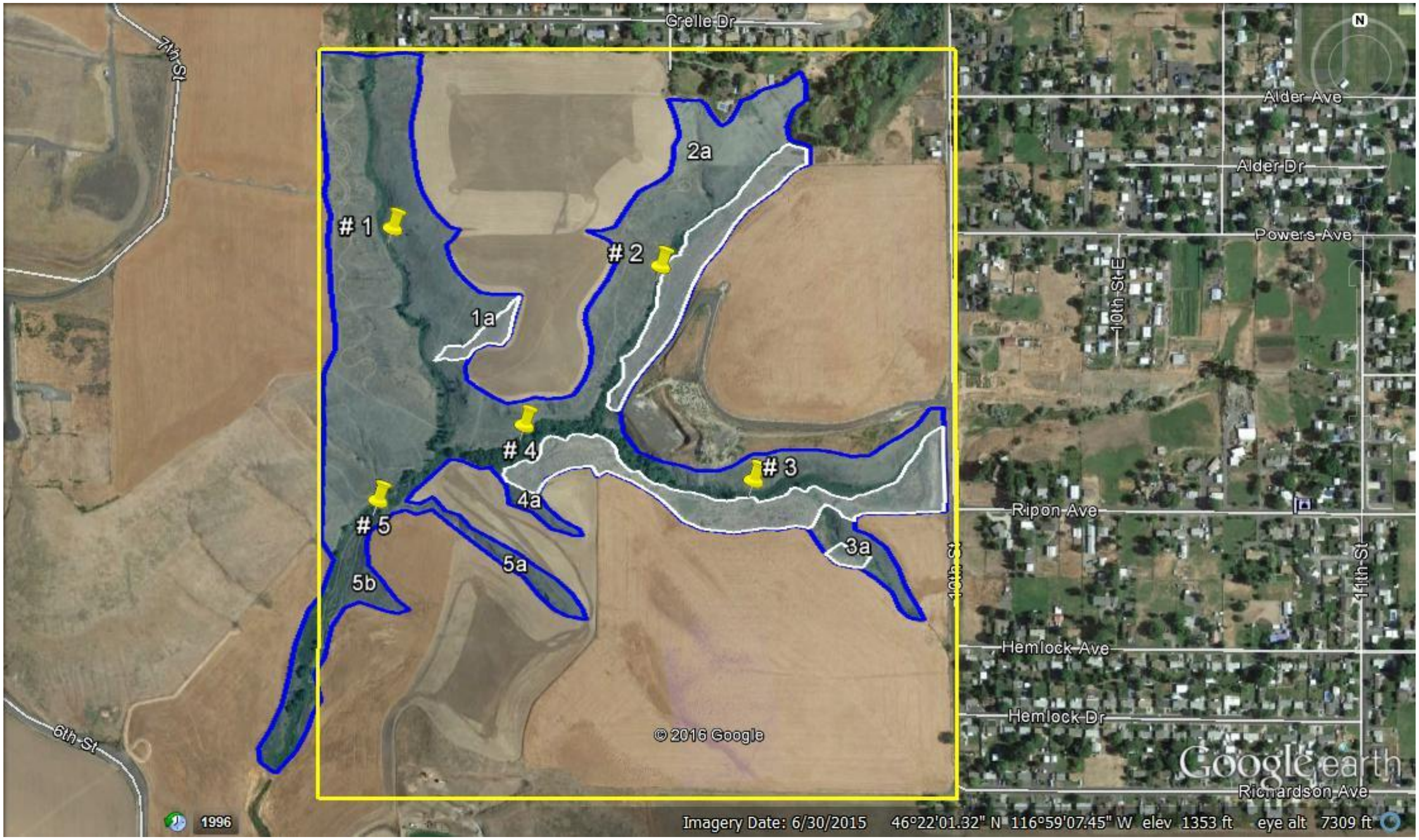
FIGURE 1

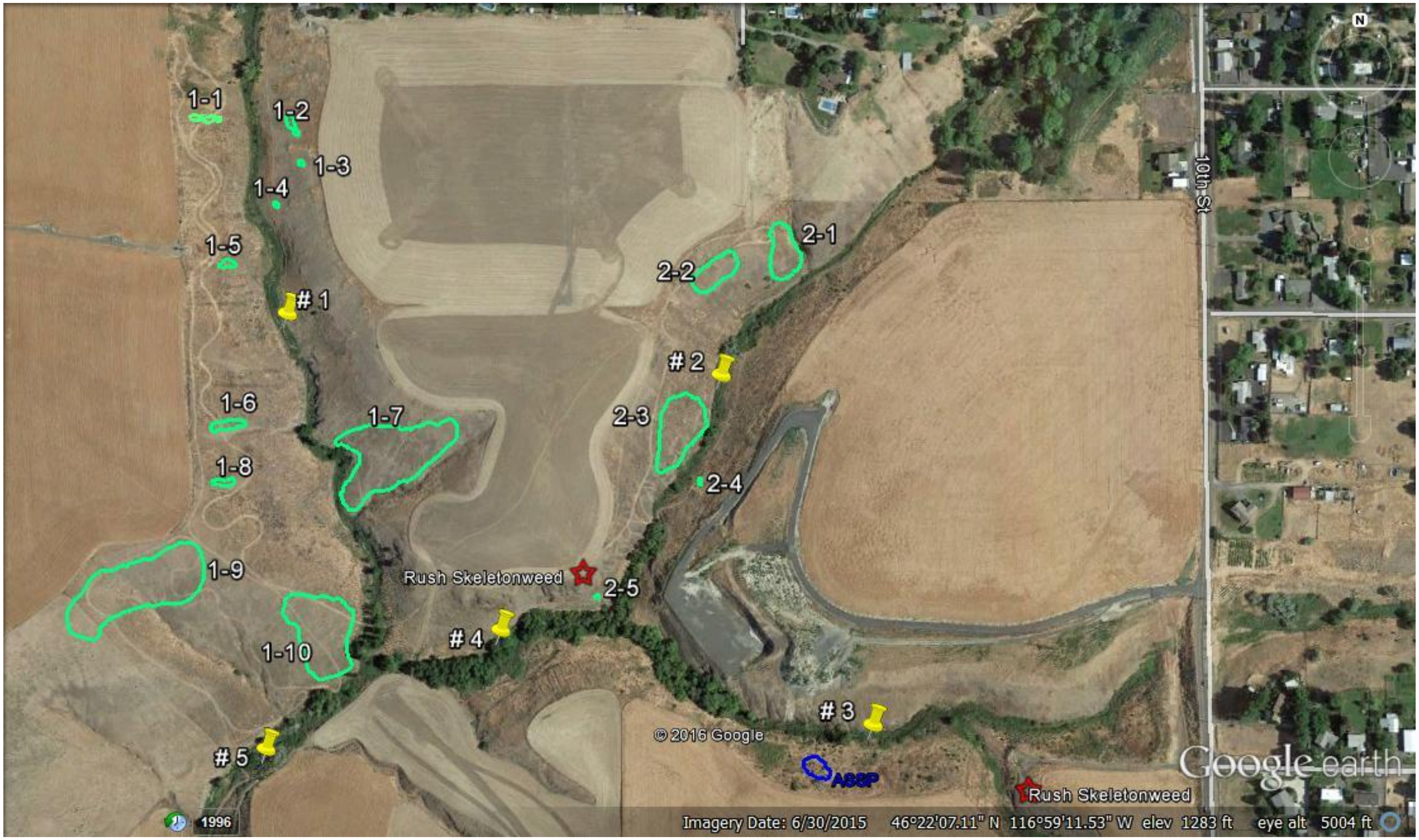
LOID Project Area (outlined in yellow)
Major Drainage Segments (marked with yellow pins)

FIGURE 2



Survey Area (shaded/outlined in blue)
Areas with high potential to support Spalding's catchfly (shaded/outlined in white)

FIGURE 3



Occurrences of green-band mariposa lily (*Calochortus macrocarpus* var. *maculosus*) outlined in green and showy milkweed (*Asclepias speciosa*) [ASSP] outlined in dark blue. Rush skeletonweed (*Chondrilla juncea*) marked with red stars.

TABLE 1. Latitude/Longitude Coordinates Table		
(one point recorded at center of cluster/population)		
	Latitude	**Longitude**
Calochortus macrocarpus var. maculosus		
1-1	46°22’15.97”N	116°59’32.98”W
1-2	46°22’15.81”N	116°59’29.39”W
1-3	46°22’14.67”N	116°59’28.95”W
1-4	46°22’13.52”N	116°59’30.24”W
1-5	46°22’11.76”N	116°59’32.21”W
1-6	46°22’06.95”N	116°59’32.19”W
1-7	46°22’06.09”N	116°59’25.30”W
1-8	46°22’05.25”N	116°59’32.27”W
1-9	46°22’02.15’N	116°59’36.19”W
1-10	46°22’00.73”N	116°59’28.42”W
2-1	46°22’12.10”N	116°59’08.30”W
2-2	46°22’11.45”N	116°59’11.33”W
2-3	46°22’06.90”N	116°59’12.77”W
2-4	46°22’05.26”N	116°59’11.95”W
2-5	46°22’01.75”N	116°59’16.46”W
Asclepias speciosa	46°21’56.83"N	116°59’06.96"W
Rush skeletonweed		
Drainage Segment #3	46°21’56.15"N	116°58’57.87"W
Drainage Segment #4	46°22’02.49"N	116°59’17.03"W

Drainage Segment #1
(from south to north)

Drainage Segment #2
(from south to north)

Drainage Segment #3
(from west to east)

Drainage Segment #4
(from east to west)

Drainage Segments #3 and #4
(from west to east)

Drainage Segment #5
(from north to south)

Green-band mariposa lily
Calochortus macrocarpus* var. *maculosus

Green-band mariposa lily
Calochortus macrocarpus* var. *maculosus

Green-band mariposa lily
Subpopulation 1-6 (Drainage Segment #1)
with yellow starthistle, vetch, annual bromes

Showy milkweed
(*Asclepias speciosa*)

Showy milkweed
Drainage Segment #3

Drainage Segment #2 (northwest slope) Potential Spalding's catchfly habitat invaded by bindweed, bur chervil, Scotch thistle, Jim Hill mustard, and annual bromes

Drainage Segment #1 (southeast slope) Green-band mariposa lily subpopulation 1-9 invaded by yellow starthistle, Scotch thistle, annual bromes and bulbous bluegrass

Drainage Segment #3; potential Spalding's catchfly habitat invaded by Scotch thistle, bur chervil (dark red-brown), and annual bromes (foreground)

Drainage Segment #4; potential Spalding's catchfly habitat invaded by bur chervil, Scotch thistle, Jim Hill mustard, prickly lettuce, vetch, and annual bromes

Rush skeletonweed (*Chondrilla junceae*) Drainage Segment #4 (south slope)

Disturbance from 4-wheelers Drainage Segment #1