APPENDICES

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Appendix A   Summary Scoping Report

SCOPING SUMMARY REPORT

Minidoka Dam Spillway Replacement Project Environmental Impact Statement

Minidoka Project
Burley, ID

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

August, 2009

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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SCOPING SUMMARY REPORT
MINIDOKA DAM SPILLWAY REPLACEMENT

The Proposed Project

The Bureau of Reclamation is preparing an environmental impact statement (EIS) for the proposed Minidoka Dam Spillway Replacement project. The purpose of the project is to prevent a structural failure of the Minidoka Dam spillway and associated structures. Alternatives currently being considered are No Action as required under NEPA, total replacement of the spillway and headgate structures, or replacement of just the spillway.

The purpose of this summary report is to provide a summary of the major comments and issues received as part of the scoping process under the National Environmental Policy Act (NEPA).

Background

Minidoka Dam impounds Lake Walcott and is a feature of Reclamation's Minidoka Project. It is located on the main stem Snake River about 18 miles northeast from the city of Burley, ID within the Minidoka Wildlife Refuge. After over 103 years of continued use, the over 2000 feet long concrete spillway at the Minidoka Dam has reached the end of its functional lifespan. The concrete that forms the spillway crest and the piers of the pier-and-stoplog structure shows extensive visible deterioration at numerous locations. In addition, the potential for ice damage to the stoplog piers requires that reservoir water levels be dropped each winter. The headgate structures at the North Side Canal and South Side Canal also show serious concrete deterioration similar to that seen along the spillway. The current conditions of the Minidoka Dam spillway and headgate structures present increasingly difficult reliability and maintenance problems. If structural problems are not corrected there is potential of partial or complete failure of the spillway and headgates. If these failures occur, Reclamation may not be able to meet contractual obligations for water delivery, power generation and Reclamation's commitments to deliver flow augmentation water under the Nez Perce Settlement Agreement and the Endangered Species Act.

A related action currently being studied is a structural raise (to be determined) of Minidoka Dam to accommodate a 5-foot raise in the Reservoir Water Surface (RWS) elevation. The Idaho Water Resource Board (IWRB) is funding a special study that explores the feasibility and costs associated with this action. The purpose of the dam raise is to increase the storage capacity of Lake Walcott by approximately 50,000 acre-feet as one element of efforts to address water supply concerns in the Eastern Snake River Plain Aquifer area. The IWRB anticipates the additional supplies of stored water could be used to help address surface and groundwater demands by implementing improvement measures being considered by the State. If the IWRB decides to pursue this action, a supplemental EIS will be developed to evaluate impacts.

Scoping Process

Scoping is an essential part of public involvement. Public involvement is a process for including interested and affected individuals, organizations, and local, state and federal agencies in the decision making process. Scoping is a term used for the process of seeking comments and public information to identify significant issues related to a proposal.

The scoping process for this project was initiated on November 13, 2008 when a Notice of Intent to prepare an EIS and to conduct public scoping meetings was published in the *Federal Register*. A scoping letter discussing the project and notifying the public of the scoping meetings was sent to a mailing list of 106 individuals, organizations, governmental agencies, and congressional delegates. A similar letter was sent to 28 tribal governments.

Initially, two public scoping meetings were held. The first meeting was held in Idaho Falls, Idaho on December 3, 2008, the second was held in Burley, Idaho on December 4, 2008. Sixteen people in total attended the scoping meetings. At the public meetings, Reclamation presented the proposed alternatives, provided an overview of the NEPA process, and provided opportunities for the public to identify issues and concerns associated with the proposed project. In addition to comments received at the scoping meetings, written comments were accepted through December 19, 2008. At the Shoshone Bannock Tribe's request, a public meeting was held from 6-8 p.m. on the Shoshone-Bannock Reservation on April 7, 2009. One member of the public attended the meeting.

Five letters of comment were received. Comments ranged from brief comments and questions to detailed statements. Each comment relevant to the project has been summarized under an issue category, and is presented in this document. Comments received during the scoping process dealing with issues, concerns, and potential impacts will be considered by Reclamation in the preparation of the Draft EIS. Additional issues will also be considered as they arise.

The comments received will be used to assist in the following:

1. Identifying the significant issues relevant to the proposed action.
2. Identifying those elements of the environment that could be affected by the proposed action.
3. Formulating new or modifying current alternatives for the proposed action.

The Notice of Intent, news release, scoping letter, maps, and meeting handouts are attached to this document.

Summary of Comments and Issues

This section identifies the major comments and issues provided to Reclamation as part of the scoping process.

1. **Elimination of Winter Drawdown**
   - Adverse effects to downstream vegetation and waterfowl.
   - Potential for Eurasian milfoil to invade Lake Walcott at a higher water elevation.

2. **Alternatives**
   - What is the purpose of the spillway?
   - When the new spillway is being built will the silt in front of the old spillway be cleaned out?
   - What is the timeframe for construction?
   - After the replacement goes in, will the old one be removed?
   - Will the water be drawn down?

3. **Economic impact to the Minidoka Irrigation District**

4. **Fish Entrainment in canal diversions, hydroelectric generators, and the spillway**
   - Include an analysis of alternatives to prevent canal entrainment including screening, electrical barriers, strobes, and/or bypass structures.
   - What fish species are in Lake Walcott?

5. **Spillway Fishery below Minidoka Dam**
   - Need to maintain the sport fishery for rainbow trout, smallmouth bass, and other species.
   - Current flows in the spillway represent the minimal discharge needed to sustain basic aquatic life in this area particularly during the summer months.
   - The ability to stabilize flows below the spillway has the potential to increase the productivity of the fishery. Conversely, any loss, modification, or degradation of flows has the potential to affect a locally popular fishery.
   - Include an analysis of alternatives to maintain or improve aquatic resource conditions and the sport fishery.

6. **Wetland Habitat below Minidoka Dam Spillway**
   - Include an analysis of alternatives to maintain, improve, or mitigate impacts to wetland habitats below Minidoka spillway.

7. **Spillway Flows**

- Partial mitigation for the impacts resulting from the replacement of the powerplant requires that Reclamation release certain flows during the irrigation season.
- Include an analysis of alternatives to maintain, improve, or mitigate flows below the Minidoka spillway.

8. Lake Walcott Water Levels

- Annual winter drawdown of the reservoir negatively affects a number of aquatic species including trout and smallmouth bass.
- Benefits to fish resources as a result of water level stabilization, with options for periodic drawdown to manage wetland/aquatic vegetation, should be included in the analysis.

9. Endangered Species Act

- Yellow-billed cuckoo (candidate species)
- Desert valvata (endangered species)
- What Threatened and Endangered species are in the reservoir or below it?
- Are there land locked Sturgeon?

10. Species of Greatest Conservation Need

- One invertebrate, one amphibian, variety of birds.

11. Previous mitigation commitments

- Need to ensure that commitments for previous actions at the Minidoka Project have been fulfilled and /or are addressed in the spillway replacement analysis.

12. Water resources impacts

- Water quality degradation.

13. Habitat, Vegetation, and Wildlife

- Habitat for various species may be disturbed during construction.
- Construction activities will disturb vegetation which may spread noxious weeds and exotic (non-indigenous) plants.
- What is the distance between American Falls and the Minidoka spillway? Will the distance and amount of water affect any species along that distance?

14. Wetlands and riparian areas

- Clean Water Act Section 404 permit.

15. Air quality

- Potential impacts from construction activities.

16. Climate change

- Consider how climate change might affect resources as well as how greenhouse gas emissions from the project may affect climate change.

17. Cumulative effects

- Should clearly identify the resources that may be cumulatively impacted, the time over which impacts are going to occur, and the geographic area that will be impacted.

18. Environmental Justice

- Determine if environmental justice populations (minority and low-income) occur within the geographic scope of the project.
- Address the potential for disproportionate adverse impacts to minority and low-income populations, and the approaches used to foster public participation by these populations.

19. Historic and cultural resources

- Discuss potential impacts to historic and cultural resources, and treaty rights (ITA's) and describe coordination with affected tribal governments.
- Do we need to have monitors out during the project construction?
- The area of Lake Walcott was once in the Shoshone-Bannock Treaty, but the treaty was never ratified and they lost them, this area is very important to the Tribes
- There is an incredible amount of looting when water goes down at reservoir. If the water is drawn down need to ensure protection of these sites and the Tribes would like to have a monitor at for the reservoir.

20. Monitoring

- Include implementation and effectiveness monitoring.

22. Miscellaneous

- Need to make sure that equipment is cleaned prior to entering area to ensure there are no epidemics of invasive species like mussels or other aquatic travelers.
- Why are there no screens to prevent sturgeon from going down the canals?
- There are a lot of areas that are not disturbed and every effort should be taken to protect these areas.

23. Outside Scope of Project

- Have we taken into consideration the coal plant that is going to be built near American falls?
- The coal plant could deposit up to 10% of its debris per year, this should be addressed.

- What about the Simplot chemicals, have any tests occurred to test for these polluting the water at Lake Walcott?
- Has the Snake River aquifer been taken into consideration and effects from pollution or reservoir change been incorporated into that?
- Spillway Replacement alternatives are premature since a study of a dam raise is currently underway.
- Increase capacity of site (raise the dam) as part of the spillway project.
- Delay to Spillway Replacement if dam raise is pursued.
- Does sediment deposition affect carrying capacity?

Tribal Government to Federal Government Consultation and Scoping of Issues

A meeting was held April 7th, 2009 with the Shoshone-Bannock Fort Hall Business Council from 11:00 a.m. to12:00 p.m. The meeting was attended by Chairman, Vice Chairman, and four Council members. Reclamation employees included the Assistant Area Manager, Activity Manager and the Native American Affairs Coordinator. Discussion ranged from brief comments and questions to detailed statements. They are summarized within the categories identified above. No written comments were received. In addition, the following comments, although not considered scoping issues, are comments considered as part of the Tribal Government to Federal Government Consultation.

- The council looks for employment opportunities for Tribal members, the economy is even worse on the Reservation, they would like Reclamation to add something to the contract so that any sub-contracting or hiring of employees would have native preference, work with the TERO office to do this.

- Tribes want to be involved from day one, not when the project is near completion.

- When the construction starts will they be able to hire Tribal folks?

Attachments

Notice of Intent

Dated: November 6, 2008.

Randall B. Luthi,

Director, Minerals Management Service.

[FR Doc. E8–26995 Filed 11–12–08; 8:45 am]

BILLING CODE 4310–MR–C

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Minidoka Dam Spillway Replacement; Minidoka County, ID

AGENCY: Bureau of Reclamation, Interior.

ACTION: Notice of intent to prepare an Environmental Impact Statement.

SUMMARY: Pursuant to section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969, as amended, the Bureau of Reclamation (Reclamation) intends to prepare an Environmental Impact Statement (EIS) on the proposed Minidoka Dam Spillway Replacement. Alternatives currently being considered are No Action as required under NEPA, total replacement of the spillway and headgate structures, or replacement of just the spillway.

Reclamation is requesting early public comment and agency input to help identify significant issues or other alternatives to be addressed in the EIS. Information obtained during the scoping period will help in developing information to be included in the EIS. A draft EIS is expected to be provided to the public for review by winter, 2009 followed by opportunities to provide written and oral comments. The final EIS is scheduled for completion in winter, 2010. A Record of Decision, describing which alternative is selected for implementation, and the rationale for its selection, would then be issued following a 30-day waiting period.

DATES: Scoping meetings will be held on the following dates and times:

• *Idaho Falls, ID: December 3, 2008:* Open House Meeting 6 pm to 9 pm.

• *Burley, ID: December 4, 2008:* Open House Meeting 6 pm to 9 pm.

Written comments will be accepted through December 19, 2008 for inclusion in the scoping summary document. Please direct requests for sign language interpretation for the hearing impaired or other auxiliary aids, to Ms. Allyn Meuleman by November 24, 2008, at the telephone or fax numbers listed under the FOR FURTHER INFORMATION section of this notice.

ADDRESSES: Comments and requests to be added to the mailing list may be submitted to Bureau of Reclamation, Snake River Area Office, Attention: Allyn Meuleman, Activity Manager, 230 Collins Road, Boise, ID 83702–4520. Comments may also be submitted electronically to *minidoka_dam_eis@pn.usbr.gov.*

The scoping meetings will be held at the following locations which are physically accessible to people with disabilities.

• Red Lion Hotel, 475 River Park Way, Idaho Falls, ID 83402

• Burley Best Western Inn, 800 North Overland Avenue, Burley, ID 83318

FOR FURTHER INFORMATION: Contact Allyn Meuleman, (208) 383–2258, fax: (208) 383–2237 for additional information. Information on this project can also be found at: *http://www.usbr.gov/pn/programs/eis/minidokadam/index.html.*

SUPPLEMENTARY INFORMATION: The purpose of the proposed spillway replacement action is to prevent a structural failure of the Minidoka Dam spillway and associated structures.

Minidoka Dam impounds Lake Walcott and is a feature of Reclamation's Minidoka Project. They are located on the main stem Snake River about 18 miles northeast from the city of Burley, ID within the Minidoka Wildlife Refuge. After over 103 years of continued use, the over 2000 feet long concrete spillway at the Minidoka Dam has reached the end of its functional lifespan. The concrete that forms the spillway crest and the piers of the pier-and-stoplog structure shows extensive visible deterioration at numerous locations. In addition, the potential for ice damage to the stoplog piers requires that reservoir water levels be dropped each winter. The headgate structures at the North Side Canal and South Side Canal also show serious concrete deterioration similar to that seen along the spillway. The current conditions of the Minidoka Dam spillway and headgate structures present increasingly difficult reliability and maintenance problems. If structural problems are not corrected there is potential of partial or complete failure of the spillway and headgates. If these failures occur, Reclamation may not be able to meet contractual obligations for water delivery, power generation and Reclamation's commitments to deliver flow augmentation water under the Nez Perce Settlement Agreement and the Endangered Species Act.

A related action which may be considered is a structural raise (to be determined) of Minidoka Dam to accommodate a 5-foot raise in the Reservoir Water Surface (RWS) elevation. The Idaho Water Resource Board (IWRB) is funding a special study that explores the feasibility and costs associated with this action. The purpose of the dam raise is to increase the storage capacity of Lake Walcott by approximately 50,000 acre-feet as one element of efforts to address water supply concerns in the Eastern Snake River Plain Aquifer area. The IWRB anticipates the additional supplies of stored water could be used to help address surface and groundwater demands by implementing improvement measures being considered by the State. If the IWRB decides to pursue this action, a supplemental EIS will be developed to evaluate impacts.

Public Involvement

Reclamation will conduct public scoping meetings to solicit input on the alternatives developed to address replacement of the Minidoka Dam Spillway and associated structures and the impacts associated with those alternatives. Reclamation will summarize comments received during the scoping meetings and written comments received during the scoping period, identified under DATES, into a scoping summary document which will be made available to those who have provided comments. It will also be available to others upon request and will be posted on the Web site listed under FOR FURTHER INFORMATION.

If you wish to comment, you may provide your comments as indicated under the ADDRESSES section. Before including your name, address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment (including your personal identifying information) may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

J. William McDonald,

Regional Director, Pacific Northwest Region.

[FR Doc. E8–26990 Filed 11–12–08; 8:45 am]

BILLING CODE 4310–MN–P

News Releases

News Release RECLAMATION

Managing Water in the West

Pacific Northwest Region
Boise, Idaho

Media Contact: John Redding, 208-378-5012 jredding@pn.usbr.gov Allyn Meuleman, 208-383-2258 ameuleman@pn.usbr.gov

Released On: November 21, 2008

Reclamation Hosts Public Meetings for Minidoka Dam Spillway Replacement EIS

The Bureau of Reclamation will hold two public scoping meetings for the proposed Minidoka Dam Spillway Replacement aimed at preventing possible structural failure of the dam's spillway and associated structures. Minidoka Dam is located on the Snake River about 18 miles northeast of Burley, Idaho.

The scoping meetings will give the public the opportunity to identify issues and concerns associated with the currently proposed alternatives, and to identify other potential alternatives that could be considered in the Environmental Impact Statement (EIS). Alternatives currently being considered are No Action as required under National Environmental Policy Act, total replacement of the spillway and headgate structures, or replacement of just the spillway. Scoping meetings will be held:

December 3, 6:00 - 9:00 p.m., Red Lion Hotel 475 River Park Way, Idaho Falls, ID

December 4, 6:00 - 9:00 p.m., Burley Best Western Inn 800 North Overland Avenue, Burley, ID

In addition to comments received at the scoping meetings, written comments will be accepted through December 19, and may be submitted to Bureau of Reclamation, Snake River Area Office, Attention: Allyn Meuleman, Activity Manager, 230 Collins Road, Boise, ID 83702, or at 208-383-2258. Comments may also be submitted electronically to minidoka_dam_eis@pn.usbr.gov. The meeting facilities are physically accessible to people with disabilities.

Minidoka Dam was constructed in 1906 by Reclamation as part of the Minidoka Project. The dam is operated as one of five storage facilities constructed on the Snake and Henrys Fork rivers. The multi-purpose project provides irrigation, power production, flood control, recreation, and fish and wildlife benefits.

For more information about the project, please go to:
http://www.usbr.gov/pn/programs/eis/minidokadam/index.html

# # #

Reclamation is the largest wholesale water supplier and the second largest producer of hydroelectric power in the United States, with operations and facilities in the 17 Western States. Its facilities also provide substantial flood control, recreation, and fish and wildlife benefits. Visit our website at www.usbr.gov.

Relevant Links:

http://www.usbr.gov/pn/programs/eis/minidokadam/index.html

News Release RECLAMATION

Pacific Northwest Region
Boise, Idaho

Managing Water in the West

Media Contact: David Walsh, 208-378-5026 dwalsh@pn.usbr.gov Allyn Meuleman, 208-383-2258 ameuleman@pn.usbr.gov

Released On: April 02, 2009

Reclamation Hosts Public Meeting for Minidoka Dam Spillway Replacement EIS

The Bureau of Reclamation will hold a public scoping meeting for the proposed Minidoka Dam Spillway Replacement project on April 7 in Fort Hall, Idaho. The spillway on the 103 year-old dam has been targeted for replacement and has reached the end of its functional lifespan.

The dam, located on the Snake River about 18 miles northeast of Burley, Idaho, is a major feature of Reclamation's Minidoka Project.

The scoping meeting will be an opportunity for the public to identify issues and concerns associated with the currently proposed alternatives, and to identify other potential alternatives that could be considered in the Environmental Impact Statement (EIS).

Alternatives currently being considered are: No Action as required under National Environmental Policy Act (NEPA), total replacement of the spillway and headgate structures, or replacement of just the spillway.

The April 7 scoping meeting will be held from 6:00 to 8:00 p.m., at the Shoshone-Bannock Tribal Office, Business Council Conference Room, Pima Drive, Fort Hall, Idaho. The meeting facilities are physically accessible to people with disabilities.

In addition to comments received at the scoping meetings, written comments will be accepted through April 30, 2009, and may be submitted to Bureau of Reclamation, Snake River Area Office, Attention: Allyn Meuleman, Activity Manager, 230 Collins Road, Boise ID 83702-4520 or at (208) 383-2258. Comments may also be submitted by email at: minidoka_dam_eis@pn.usbr.gov.

Minidoka Dam was completed in 1906 and is operated as one of six storage facilities on the Snake and Henry's Fork rivers. The multi-purpose project provides irrigation, power production, flood control, recreation, and fish and wildlife benefits.

For more information about the project, please go to:
http://www.usbr.gov/pn/programs/eis/minidokadam/index.html

Scoping Letter

Minidoka Dam Spillway Replacement EIS

MINIDOKA PROJECT

SCOPING MEETINGS

DECEMBER 2008

Reclamation intends to prepare an Environmental Impact Statement (EIS) on the proposed Minidoka Dam Spillway Replacement. Reclamation is requesting early public comment and agency input to help identify significant issues or other alternatives to be addressed in the EIS. Information obtained during the scoping period (November 12-December 19, 2008) will help in developing information to be included in the EIS. A draft EIS is expected to be provided to the public for review by winter, 2009 followed by opportunities to provide written and oral comments. The final EIS is scheduled for completion in winter, 2010. A Record of Decision, describing which alternative is selected for implementation, and the rationale for its selection, would then be issued following a 30-day waiting period. Additional information about the project is available at Reclamation's website:

http://www.usbr.gov/pn/programs/eis/minidokadam/index.html

PUBLIC SCOPING MEETINGS

Reclamation is hosting two public meetings to obtain your input about the project. During these meetings, the current alternatives being considered will be described and staff will be available to answer questions. You will also be given an opportunity to identify issues and concerns associated with the current alternatives and to identify other potential alternatives.

SCOPING MEETING DETAILS

Wednesday, December 3, 2008	***Thursday, December 4, 2008***
Red Lion Hotel	Burley Best Western Inn
475 River Park Way	800 North Overland Avenue
Idaho Falls, ID	Burley, ID

Both meetings are from 6 – 9 p.m.

The meeting facilities are physically accessible to people with disabilities. If you need other accommodations or auxiliary aids, please contact Allyn Meuleman 208 -383 -2258 before November 24th, 2008.

PURPOSE AND NEED

The purpose of the proposed spillway replacement action is to prevent a structural failure of the Minidoka Dam spillway and associated structures. Minidoka Dam impounds Lake Walcott and is a feature of Reclamation's Minidoka Project. They are located on the main stem Snake River about 18 miles northeast from the city of Burley, Idaho within the Minidoka Wildlife Refuge. After over 103 years of continued use, the over 2,000 feet-long concrete spillway at the Minidoka Dam has reached the end of its functional lifespan. The concrete that forms the spillway crest and the piers and-stoplog structure shows extensive visible deterioration at numerous locations. In addition, the potential for ice damage to the stoplog piers requires that reservoir water levels be dropped each winter. The headgate structures at the North Side Canal and South Side Canal also show serious concrete deterioration similar to that seen along the spillway. The current condition of the Minidoka Dam spillway and headgate structures present increasingly difficult reliability and maintenance problems. If structural problems are not corrected, there is potential of partial or complete failure of the spillway and headgates. If these failures occur, Reclamation may not be able to meet contractual obligations for water delivery, power generation, and commitments to deliver flow augmentation water under the Nez Perce Settlement Agreement and the Endangered Species Act.

PROPOSED ALTERNATIVES

Reclamation is currently investigating the alternatives identified below.

- No Action
- Total replacement of the spillway and headgate structures
- Replacement of just the spillway

YOUR FEEDBACK REQUESTED

We want to hear your thoughts about the issues and concerns associated with the proposed alternatives. Please attend one of the scoping meetings scheduled in December 2008 to provide input. If you cannot attend one of our public scoping meetings, please submit your comments using the enclosed comment form and return it to us by December 19, 2008.

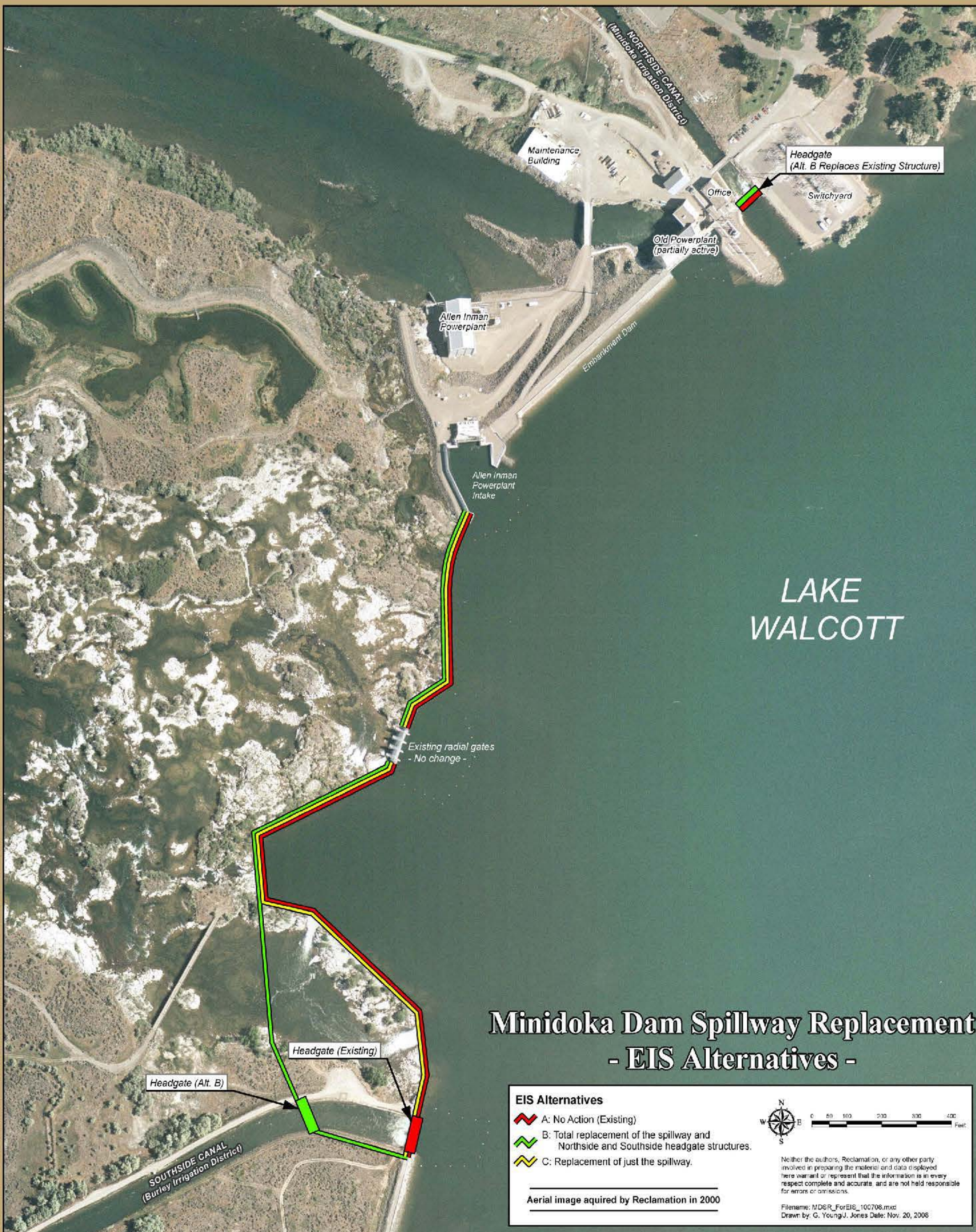
FOR MORE INFORMATION

For more information about the project, please contact:

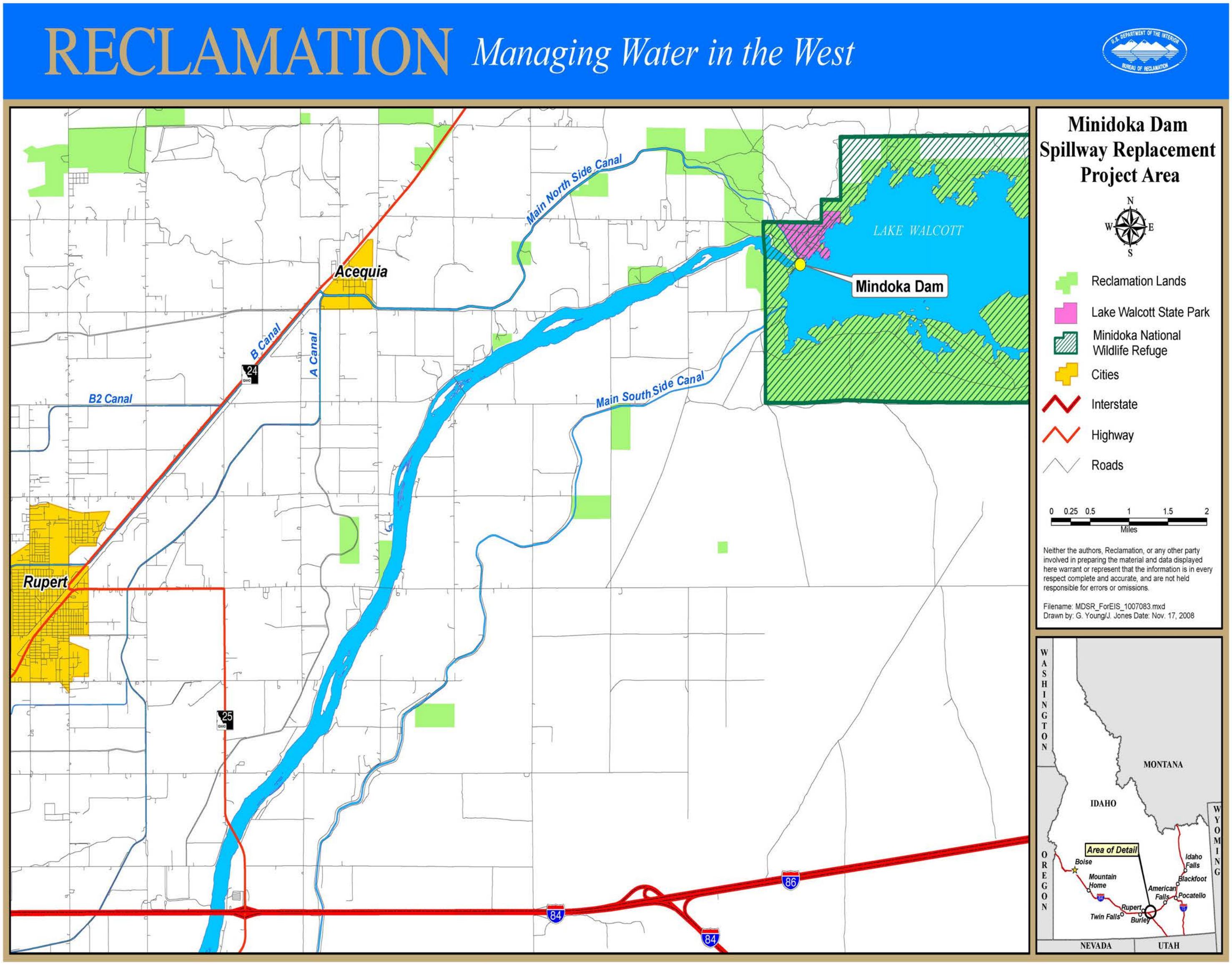
Allyn Meuleman, Activity Manager
Bureau of Reclamation
230 Collins Road
Boise, Idaho 83712
208-383-2258 (telephone)
208-383-2275 (fax)
minidoka_dam_eis@pn.usbr.gov

Maps

RECLAMATION *Managing Water in the West*




NORTHSIDE CANAL
(Minidoka Irrigation District)
Maintenance Building
Switchyard
Office
Old Powerplant (partially active)
Northside Canal Headgate (Alt. B Replaces The Existing Structure)
Allen Inman Powerplant
Embankment Dam
LAKE WALCOTT
Existing road
Allen Inman Powerplant Intake
Existing Overflow Spillway Section, total Length =1480 feet. Piers to be removed
Access Road A
Alt. 'B' Overflow Spillway Section
Existing radial gates - No change -
Access Road B
12 New Radial Gates and 13 Piers
Limits of Discharge Channel, El. 4222
Existing bridge
Existing road
Dike
Headgate (Existing) Remove with Alt. 'B'
Flat area for storage of stoplogs, materials, and equipment for spillway and canal headworks, El. 4250
South Canal Bank Left Road
SOUTHSIDE CANAL
(Burley Irrigation District)
South Canal Bank Right Road
New Southside Canal Headgate (Alt. B)
Rock Wall and Dike
Minidoka Dam Spillway Replacement
- EIS Alternative B -
New Structures (Alt. B)
New Access Roads (Alt. B)
Existing Structures To Be Removed
Aerial image aquired by Reclamation in 2000
N
W
E
S
0 50 100 200 300 400 Feet
Neither the authors, Reclamation, or any other party involved in preparing the material and data displayed here warrant or represent that the information is in every respect complete and accurate, and are not held responsible for errors or omissions.
Filename: MDSR_ForEIS_1007082.mxd
Drawn by: G. Young/J. Jones Date: Nov. 21, 2008


RECLAMATION Managing Water in the West
Minidoka Dam Spillway Replacement Project Area
N
S
E
W
Reclamation Lands
Lake Walcott State Park
Minidoka National Wildlife Refuge
Cities
Interstate
Highway
Roads
0 0.25 0.5 1 1.5 2
Miles
Neither the authors, Reclamation, or any other party involved in preparing the material and data displayed here warrant or represent that the information is in every respect complete and accurate, and are not held responsible for errors or omissions.
Filename: MDSR_ForEIS_1007083.mxd
Drawn by: G. Young/J. Jones Date: Nov. 17, 2008
LAKE WALCOTT
Mindoka Dam
Main North Side Canal
Main South Side Canal
Acequia
Rupert
B Canal
A Canal
B2 Canal
24
25
84
86
WASHINGTON
OREGON
MONTANA
WYOMING
IDAHO
NEVADA
UTAH
Area of Detail
Boise
Mountain Home
Twin Falls
Rupert
Burley
American Falls
Pocatello
Blackfoot
Idaho Falls

Meeting Handouts

MINIDOKA DAM SPILLWAY REPLACEMENT

Minidoka Project

ENVIRONMENTAL COMPLIANCE

December 2008

The National Environmental Policy Act

The National Environmental Policy Act (NEPA) was enacted into law on January 1, 1969. It requires Federal agencies to evaluate and consider environmental factors during decision making and to seek input to these evaluations from state and local agencies, Tribal Governments, organizations, and the public. Agencies also must consider and evaluate a range of alternatives that meet the purpose and need of the proposed action.

When a Federal action is determined likely to significantly affect the quality of the human environment, an environmental impact statement (EIS) is prepared. The EIS provides decision-makers with important information on the types of issues and concerns identified by the public, the expected environmental consequences of all alternatives, and potential mitigation measures.

Terms Commonly Associated with an EIS

- **Federal Action –** This is what triggers the requirement for NEPA compliance. It can be an action that the Federal agency will take, or a decision that must be made, that may significantly impact the human environment.

- **Scoping –** The process by which input from the public, agencies, and organizations is sought to help define the alternatives, issues, and impacts that should be addressed in the EIS.

- **Purpose and Need –** The statement of purpose and need identifies the underlying reasons why an action is needed.

- **Proposed Action –** This is the action initially identified to meet the identified purpose and need for action.

- **Alternatives –** These are reasonable actions that meet the identified purpose and need of the proposed action.

- **Federal Preferred Alternative –** This is the alternative that the Federal agency proposes to implement. If one has been identified, it will be described in the Draft EIS. A Preferred Alternative must be identified in the Final EIS.

- **No Action Alternative –** This is considered to be the most likely future without implementation of the proposed action or other alternative.

- **Alternatives Considered but Eliminated From Further Study –** These are other alternatives considered, but not found to be technically feasible or to reasonably meet the purpose and need of the proposed action.

- **Record of Decision –** This document summarizes the alternatives considered in the EIS and identifies the agency's decision along with the basis for that decision.

NEPA as an Umbrella for Other Environmental Laws

Compliance with related environmental laws, rules, regulations, and executive and secretarial orders is integrated into the NEPA process and documented in the EIS. However, these other laws, regulations and Executive and Secretarial Orders have their own specific compliance requirements separate from NEPA. A partial list of other major environmental laws, regulations, and Executive and Secretarial Orders requiring compliance includes:

Endangered Species Act
Fish and Wildlife Coordination Act
National Historic Preservation Act
Clean Water Act
Environmental Justice Executive Order
Sacred Sites Executive Order
Indian Trust Assets Secretarial Order

FOR MORE INFORMATION

EIS Website:
http://www.usbr.gov/pn/programs/eis/minidokadam/index.html

Activity Manager: Allyn Meuleman
Bureau of Reclamation
230 Collins Road
Boise, Idaho 83702-4520

208-383-2258
208-383-2237 FAX
Minidoka_dam_eis@pn.usbr.gov

MINIDOKA DAM SPILLWAY REPLACEMENT
Minidoka Project

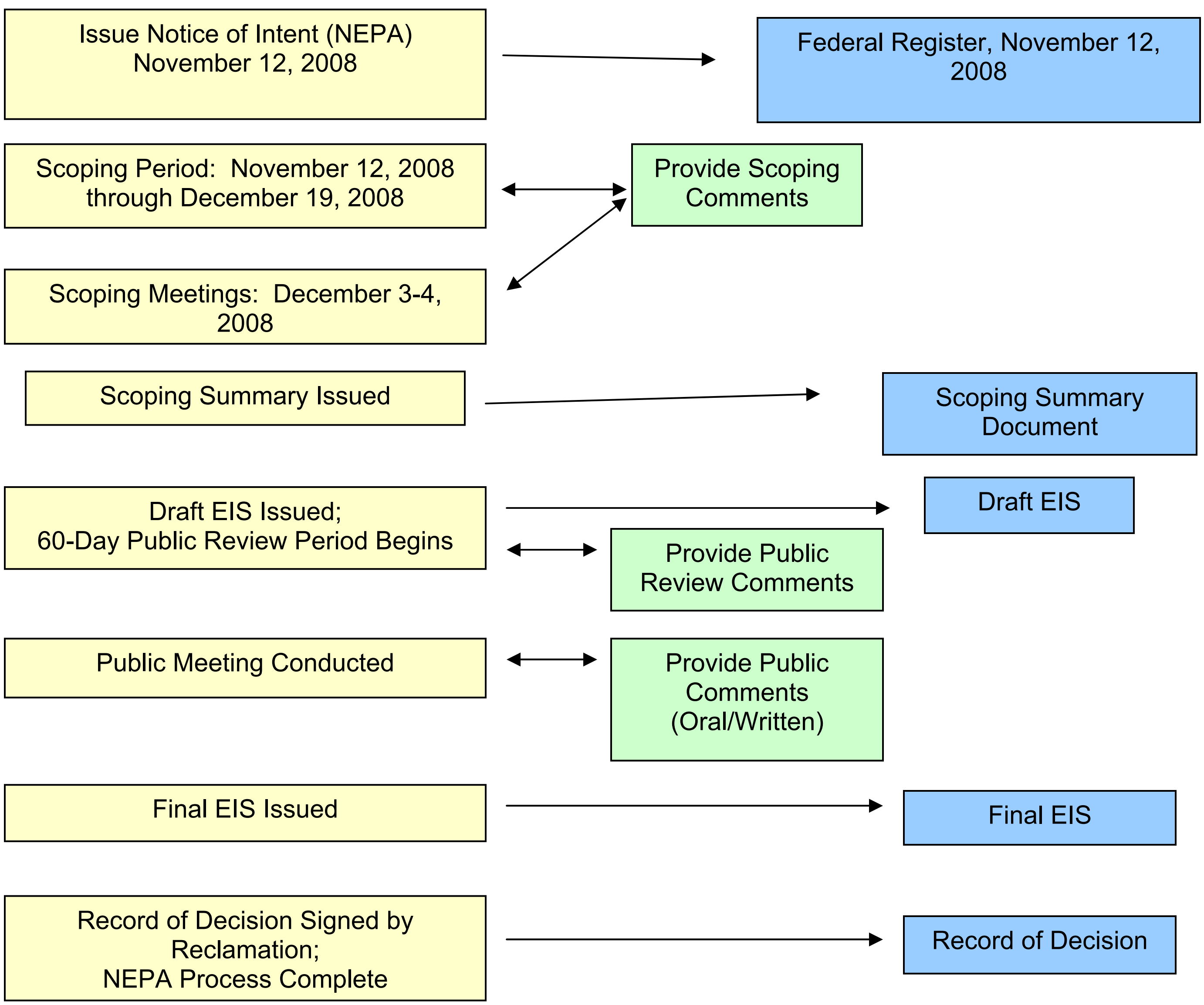
NEPA PROCESS
December 2008

Public

Documents
NEPA Process
Available to

Involvement

Opportunities
the Public



Contact: Allyn Meuleman, Activity Manager, Bureau of Reclamation, 208-383-2258

Minidoka Dam Spillway Replacement
Minidoka Project

Fort Hall, Idaho
April 7, 2008

AGENDA

6:00 p.m. **Doors open**

6:15 p.m. **Welcome**
Chris Ketchum, Assistant Area Manager, Reclamation
Hap Boyer, Natural Resource Manager, Reclamation

PowerPoint Presentation by Reclamation
Allyn Meuleman, Activity Manager, Reclamation

Identification of Issues and Concerns
Take this opportunity to provide written comments about any issues or concerns you have about the impacts associated with the alternatives currently proposed or identify other alternatives that address the project's purpose and need.
Comment categories include:

- ***Historic Properties/Cultural Resources***
- ***Recreation***
- ***Water Resources and Reservoir operations***
- ***Water quality***
- ***Fish and Wildlife***
- ***Threatened and Endangered Species***
- ***Vegetation/Wetlands***
- ***Economics***
- ***Other Issues and Concerns***
- ***Alternatives***

This is also an opportunity to review maps and other information and have one-on-one discussions with technical team members and managers.

Review and Wrap-Up

8:00 p.m. **Adjourn**
If you have additional comments, please turn in your comment form before you leave.

Minidoka Dam Spillway Replacement
Minidoka Project

PUBLIC SCOPING MEETING

Idaho Falls, Idaho
December 3, 2008

AGENDA

6:00 p.m. **Doors open**

6:15 p.m. **Welcome**
Chris Ketchum, Activity Manager, Reclamation

PowerPoint Presentation by Reclamation
Allyn Meuleman, Activity Manager
Lola Abshire, Environmental Specialist
Keith Brooks, Civil Engineer

Identification of Issues and Concerns
Take this opportunity to provide written comments about any issues or concerns you have about the impacts associated with the alternatives currently proposed or identify other alternatives that address the project's purpose and need. Post-its are provided for you to record your comments and then place them on the appropriate comment board.

Comment board categories include:

- ***Historic Properties/Cultural Resources***
- ***Recreation***
- ***Water Resources and Reservoir operations***
- ***Water quality***
- ***Fish and Wildlife***
- ***Threatened and Endangered Species***
- ***Vegetation/Wetlands***
- ***Economics***
- ***Other Issues and Concerns***
- ***Alternatives***

This is also an opportunity to review maps and other information and have one-on-one discussions with technical team members and managers.

Review and Wrap-Up

9:00 p.m. **Adjourn**
If you have additional comments, please turn in your comment form before you leave.

Minidoka Dam Spillway Replacement
Minidoka Project

PUBLIC SCOPING MEETING

Burley, Idaho
December 4, 2008

AGENDA

6:00 p.m. **Doors open**

6:15 p.m. **Welcome**
Chris Ketchum, Assistant Area Manager, Reclamation

PowerPoint Presentation by Reclamation
Allyn Meuleman, Activity Manager
Lola Abshire, Environmental Specialist
Keith Brooks, Civil Engineer

Identification of Issues and Concerns
Take this opportunity to provide written comments about any issues or concerns you have about the impacts associated with the alternatives currently proposed or identify other alternatives that address the project's purpose and need. Post-its are provided for you to record your comments and then place them on the appropriate comment board.

Comment board categories include:

- ***Historic Properties/Cultural Resources***
- ***Recreation***
- ***Water Resources and Reservoir operations***
- ***Water quality***
- ***Fish and Wildlife***
- ***Threatened and Endangered Species***
- ***Vegetation/Wetlands***
- ***Economics***
- ***Other Issues and Concerns***
- ***Alternatives***

This is also an opportunity to review maps and other information and have one-on-one discussions with technical team members and managers.

Review and Wrap-Up

9:00 p.m. **Adjourn**
If you have additional comments, please turn in your comment form before you leave.

COMMENT FORM

Minidoka Dam Spillway Replacement

Name (please print legibly):	
Organization:	
Mailing Address:	
City, State, and Zip Code:	
Telephone (optional):	**E-mail (optional):**

If you received this form in the mail or attended a public scoping meeting you will be placed on our mailing list.

___ I want my name removed from this mailing list.

Please note: Before including your name, address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment (including your personal identifying information) may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

My comments on the Minidoka Dam Spillway Replacement are:

____

____

____

____

____

(Use back of sheet or additional sheets as necessary)

Please mail, fax, or email your comments before December 19, 2008, to: Allyn Meuleman, Activity Manager, Bureau of Reclamation, 230 Collins Road, Boise, ID 83702-4520; fax: (208) 383-2237; email: Minidoka_dam_eis@pn.usbr.gov

Comments (continued)

Please mail, fax, or email your comments before December 19, 2008, to: Allyn Meuleman, Activity Manager, Bureau of Reclamation, 230 Collins Road, Boise, ID 83702-4520; fax: (208) 383-2237; email: Minidoka_dam_eis@pn.usbr.gov

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Appendix B MEIS 11x17 Figures

RECLAMATION *Managing Water in the West*

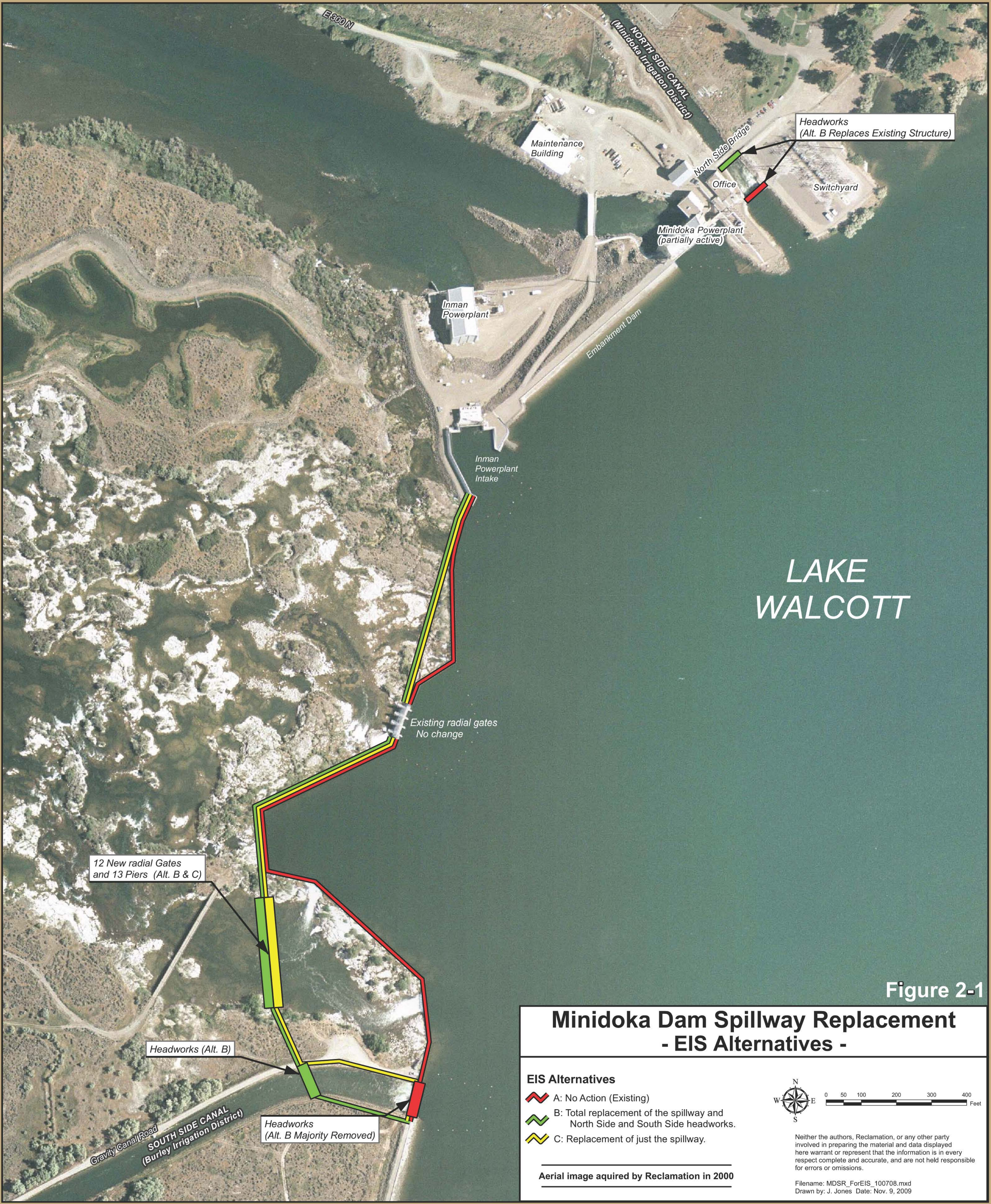

Figure 2-1

Minidoka Dam Spillway Replacement
- EIS Alternatives -

EIS Alternatives

- A: No Action (Existing)
- B: Total replacement of the spillway and North Side and South Side headworks.
- C: Replacement of just the spillway.

Aerial image aquired by Reclamation in 2000

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Filename: MDSR_ForEIS_100708.mxd
Drawn by: J. Jones Date: Nov. 9, 2009

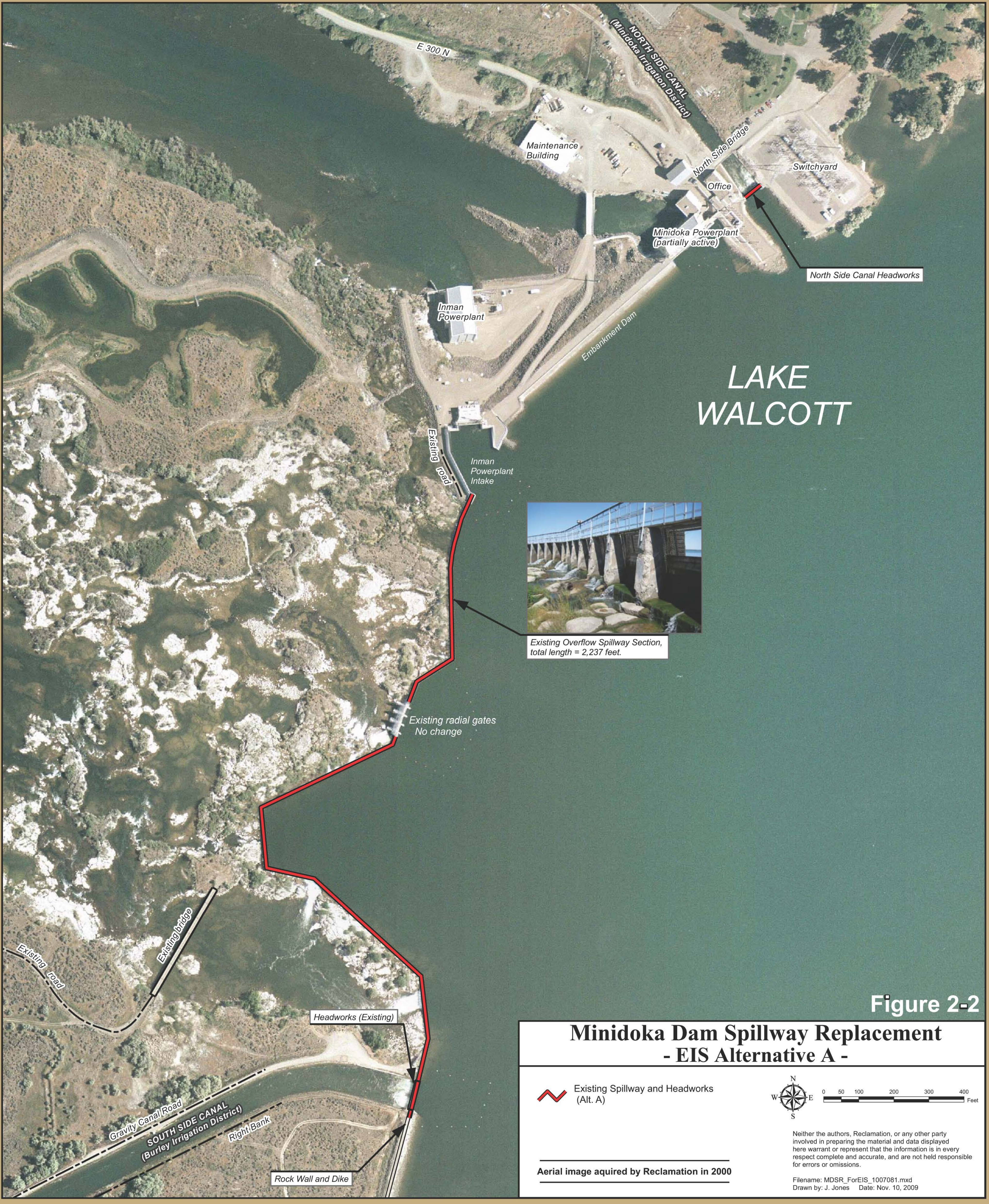
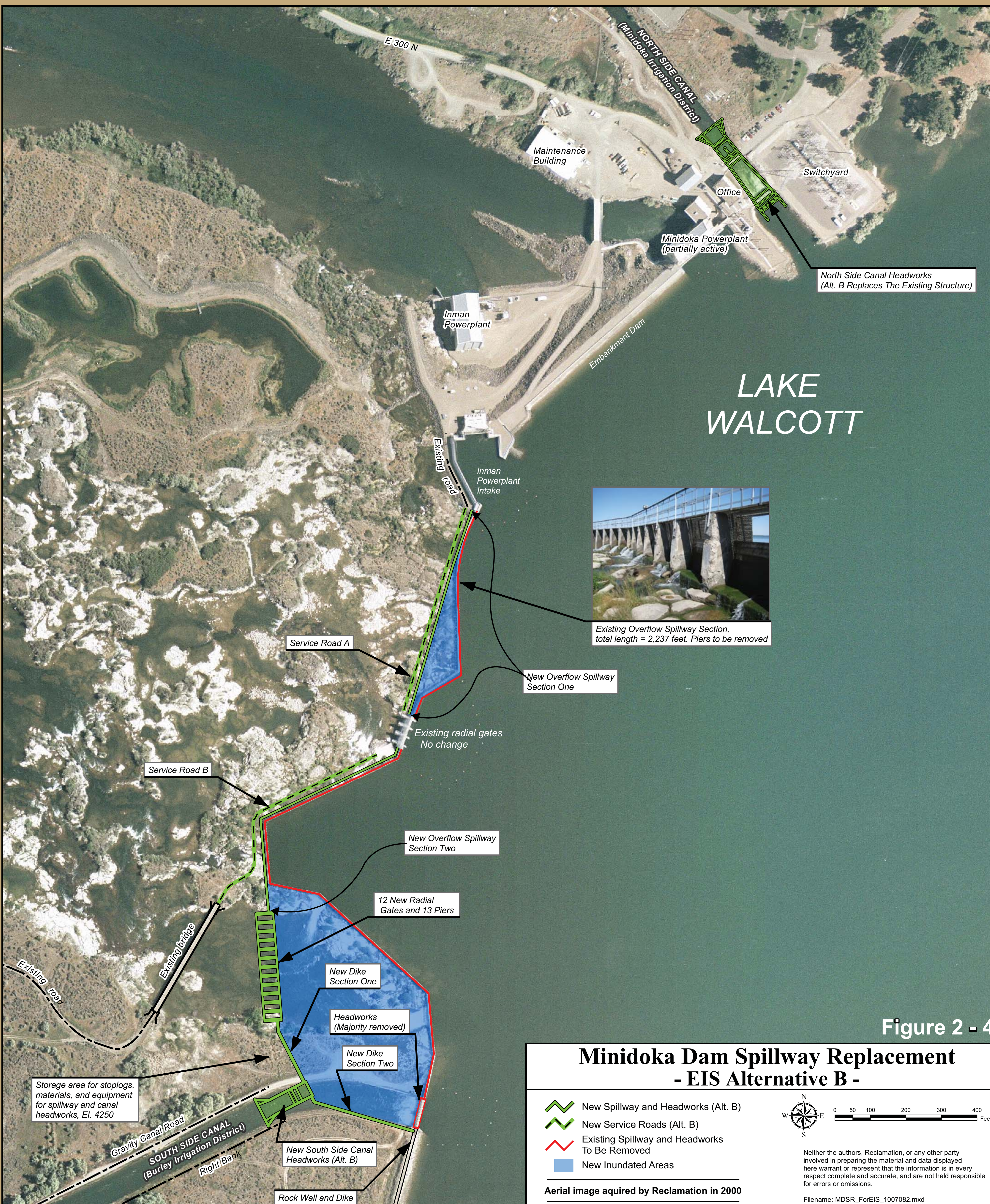


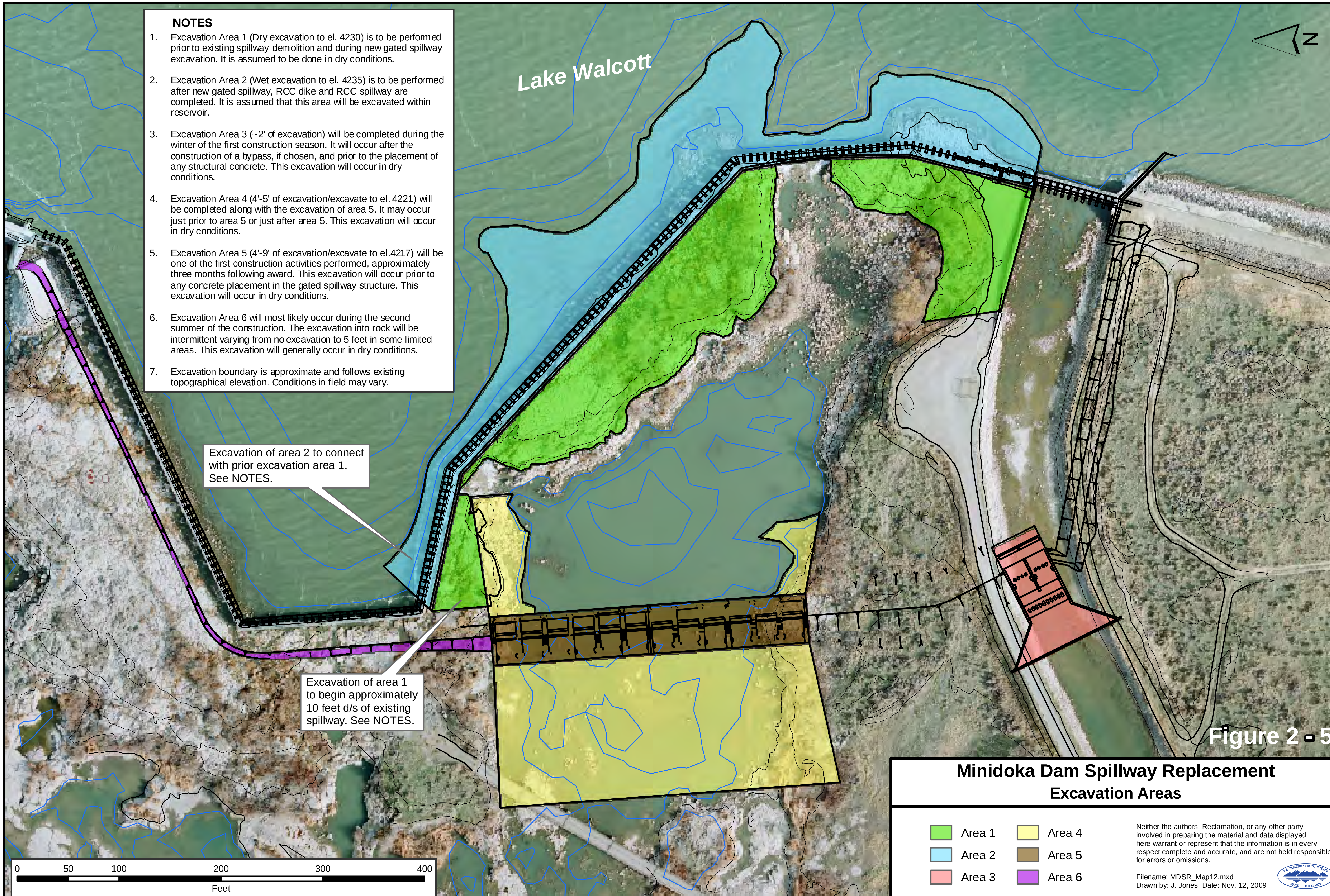
Figure 2-2

Minidoka Dam Spillway Replacement
- EIS Alternative A -

Lake Walcott State Park
LAKE WALCOTT
Switchyard
Existing MID Headworks
North Side Canal Headworks
Minidoka Powerplant
Embankment Dam
Above the Dam
Existing Radial Gates
Existing Spillway Parking
Existing BID Headworks
South Side Canal Headworks
Rock Wall and Dike
Inman Powerplant
NORTH SIDE CANAL
E Minidoka Dam
Sewage Ponds
Snake River
E 300 N
Below the Dam
Existing Bridge
SOUTH SIDE CANAL
Gravity Canal Road
300 N
Minidoka Boat Ramp
Bishop's Hole Road
E 400 N
Bishop's Hole Launch Point
E 300 N
Bishop's Hole Toilet
Below the Spillway
0 100 200 400 600 800
Feet
N
Figure 2 - 3
Minidoka Dam Spillway Replacement
Recreation / Public Use Areas (Alt. A)
Reclamation Land
National Wildlife Refuge
Existing Spillway
Existing Buoys
Existing Fence
Historic Public Use Below The Dam
Historic Public Use Below The Spillway
43 CFR Part 423
Part 423.36 & 37 (300 yard Zone)
Neither the authors, Reclamation, or any other party involved in preparing the material and data displayed here warrant or represent that the information is in every respect complete and accurate, and are not held responsible for errors or omissions.
Filename: MDSR_Map6-7-8(A).mxd
Drawn by: J. Jones Date: Nov. 10, 2009



Minidoka Dam Spillway Replacement - EIS Alternative B -


NOTES
1. Excavation Area 1 (Dry excavation to el. 4230) is to be performed prior to existing spillway demolition and during new gated spillway excavation. It is assumed to be done in dry conditions.
2. Excavation Area 2 (Wet excavation to el. 4235) is to be performed after new gated spillway, RCC dike and RCC spillway are completed. It is assumed that this area will be excavated within reservoir.
3. Excavation Area 3 (~2' of excavation) will be completed during the winter of the first construction season. It will occur after the construction of a bypass, if chosen, and prior to the placement of any structural concrete. This excavation will occur in dry conditions.
4. Excavation Area 4 (4'-5' of excavation/excavate to el. 4221) will be completed along with the excavation of area 5. It may occur just prior to area 5 or just after area 5. This excavation will occur in dry conditions.
5. Excavation Area 5 (4'-9' of excavation/excavate to el.4217) will be one of the first construction activities performed, approximately three months following award. This excavation will occur prior to any concrete placement in the gated spillway structure. This excavation will occur in dry conditions.
6. Excavation Area 6 will most likely occur during the second summer of the construction. The excavation into rock will be intermittent varying from no excavation to 5 feet in some limited areas. This excavation will generally occur in dry conditions.
7. Excavation boundary is approximate and follows existing topographical elevation. Conditions in field may vary.
Lake Walcott
N
Excavation of area 2 to connect with prior excavation area 1. See NOTES.
Excavation of area 1 to begin approximately 10 feet d/s of existing spillway. See NOTES.
0 50 100 200 300 400
Feet
Figure 2 - 5
Minidoka Dam Spillway Replacement
Excavation Areas
Area 1
Area 2
Area 3
Area 4
Area 5
Area 6
Neither the authors, Reclamation, or any other party involved in preparing the material and data displayed here warrant or represent that the information is in every respect complete and accurate, and are not held responsible for errors or omissions.
Filename: MDSR_Map12.mxd
Drawn by: J. Jones Date: Nov. 12, 2009

(IS) Water released during Irrigation Season
(NIS) Water released during Non Irrigation Season.
1 50 cfs (IS) and 0 cfs (NIS)
2 300 cfs (IS) and 0 cfs (NIS)
3 50 cfs (IS) and 100 cfs minus seepage (NIS)
Releases through point 3 will be added to any natural seepage to result in 100 cfs minimum flow all year.
Example: If seepage is 20 cfs then 80 cfs will be released.
4 When necessary to satisfy minimum flow requirements, additional releases will be made through the powerhouses. Minimum flows, comprised of both powerhouse and spillway flows, will be 525 cfs during dry water type years and 600 cfs for average and high water type years. (Measurements are taken at USGS gauge located at Howells Ferry)
LAKE WALCOTT
Lake Walcott State Park
Switchyard
Existing MID Headworks
North Side Canal Headworks (Replaces The Existing Structure)
Minidoka Powerplant
Embankment Dam
NORTH SIDE CANAL
E Minidoka Dam
Inman Powerplant
Existing Radial Gates (No Change)
New South Side Canal Headworks
New Radial Gates
Existing BID Headworks
Rock Wall and Dike
South Side Canal Headworks (Majority Removed)
Sewage Ponds
Snake River
E 300 N
SOUTH SIDE CANAL
Gravity Canal Road
Bishop's Hole Road
0 100 200 400 600 800
Feet
N
Figure 2 - 6
Minidoka Dam Spillway Replacement
Proposed Biological Flows
New Spillway and Headworks
Existing Spillway
National Wildlife Refuge
Reclamation Land
Winter Release Flows
Water Release Gate
Neither the authors, Reclamation, or any other party involved in preparing the material and data displayed here warrant or represent that the information is in every respect complete and accurate, and are not held responsible for errors or omissions.
Filename: MDSR_Map5.mxd
Drawn by: J. Jones Date: Nov. 12, 2009

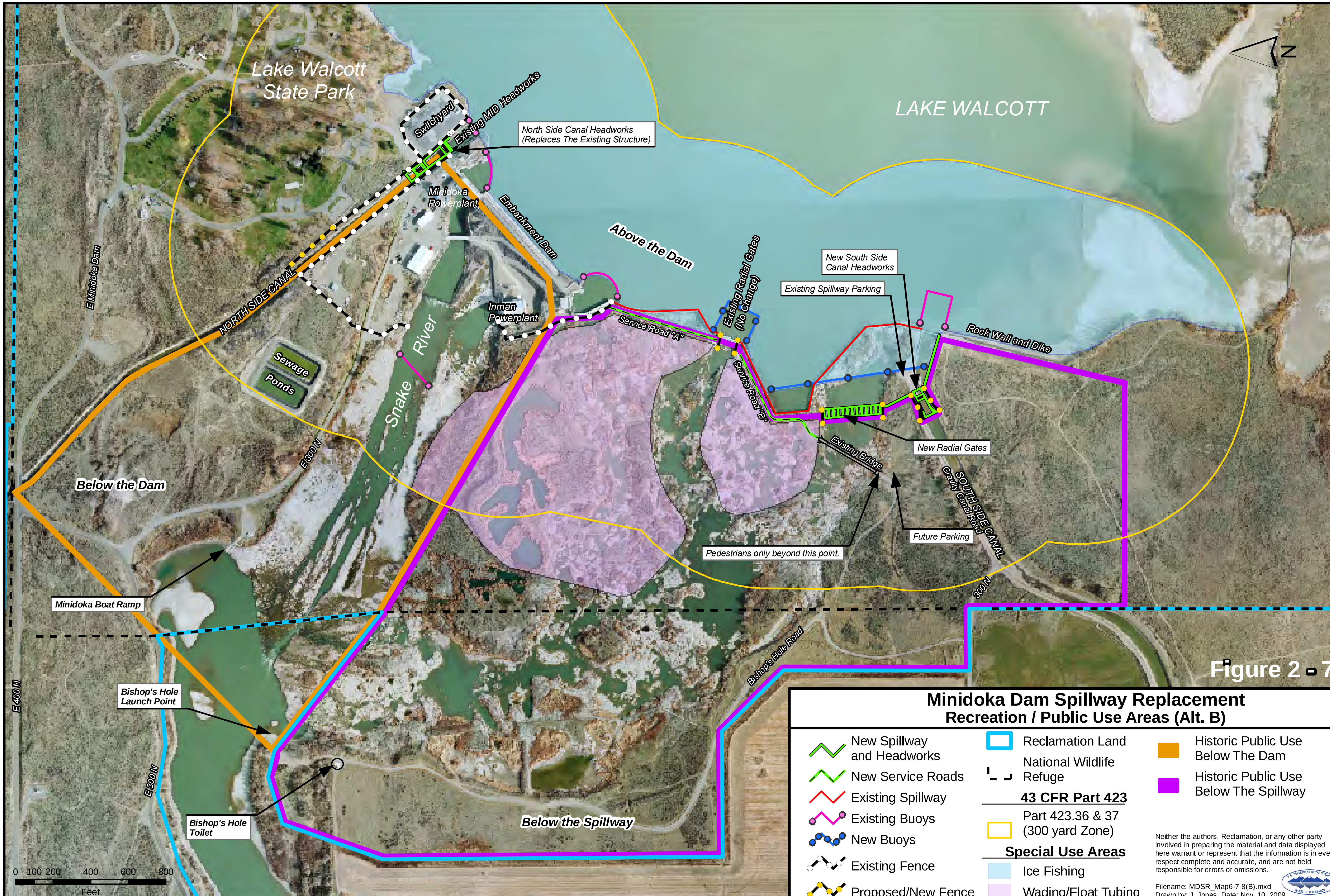


Figure 2 - 7

Minidoka Dam Spillway Replacement
Recreation / Public Use Areas (Alt. B)

Figure 2-8

Minidoka Dam Spillway Replacement
Staging, Waste Area & Construction Closure Points

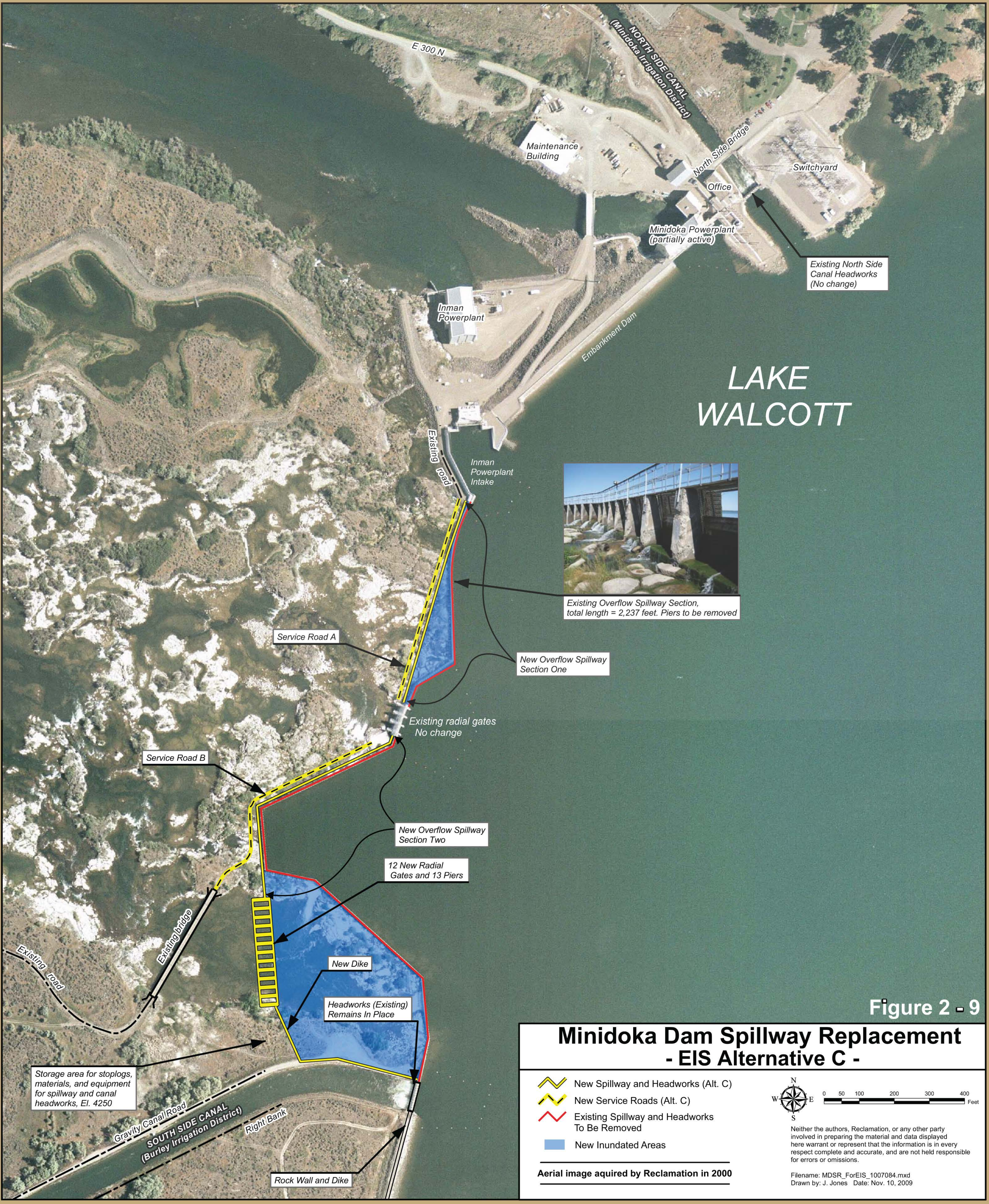


Figure 2 - 9

Minidoka Dam Spillway Replacement
- EIS Alternative C -

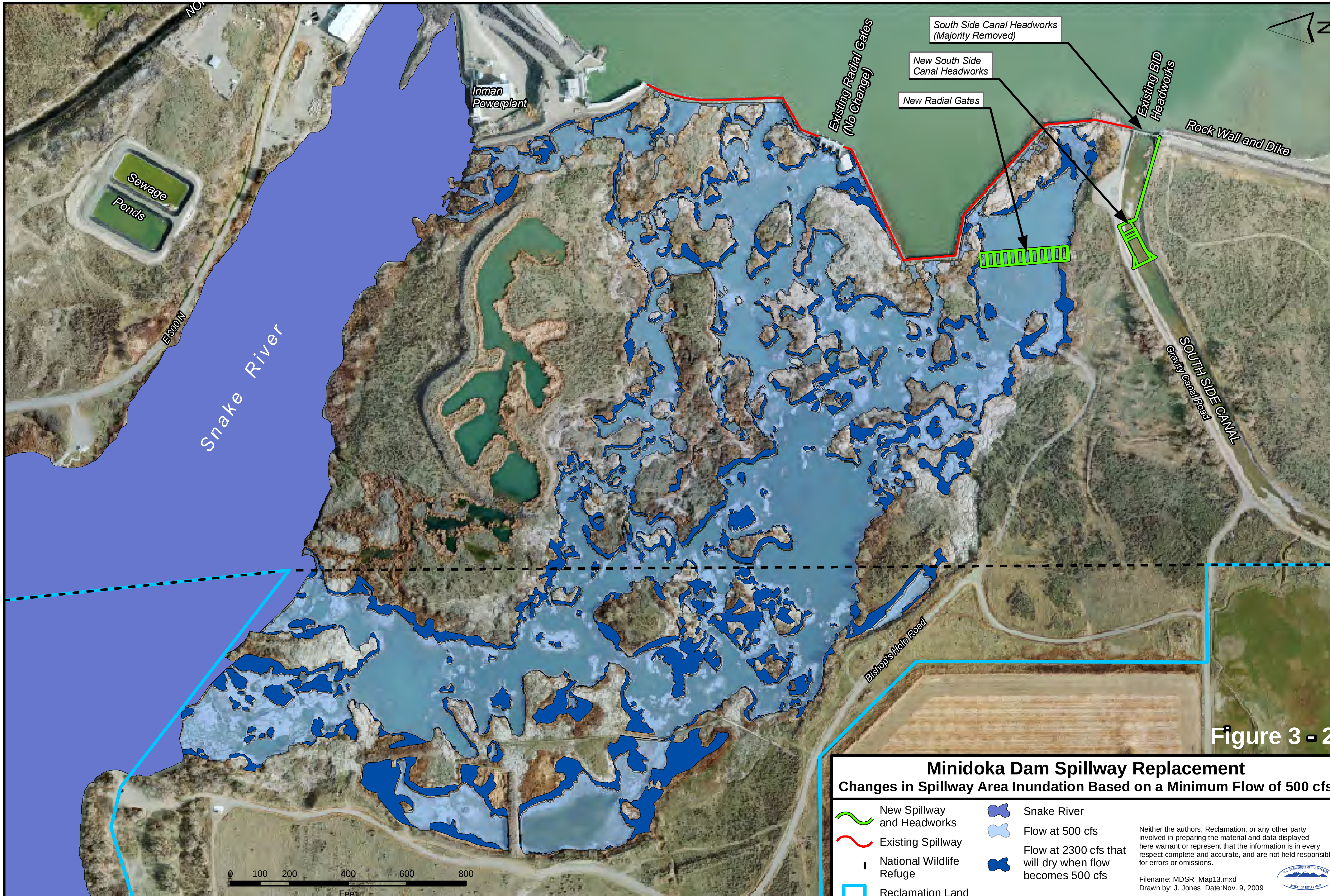


Figure 3 - 2

Minidoka Dam Spillway Replacement

Changes in Spillway Area Inundation Based on a Minimum Flow of 500 cfs


LAKE WALCOTT
Lake Walcott State Park
Switchyard
Existing MID Headworks
North Side Canal Headworks (Replaces The Existing Structure)
Minidoka Powerplant
Embankment Dam
NORTH SIDE CANAL
E Minidoka Dam
Inman Powerplant
Sewage Ponds
Snake River
Existing Radial Gates (No Change)
Existing BID Headworks
Rock Wall and Dike
(IS) Water released during Irrigation Season
(NIS) Water released during Non Irrigation Season.
50 cfs (IS) and 100 cfs minus seepage (NIS)
Releases through this point will be added to any natural seepage to result in 100 cfs minimum flow all year.
Example: If seepage is 20 cfs then 80 cfs will be released.
South Side Canal Headworks (Majority Removed)
New South Side Canal Headworks
New Radial Gates
SOUTH SIDE CANAL
Gravity Canal Road
E 300 N
Bishop's Hole Road
0 100 200 400 600 800
Feet
N
Figure 3 - 3
Minidoka Dam Spillway Replacement
Snail Pool and All Year Release Point
New Spillway and Headworks
Existing Spillway
National Wildlife Refuge
Reclamation Land
Winter Release Flows
Water Release Point
Snail Pool
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Filename: MDSR_Map11.mxd
Drawn by: J. Jones Date: Nov. 9, 2009

Figure 3 - 4

Minidoka Dam Spillway Replacement
Winter Release Flow Pattern Based on Elevations

Appendix C Groundwater Model Construction and Calibration

1. Model Development

The Minidoka Groundwater Model (MGM) was developed using MODFLOW, a groundwater modeling software package developed by the USGS (USGS, 2000). The MGM was a modified version of ESPAM1.1 (Cosgrove and others, 2006). The decision was made to modify the existing ESPA model because it is technically accepted by the Idaho Department of Water Resources.

Since it was determined that the RBPA is hydrologically disconnected from Lake Walcott it was not included in the model. In addition, only the portion of the Snake River just downstream of the dam was included in the model since further downstream, it is considered hydrologically disconnected from Lake Walcott. Any change in return flow to the Minidoka to Milner reach of the river are assumed to be due to changes immediately downstream of the dam:

- changes in seepage on the north side of the river,
- changes in returns to the river just downstream of the dam, and
- changes to seepage through the wetlands on the south side of the river

The MGM was designed to determine how much water will impact the river by way of seepage in the silty sand layer (Model Layer 1); how much water will impact the river just downstream of the dam (represented in Layer 2); and how much water will impact the regional aquifer (Layer 2).

Other modifications to the ESPAM1.1 model include:

- The MODFLOW flow package was converted from the Block-Centered Flow (BCF) package to the Layer Property Flow (LPF) package.
- The model grid was modified to give greater resolution near the Dam.

Recharge was assumed to be the same as recharge in ESPAM1.1.

2. Layering

A layer was added to ESPAM1.1 to represent the silty sand layer on the north side of the dam and reservoir. The layer (Layer 1) is limited to the extent of the silty sand interbed on the north side of the reservoir that is believed to be a geologic pathway for seepage (Figure 1).

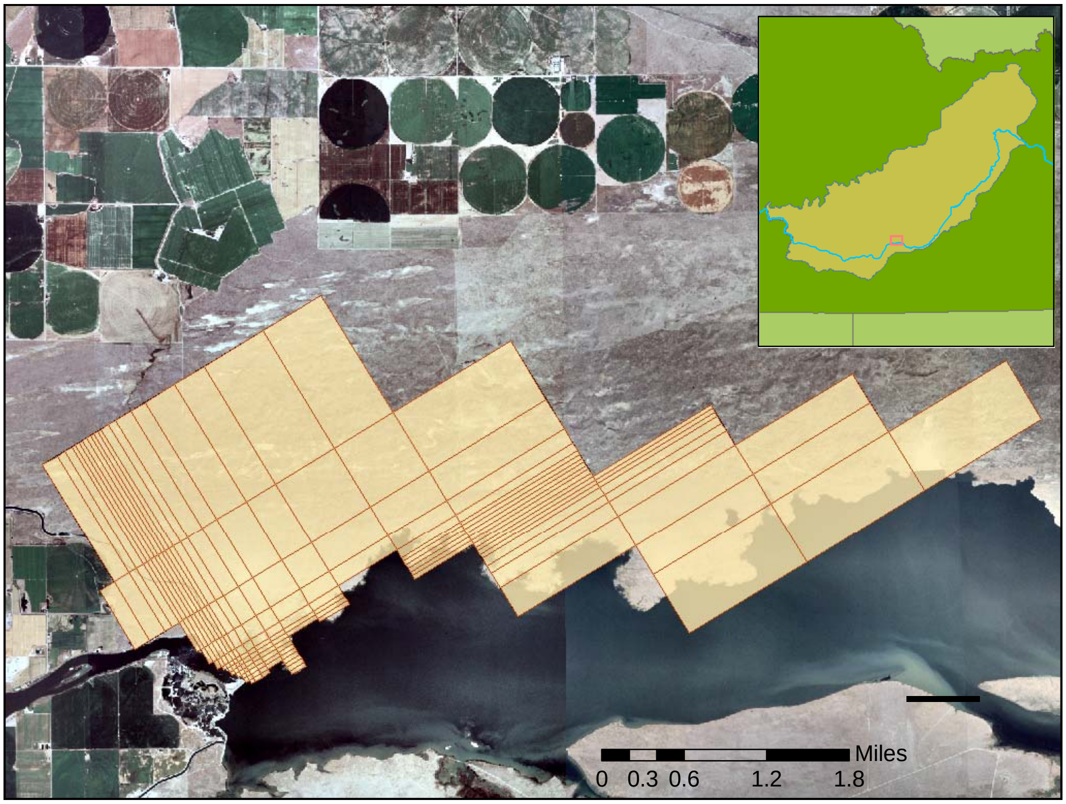


Figure 1. Model representation of the silty sand layer (Layer 1) on the north side of Lake Walcott.

Layer 1 extends upstream along the reservoir to correspond to the eolian sand deposits as mapped by Scott (1982). The bottom of the silty sand layer is at elevation 4160 near the dam and slightly decreases to 4150 downstream from the dam (Buehler and Carter, 1985). The top of the layer is represented by land surface elevation from 30 meter digital elevation models (DEM) (USGS, 1999a-i).

The MODFLOW flow package was converted from the BCF package to the LPF package to allow for better representation of the additional model layer. In the ESPAM1.1 model, the regional aquifer has a top elevation of 6000 feet and a bottom elevation of 2000 feet. In the MGM, the aquifer bottom elevation was left unchanged at 2000 feet but the top elevation was converted to the top of land surface elevation. In the area of the new layer, the bottom of the new layer was used as the top elevation of layer 2.

Transmissivity was converted to hydraulic conductivity by dividing the transmissivity values by the new thickness of the aquifer layer. The storage coefficient values were converted to specific storage by dividing the values by the thickness of the model layer. Hydraulic properties of the new Layer 1 were determined by the calibration process, but were limited by known estimates of silty sand properties.

2.1 Grid and Vertical Datum

The Eastern Snake Plain Aquifer model grid was refined in the area near Minidoka Dam to allow for better resolution in the area of interest for the MGM. The ESPAM1.1 grid has grid cells that represent one mile by one mile. The MGM grid was telescoped down to grid cells that represent 165 feet by 165 feet (Figure 1and Figure 2).

All vertical elevations in this report are with respect to North American Vertical Datum (NAVD) 1988. To correct to the local Minidoka Dam vertical datum, add 49.67 feet to all elevations.

2.2 Steady-state and Transiet Models

Both steady-state and transient versions of the MGM were developed for this project. The steady-state model was developed similarly to the steady-state ESPAM1.1 model by using average water level conditions from 1980 to 2002 (Cosgrove and others, 2006). The solution to the steady-state MGM was used as the starting head condition for the transient model.

The transient MGM used six month stress periods and simulates the historical period from May 1980 to April 2002. The stress periods start in May and November and the values for each stress period represented average historical values during each six month period.

2.3 River, General Head, and Drain Features

River and drain features that existed in ESPAM1.1 were not changed in the MGM outside the area of interest. Near the dam, river features were added to more accurately represent Lake Walcott and the river just downstream of the dam (Figure 2).

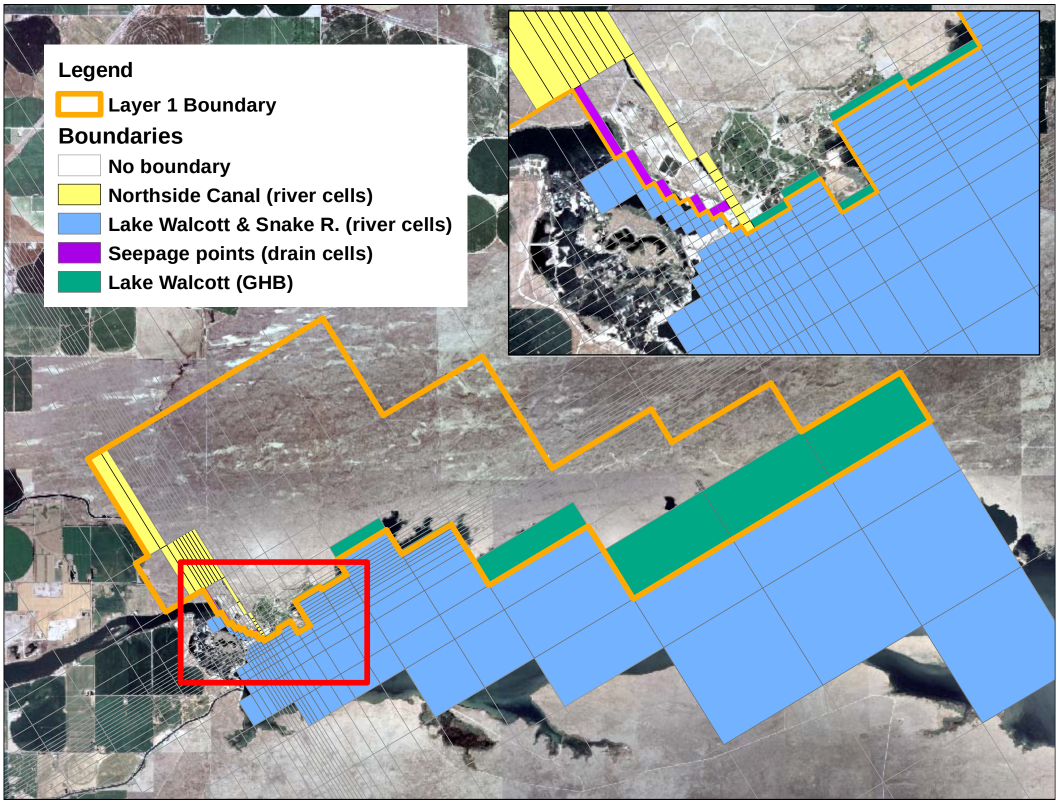


Figure 2. Boundary conditions in Layers 1 and 2 near Lake Walcott. The orange line designates the location of Layer 1; no boundary conditions exist in Layer 2 below Layer 1.

The bottom elevation of the reservoir was represented at elevation 4114 feet. The stage was 4195 feet for the steady-state model and varied in six month average elevations for the transient model (Table 1).

The Snake River downstream of the dam was included for a distance of 2200 ft (Figure 2). The water surface elevations of the river in the transient model are shown in Table 1. River features were also added to represent the Northside canal since it is assumed to be a large contributor to seepage. The bottom of the Northside canal is at 4185 feet. In the steady-state model, the canal was assumed full and, in the transient model, the stage varied from elevation 4195 feet during the irrigation season to 4185 feet (or empty) during the non-irrigation season.

General head boundary (GHB) features were used to represent Lake Walcott in the silty sand layer (Layer 1). A GHB boundary is essentially a river boundary where the bottom elevation of the feature is the bottom elevation of the cell. This condition closely represents the behavior of the reservoir in the silty sand layer. The GHB features were added along the south end of the layer, where the reservoir is located. The GHB water level was 4195 feet in the steady-state model and varied in six month average elevations in the transient model (Table 1).

Table 1. Lake Walcott and Snake River elevations for transient model.

Stress Period		Water Surface Elevation (feet)	
No.	Starting Month	Lake Walcott*	Snake R. below Dam
1	May-80	4196.09	4138.33
2	Nov-80	4190.1	4135.29
3	May-81	4195.47	4138.33
4	Nov-81	4189.5	4135.29
5	May-82	4195.58	4143.27
6	Nov-82	4190.9	4135.87
7	May-83	4196.04	4144.05
8	Nov-83	4190.21	4135.72
9	May-84	4196.05	4144.39
10	Nov-84	4190.04	4136.22
11	May-85	4195.52	4142.79
12	Nov-85	4190.22	4136.54
13	May-86	4195.59	4144.09
14	Nov-86	4189.97	4135.76
15	May-87	4195.64	4139.69
16	Nov-87	4189.99	4134.41
17	May-88	4195.51	4139.76
18	Nov-88	4189.5	4134.72
19	May-89	4195.56	4139.98
20	Nov-89	4188.59	4134.82
21	May-90	4195.56	4139.93
22	Nov-90	4189.1	4134.54
23	May-91	4195.64	4140.12
24	Nov-91	4189.49	4134.53
25	May-92	4195.66	4139.54
26	Nov-92	4189.95	4134.51
27	May-93	4195.68	4139.54
28	Nov-93	4188.42	4135.96
29	May-94	4195.59	4144.19
30	Nov-94	4189.91	4134.5
31	May-95	4195.62	4145.84
32	Nov-95	4185.57	4135.94
33	May-96	4195.57	4142.81
34	Nov-96	4189.34	4135.86
35	May-97	4195.72	4147.48
36	Nov-97	4189.1	4136.64
37	May-98	4195.66	4147.48
38	Nov-98	4189.49	4136.92
39	May-99	4195.65	4143.55
40	Nov-99	4189.34	4135.6
41	May-00	4195.65	4140.07
42	Nov-00	4189.91	4134.74
43	May-01	4195.58	4139.52
44	Nov-01	4189.94	4134.78

Drain features were added to Layer 1 along the river where seepage has been observed (Figure 2). The bottom elevations of the drain features were determined from their mapped elevations.

2.4 No-flow Boundaries

Layer 1 was designed to represent the silty-sand layer that is assumed to be the pathway for seepage from Lake Walcott. The silty-sand layer exists only in the small region in which it is represented in the model. The geologic layer pinches out to the north, east and west so those respective boundaries are represented as no-flow boundaries.

3. Model Calibration

The model was calibrated using parameter estimation software PEST (Doherty, 2004) combined with trial and error. Parameters that were extracted from ESPAM1.1, hydraulic conductivity and specific storage of Layer 2, river and drain conductance outside the area of interest, and recharge, were not changed during the calibration process.

3.1 Calibration Observations

The model was calibrated to piezometer and seepage observations that were measured near the dam for dam safety purposes (Figure 3).

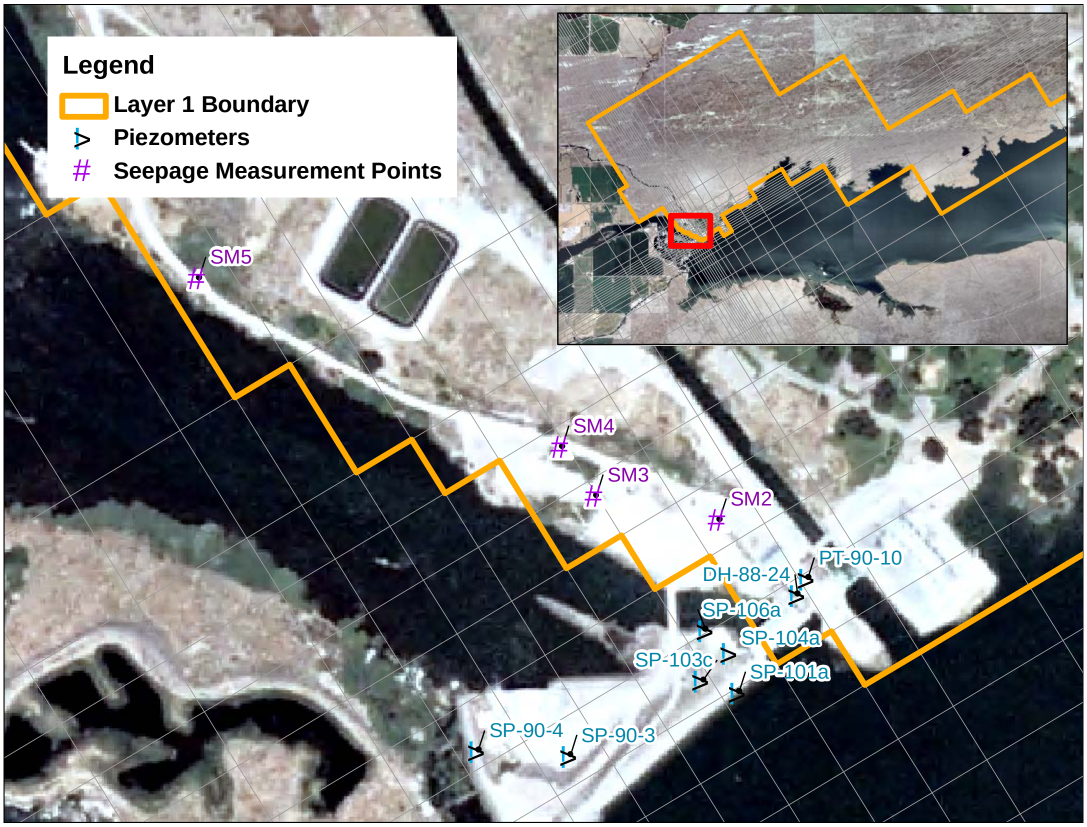


Figure 3. Locations of piezometer and seepage observation points for calibration.

Table 2 shows shows the steady-state water level and seepage measurements used in calibration. For the steady-state model, piezometer observations represented average water level measurements. Water level elevations in layer one are about 40-60 feet higher than those in layer two. Seepage observations were taken from an average water year, just after the canal was filled for the irrigation season. Average seepage measurements are generally less than one cubic feet per second (cfs).

Table 2. Table of steady-state observations used in calibration process.

	Measurement Point Name	Flow (feet^3/day)	Model Layer
Seepage	SM2	486	1
	SM4	13958	1
	SM5	60231	1
		Head (feet)	
Water Level Elevation	DH88-24	4168	1
	PT-90-10	4173	1
	SP-101A	4130	2
	SP-103AC	4132	2
	SP-104A	4130	2
	SP-106A	4130	2
	SP-90-3	4118	2
	SP-90-4	4115	2

For the transient model, six month averages of the piezometers water level measurements were calculated for all available data from 1980 to 2002 (Figure 4). The same was done for the seepage measurements (Figure 5).

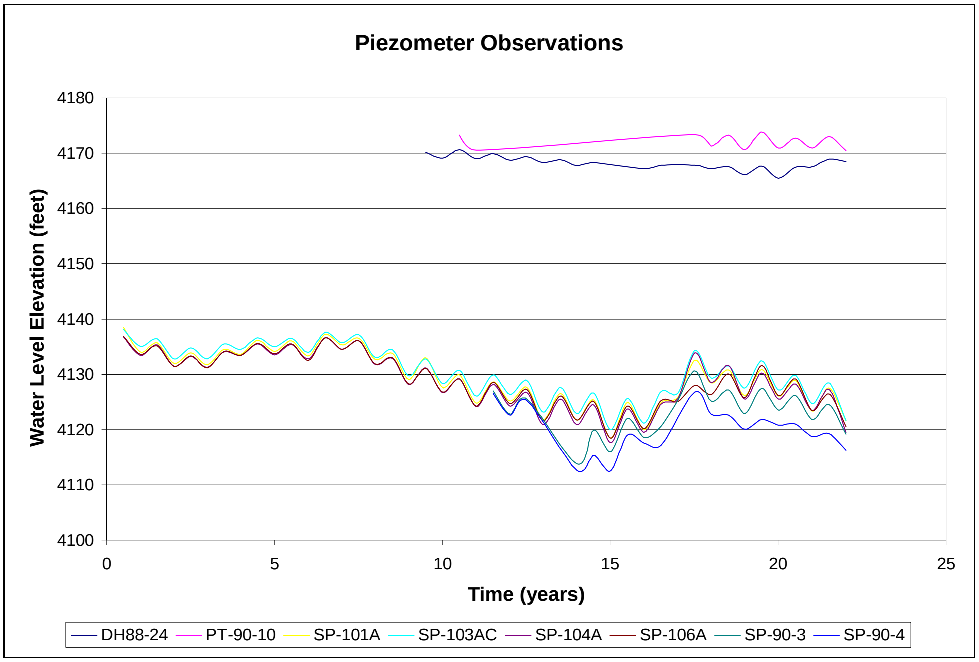


Figure 4. **Graph of time dependant water level elevations in observation piezometers.**

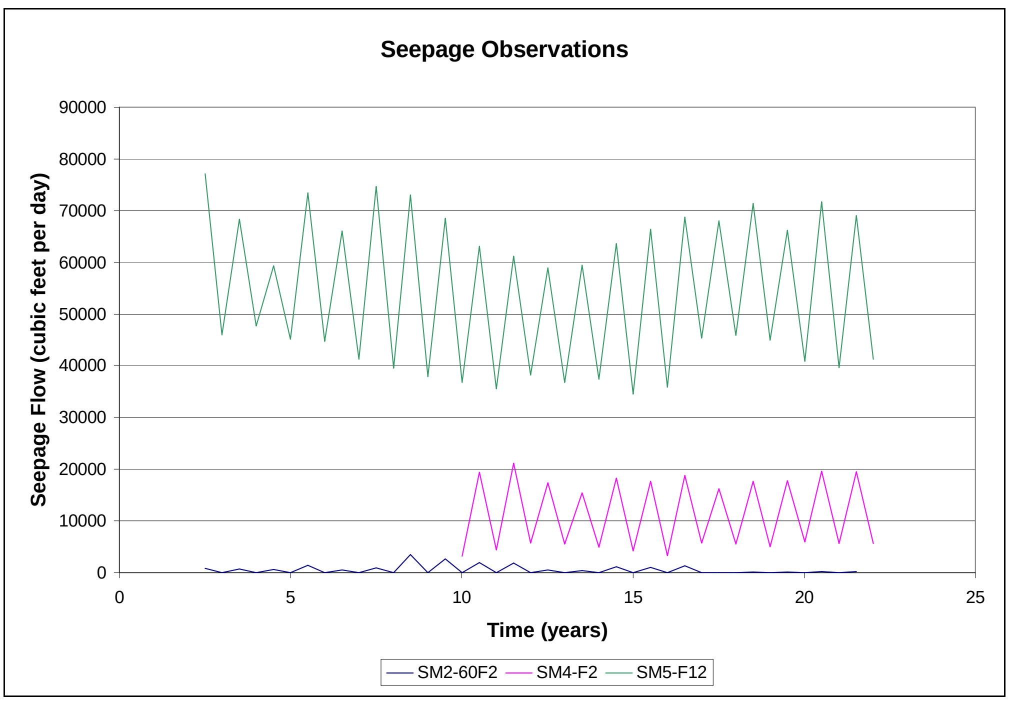


Figure 5. **Graph of time dependant seepage flows at seepage observation points.**

3.2 Estimated Parameters and Sensitivity

3.2.1 Hydraulic Conductivity and Storage

Estimated parameters included the hydraulic conductivity of Layer 1, river and drain conductance of the updated river and drain features, and specific yield of Layer 1 during the transient simulation. It was assumed that the hydraulic conductivity and specific yield of the sand layer was uniform throughout most of the layer (zone 1), except for a small region near the dam that was most likely disturbed during construction (zone 2) (Figure 6). Table 3 shows the hydraulic parameters and their estimated values for both the steady-state and transient models.

Figure 6. Map of hydraulic conductivity zones.

Table 3. Calibrated values for hydraulic conductivity.

Zones	Hydraulic Conductivity (feet/day)		Storage
	Horizontal	*Vertical*	*Specific Yield*
1	70	5.00E-06	2.00E-01
2	1.1	0.007	2.00E-01

3.2.2 Conductance

Zones were designated for the river cells based on location and feature size (Figure 7). All of the conductance values were determined during the calibration process and are shown in Table 4. River conductances vary for zone 1and zones 3 through 8 due to varying length and width of the canal feature being represented; the vertical hydraulic conductivity of the canal bottom for these features is 0.005 ft/day for zone 5 and 0.45 ft/day for the remaining zones. Conductance (shown in Table 4) is equivalent to hydraulic conductivity multiplied by the length and width of the feature divided by the bed thickness. The differences between the zones is likely due to concrete lining at the entrance of the canal (zone 5) and no lining further down the canal. Zone 1 represents the portion of the canal that was previously lined, but the concrete is considered degraded and leaky.

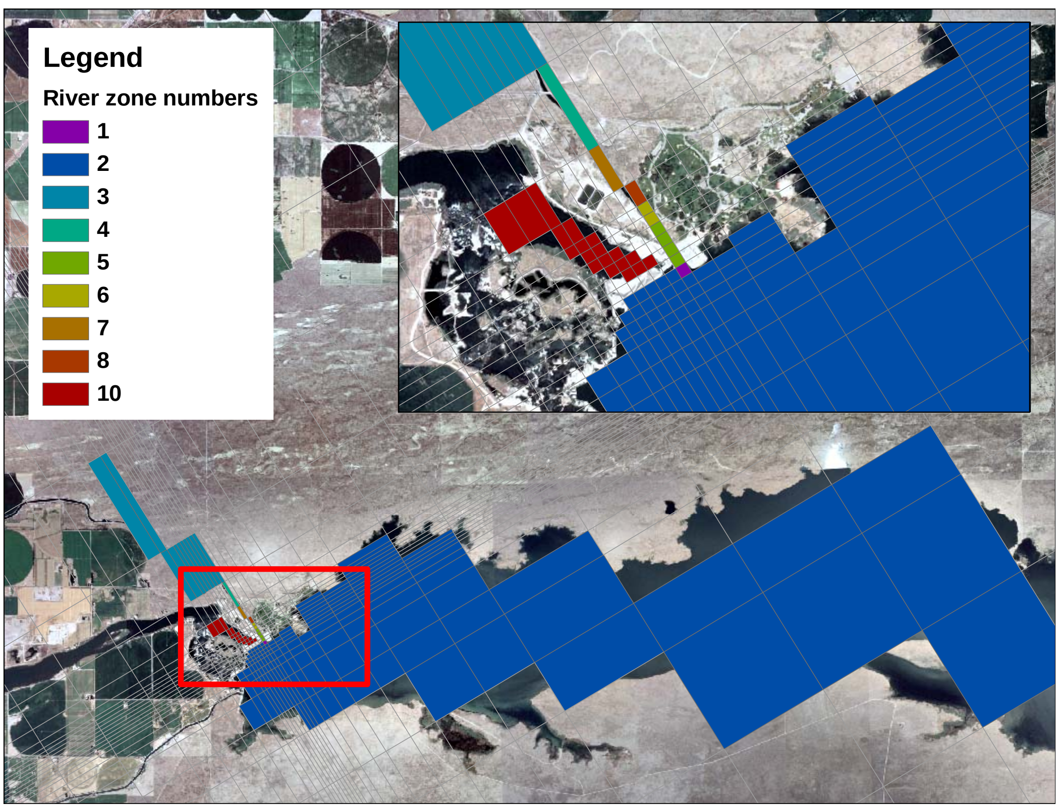


Figure 7. River zone locations.

The conductance rate of the river cells that represent Lake Walcott (zone 2) were estimated during calibration to be 824 ft2/d. The conductance rate of the cells that represent the river just below the dam (zone 10) were estimated to be 10,000 ft2/d. The estimated conductance of the GHB boundary that represents the reservoir in layer 1 is 9584 ft2/day.

Conductance for drains varied with the calibration process and is likely due to differing surface conditions where the water comes to the surface. For example, the surface may be more tightly compacted at one drain location versus another.

Table 4. Calibrated values for drain, river and GHB conductance.

Drain	**Conductance**
SM2	2000
SM4	1826
SM5	4771
River Zone	Conductance
1	743
2	824
3	1350
4	5940
5	33
6	743
7	743
8	1485
10	10000
GHB	Conductance
1	9584

3.3 Model Uncertainty

A numerical model represents a simplification of a complex natural system. The goal when developing a model is to minimize the unknowns and attempt to represent reality as closely as possible, while recognizing that a certain amount of uncertainty is inherent in the modeling process.

Uncertainty is often used as a synonym for model error. Many factors can contribute to model error, including error in the input data, hydrologic parameter variation, numerical error in the simulation, and error in observation data. These errors can compound or cancel each other. It is important to understand the error in the model output so that decision makers can appropriately utilize the output data.

Since this model is built upon the existing ESPAM1.1 model, uncertainty was only analyzed with respect to the new additions to the model.

Determining the sensitivity of model parameters can help quantify model uncertainty. Sensitive parameters are those that cause a large change in the model solution when their values are varied; while insensitive parameters can be varied by large amounts and not affect the solution. MODFLOW 2000 calculates the sensitivity of each parameter using a forward- or central- difference approximation (Harbaugh and others, 2000). The sensitivities are presented in two ways, composite scaled sensitivities (CSS) and dimensionless scaled sensitivities (DSS). CSS values were plotted in a bar chart to show the relative sensitivity of each parameter (Figure 8).

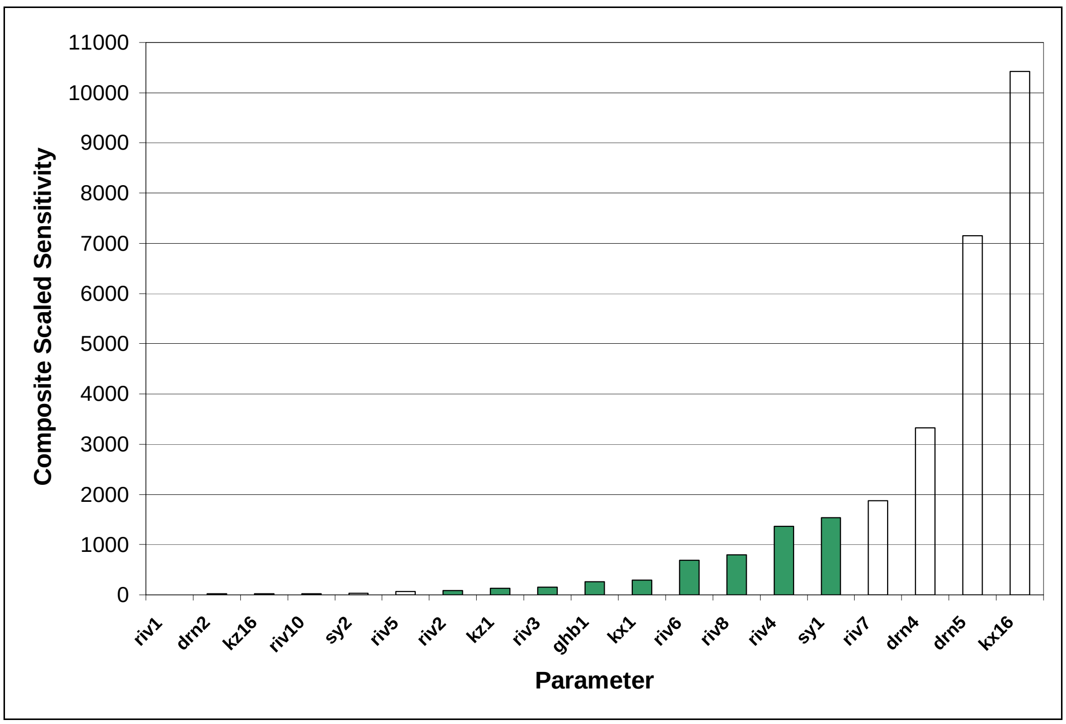


Figure 8. Plot of CSS values for Minidoka groundwater model.

Parameters that are less than 1 percent of the largest CSS value are considered not sensitive. Since the maximum CSS for this model is about 10,400 for parameter kx16, the sensitive parameters are those with CSS greater than 104. The sensitive parameters in this model are

- vertical hydraulic conductivity zone 1 (kz1),
- river conductance zone 3 (riv3),
- General Head Boundary Zone 1 (ghb1),
- horizontal hydraulic conductivity zone 1 (kx1),
- river conductance zone 6 (riv6),
- river conductance zone 8 (riv8),
- river conductance zone 4 (riv4),
- storativity zone 1 (sy1),
- river conductance zone 7 (riv7),
- drain conductance zone 4 (drn4),
- drain conductance zone 5 (drn5), and
- horizontal hydraulic conductivity zone 16 (kx16).

DSS values were plotted in a line graph to show the relative importance of each parameter to an observation based on its sensitivity (Figure 9). Observations with DSS values that are large with respect to the other observations are considered sensitive with respect to the corresponding parameter. For example, the parameter River Zone 2 is important to the estimation of the piezometers in layer 2 but not the piezometers in layer 1 nor the seepage estimates

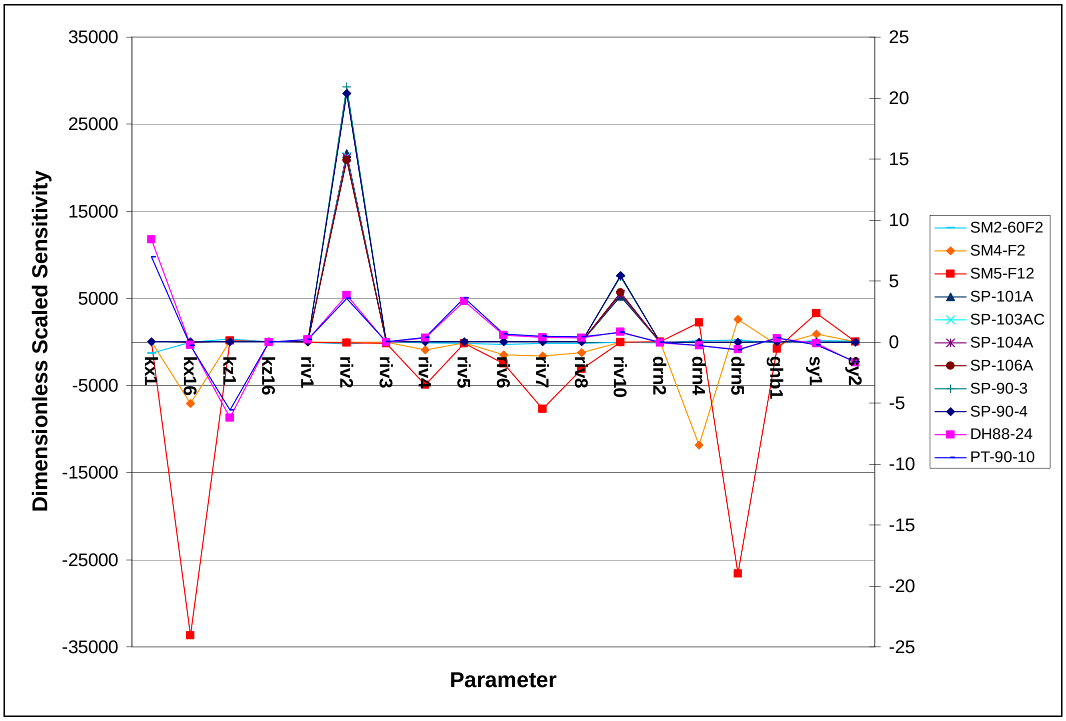


Figure 9. Plot of dimensionless scaled sensitivities for each estimated parameter in the model. The left y-axis represents the DSS for observations SM2, SM4, and SM5. The remaining observations are reflected on the right y-axis.

The CSS and DSS values can help to determine which parameters are important to developing a well calibrated model. Estimates of parameters with low DSS and CSS values are not necessary for a well calibrated model because a low DSS means that none of the observations depend on the parameter and a low CSS means that the model is not sensitive to changes in the parameter. The parameters in this model that do not have a high DSS (or high importance) are vertical hydraulic conductivity for zone 16, river conductance for zones 1 and 3, drain conductance for zone 2 and GHB conductance for zone 1. Of these parameters, GHB for zone 1 and river conductance for zone 3 are considered slightly sensitive, so changes may result in a different solution, but not at the observation points. It is often recommended that such parameters be set with a fixed value during the calibration process since changes will have little effect on the solution.

Parameters with low CSS values and high DSS values can contribute to the uncertainty of a model. This is because parameters with low CSS values can be changed by large amounts without affecting the solution at the observation point. However, the high DSS value indicates that the estimate of that particular observation is dependant on a good estimate of that non-sensitive parameter . It is possible to calibrate the model to parameters with low CSS; however, a large range of estimates for that parameter often results in a good calibration of the model. So, although the model appears to be well calibrated, predictions made with that model version may not be. Parameters that fall into the category of having a large DSS and small CSS (or a high importance, but low sensitivity) for this model are river conductance for zones 2, 5, and 10 and storativity for zone 1. To account for this issue, it is common to use a range of values for each parameter during the prediction portion to give a range of possible solutions to the problem. Since in this model they are all on the low end of the CSS chart, changes to the parameters did not affect the solution to any large degree, therefore, it was not necessary to use a range of values.

3.4 Calibration Model Fit

The quality of model calibration is determined by the residuals, which are the differences between observed and simulated water levels and flow measurements. For the steady-state model, the residual standard deviation of the water levels is 4.10, which indicates that there is a 95% chance that the simulated water levels will be within 4.10 feet of the observed water levels. The percent of the total range of observed water levels is 7.3. For calibration purposes, it is considered reasonable for the residual standard deviation percent of the range to be up to 10 percent. The residual standard deviation of the seepage flow at the drains is 4555.01 feet per day which is 7.6 percent of the total range in seepage flow.

Figure 10 shows the steady-state base case Minidoka model contours compared to the ESPAM 1.1 model contours. The contours are similar and differences likely result from the conversion of the BCF to LPF package.

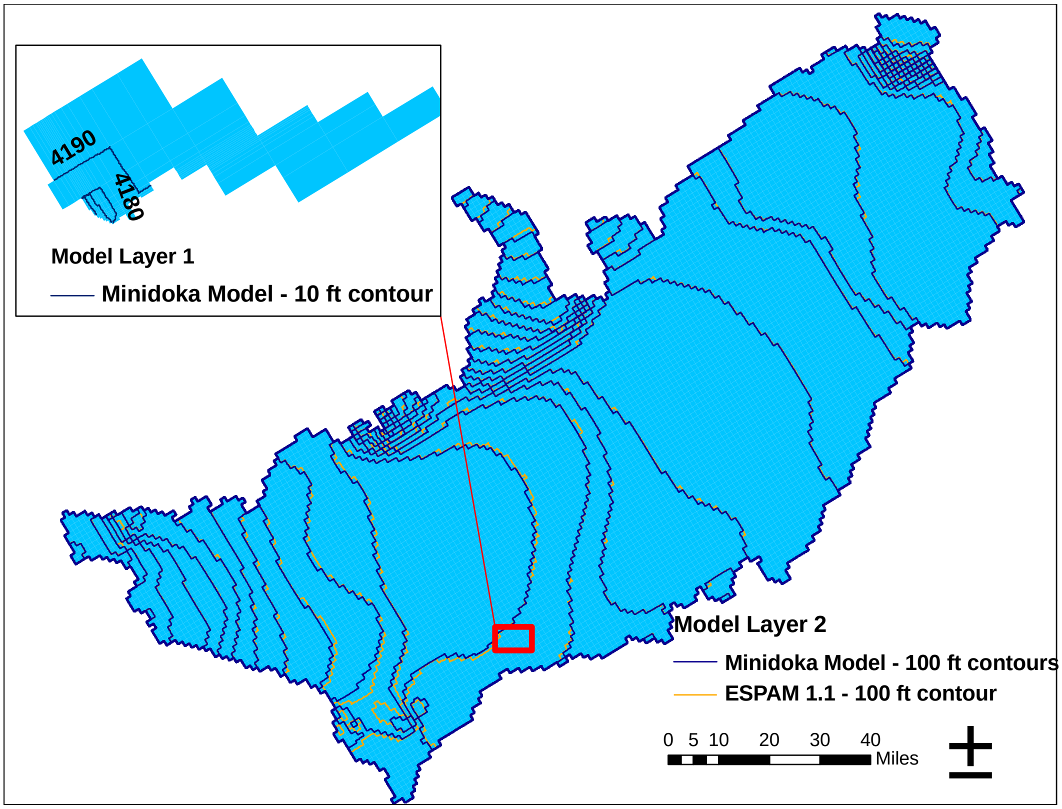


Figure 10. Base case contours compared to ESPAM model results.

The observed versus simulated values for the steady-state calibrated model are presented in Table 2-4.

Table 5. Observed versus simulated values for steady-state calibrated model.

	Name	Observed	Simulated	Residual
Water Levels (feet)	*DH-88-24*	4168	4166	3
	PT-90-10	4172	4168	4
	SP-90-4	4116	4124	-8
	SP-90-3	4119	4125	-6
	SP-101a	4127	4126	2
	SP-104a	4127	4125	2
	SP-106a	4127	4125	2
	SP-103c	4129	4125	4
Seepage (cubic feet per day)	*SM2*	-400	-1303	903
	SM4	-14000	-16364	2364
	SM5	-60000	-71213	11213

For the transient model, the residual standard deviation of the water levels is 2.88, which is 4.7 percent of the range of observations. The residual standard deviation of the seepage flow at the drains is 4148.51 feet per day, which is 5.4 percent of the range. Figure 11 is a scatter plot of the observed versus simulated water levels for the transient model. For a best fit, all values would fall in a straight line with a slope of 1 and intercept at 0 (indicated by the dashed line on the Figure 11). A regression line for water levels has a slope of 1.055 and y-intercept of -230.65.

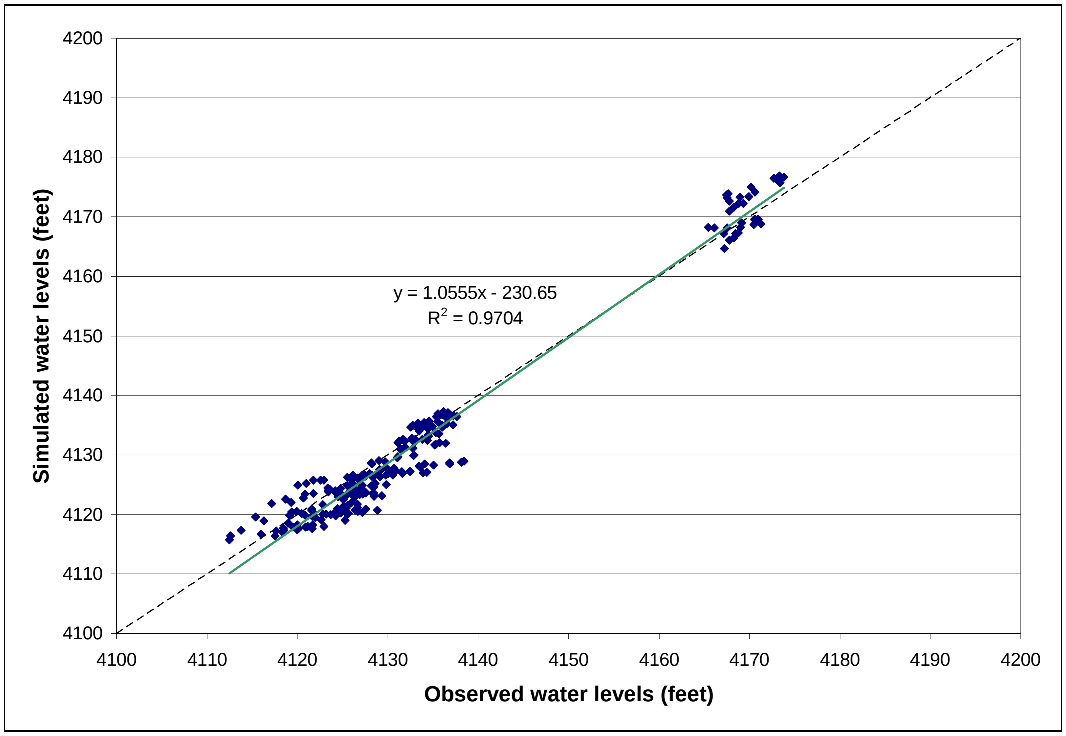


Figure 11. Observed versus simulated water levels.

Figure 12 is a plot of the observed versus simulated seepage flows at the drains. A regression line of the flow data has a slope of 0.9349 and y-intercept of 2916.9.

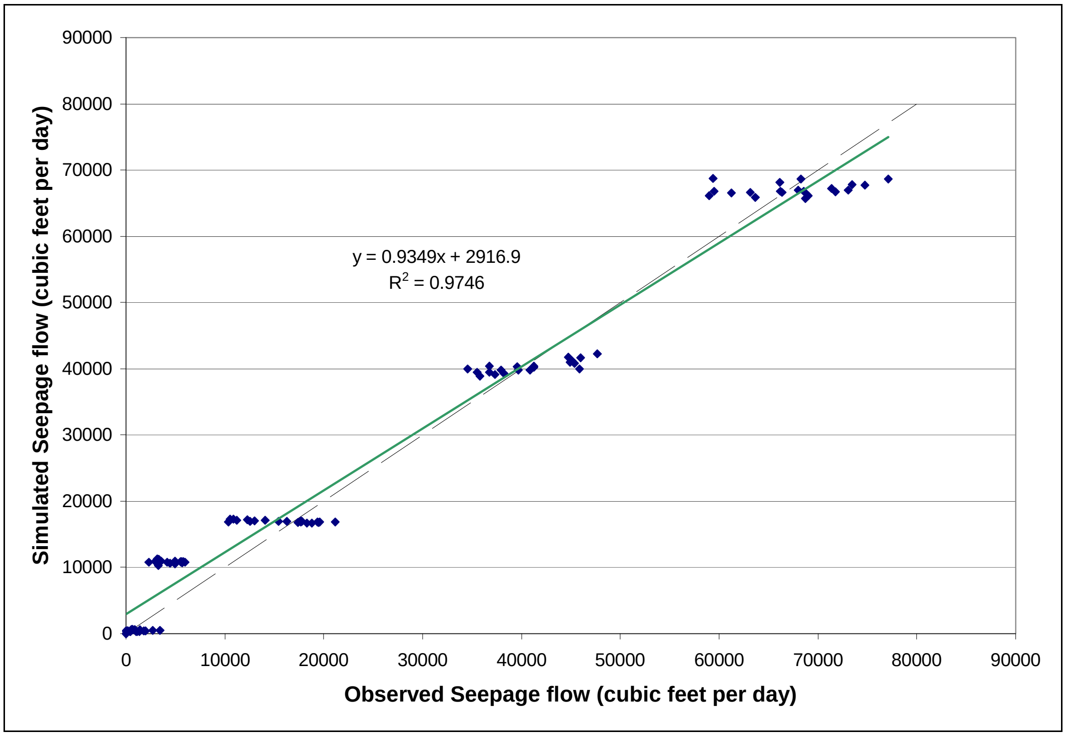
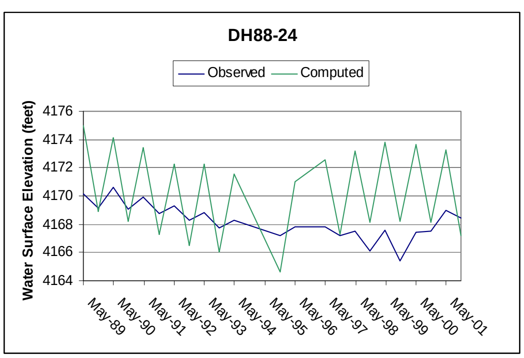
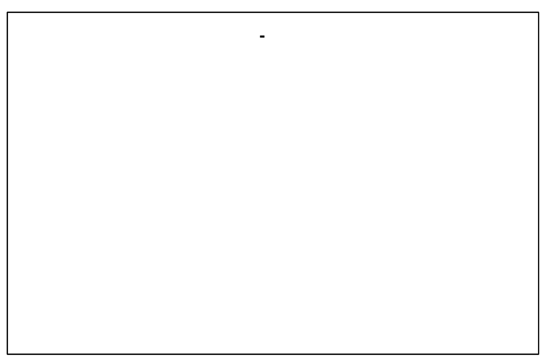


Figure 12. Observed versus simulated seepage flow.

Figure 13 shows the calibrated observed and modeled time series at the observation points. Data points that are not included in the observed time series are omitted from the computed time series. For the most, the computed values match the observed values. DH88-24 has a larger change in head values from one stress period to the next because it is in a cell that is along the boundary of the model.





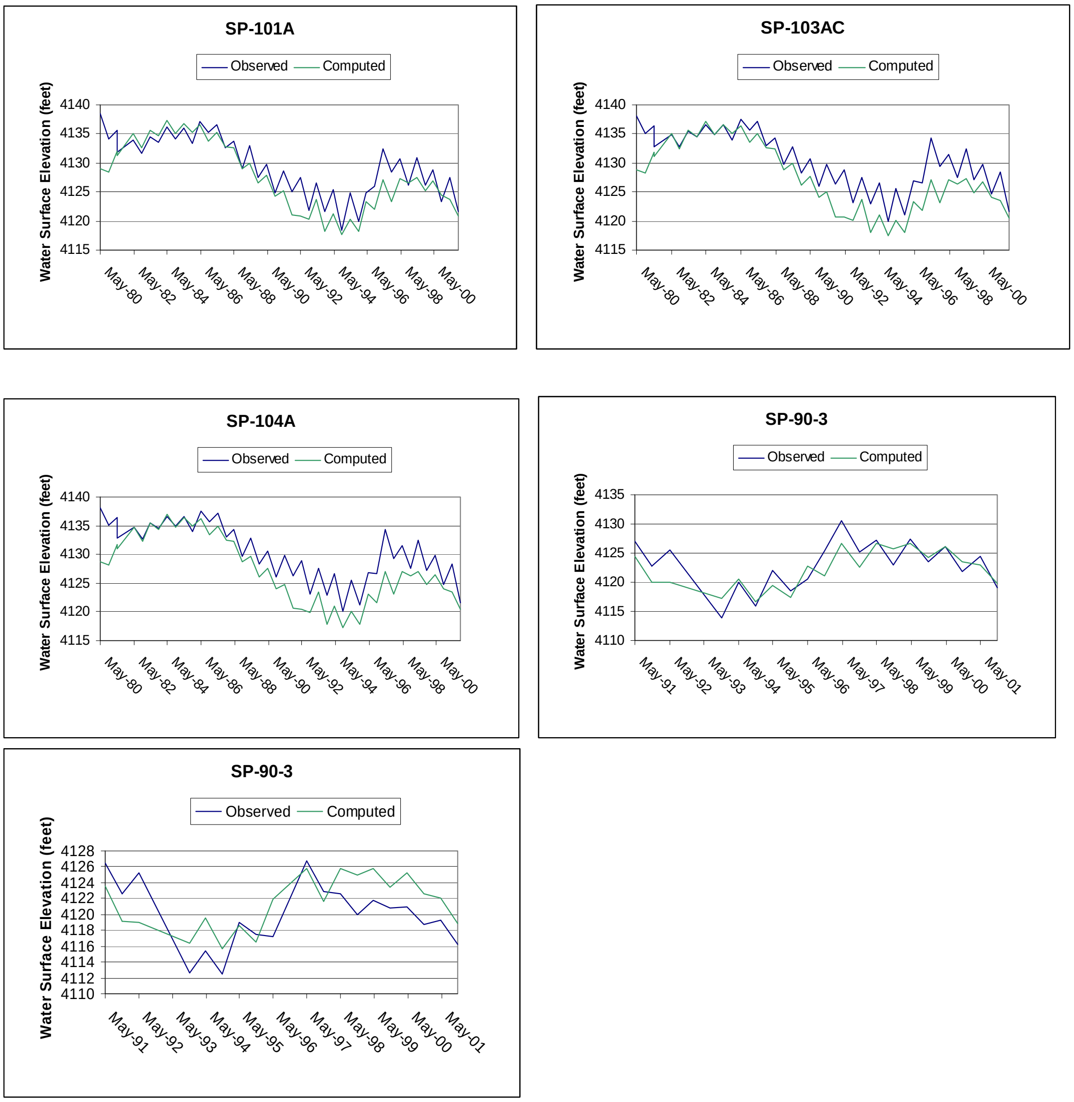


Figure 13. Observed versus calculated water level measurements in piezometers near Minidoka dam.

Figure 14 shows the observed and computed time series of the seepage points along the north side of the river.

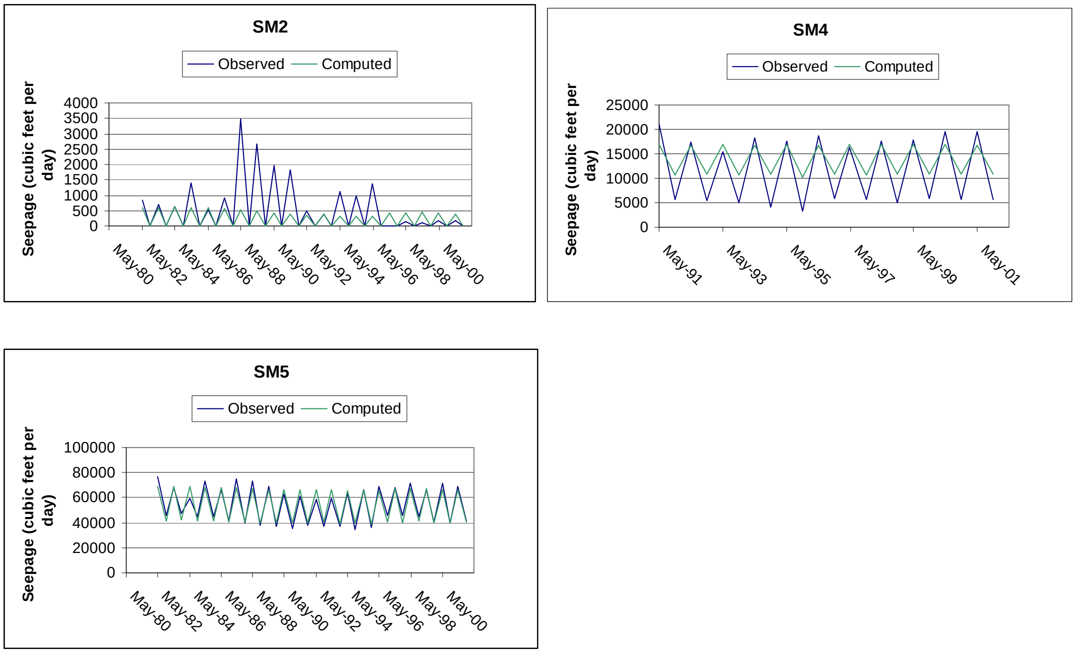


Figure 14. Observed versus computed seepage at measurement points near Minidoka Dam.

The majority of the seepage from the reservoir flows downward, to the regional aquifer with a relatively small amount flowing through the silty sand layer to the river. The water that does flow to the river originates from upstream on the reservoir, flows under the Northside canal, and daylights at the seepage measurement points along the river. Seepage from the Northside canal itself also contributes to the flow measured at the seepage measurement points. Most of the seepage is collected at SM5, which is many times larger in volume than SM4 and SM2.

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Appendix D Hydrology Studies

Historical monthly average flows below Minidoka obtained from Hydromet

UNITS: cfs

Water Year/Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	**Annual Average**
1991	2,515	502	547	1,274	476	499	2,606	6,129	8,063	9,660	9,542	6,620	**4,036**
1992	2,631	442	798	947	503	550	4,803	7,575	7,475	7,673	7,263	3,458	**3,676**
1993	1,703	439	635	839	513	557	1,174	6,967	11,909	10,205	9,285	6,728	**4,246**
1994	3,477	1,589	2,384	2,388	2,074	2,575	5,987	8,435	9,844	10,941	8,165	5,923	**5,315**
1995	1,860	593	513	651	483	412	2,467	11,438	14,095	10,878	9,917	7,568	**5,073**
1996	3,307	2,219	3,045	4,425	7,407	16,474	16,037	12,265	15,210	10,957	9,657	6,675	**8,973**
1997	3,907	2,462	3,424	8,863	18,121	20,023	16,027	15,732	32,373	11,614	11,638	12,867	**13,087**
1998	10,169	6,461	7,940	6,600	7,337	7,871	11,490	16,183	16,140	11,303	10,126	7,711	**9,944**
1999	4,922	4,804	8,297	8,396	8,270	8,254	12,417	15,990	19,237	10,558	9,735	7,650	**9,877**
2000	5,633	3,770	4,527	6,814	2,704	3,204	8,245	7,929	9,441	10,594	9,829	6,876	**6,631**
AVERAGE	**4,012**	**2,328**	**3,211**	**4,120**	**4,789**	**6,042**	**8,125**	**10,864**	**14,379**	**10,438**	**9,516**	**7,207**	**7,086**

Modsim Model Output of monthly average flows below Minidoka under Alternative A: No Action

UNITS: cfs

Water Year/Month	Oct	Novr	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	**Annual Average**
1991	2,774	504	489	488	540	607	2,798	7,321	9,433	9,925	9,195	6,712	**4,232**
1992	2,701	2,094	1,999	488	522	488	4,975	7,836	7,751	7,145	6,496	2,317	**3,734**
1993	1,793	504	488	488	597	488	899	14,530	8,564	9,819	8,405	6,808	**4,449**
1994	3,539	2,110	1,958	793	1,098	646	5,176	7,909	9,415	9,454	7,404	5,681	**4,599**
1995	1,833	514	491	825	971	488	6,339	12,436	14,121	10,090	8,558	7,376	**5,337**
1996	3,993	2,339	6,990	8,899	10,330	7,965	15,649	15,281	13,091	11,544	9,581	7,571	**9,436**
1997	4,936	2,296	2,185	11,278	11,540	10,096	18,717	27,000	26,690	14,637	9,572	7,500	**12,204**
1998	9,958	7,822	6,964	12,677	7,590	5,788	10,347	14,825	16,319	12,527	8,934	7,122	**10,073**
1999	4,033	5,830	6,521	9,220	10,305	11,819	10,605	14,637	19,955	13,826	9,778	7,781	**10,359**
2000	4,946	2,128	2,035	4,058	4,919	4,743	7,674	8,777	10,235	9,837	8,498	6,300	**6,179**
AVERAGE	**4,051**	**2,614**	**3,012**	**4,921**	**4,841**	**4,313**	**8,318**	**13,055**	**13,557**	**10,880**	**8,642**	**6,517**	**7,060**

note: for months with 31 days, the minimum flow calculation is slightly less than the 500cfs stipulated in the model constraints.

Modsim Model Output of monthly average flows below Minidoka under Alternative A: No Action

Historical monthly average flows below American Falls Dam obtained from Hydromet

UNITS: cfs

Water Year/Month	Oct	Novr	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	**Annual Average**
1991	2,712	390	381	1,202	392	389	4,366	7,557	11,554	12,942	12,310	7,414	5,134
1992	2,626	341	649	798	537	1,118	7,247	10,365	9,656	9,568	8,107	3,762	4,565
1993	2,401	340	514	689	319	306	1,951	9,097	14,585	12,677	11,193	8,456	5,211
1994	3,063	1,458	2,193	2,137	1,959	3,518	7,177	10,223	12,222	12,829	9,838	6,836	6,121
1995	1,963	397	327	420	315	1,142	3,224	12,412	15,720	12,245	11,406	8,784	5,696
1996	2,456	1,847	2,983	4,467	7,958	17,000	16,990	13,748	18,303	13,510	11,810	7,929	9,917
1997	4,405	1,473	3,178	8,965	18,079	19,935	16,960	17,361	35,583	13,616	13,284	13,557	13,866
1998	9,240	6,343	7,605	6,383	7,258	8,822	12,190	17,594	18,317	13,658	12,258	8,962	10,719
1999	4,043	4,637	7,937	7,937	7,920	8,942	12,669	17,548	22,963	13,071	11,635	8,985	10,691
2000	5,076	3,618	4,361	6,725	2,479	3,991	9,129	9,630	12,043	13,174	11,665	7,409	7,442
AVERAGE	3,799	2,084	3,013	3,972	4,721	6,516	9,190	12,554	17,095	12,729	11,351	8,209	7,936

Modsim Model Output of monthly average flows below American Falls Dam under Alternative A: N o Action

UNITS: cfs

Water Year/Month	Oct	Novr	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	**Annual Average**
1991	2,088	400	342	454	448	1,379	3,863	8,802	12,925	13,338	12,004	8,125	5,347
1992	2,264	2,017	1,952	441	466	1,447	7,203	10,732	9,924	9,159	7,308	2,145	4,588
1993	2,246	483	455	393	432	1,089	1,125	16,521	11,273	12,380	10,330	8,664	5,449
1994	3,061	2,017	1,952	705	756	1,548	6,482	9,730	11,814	11,407	9,468	6,091	5,419
1995	1,932	353	342	635	828	1,358	7,038	13,417	15,771	11,485	10,069	9,067	6,024
1996	3,325	2,017	6,901	8,686	10,313	9,000	16,464	16,786	16,178	14,096	11,772	9,060	10,383
1997	4,543	2,017	1,952	11,020	11,455	10,890	19,278	28,743	29,792	16,694	11,208	8,260	12,988
1998	8,970	7,673	6,709	12,483	7,483	6,744	11,129	16,292	18,524	14,842	11,066	8,386	10,859
1999	3,225	5,669	6,119	8,825	9,865	12,583	10,867	16,146	23,641	16,361	11,703	9,130	11,178
2000	4,306	2,017	1,952	3,907	4,688	5,612	8,501	10,508	12,826	12,412	10,323	7,238	7,024
AVERAGE	3,596	2,466	2,867	4,755	4,673	5,165	9,195	14,768	16,267	13,217	10,525	7,616	7,926

note: for months with 31 days, the minimum flow calculation is slightly less than the 350cfs stipulated in the model constraints.

Modsim Model Output of monthly average flows below Minidoka under Alternative A: No Action

UNITS: cfs

Water Year/Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	**Annual Average**
1928	1,367	550	671	1,567	1,926	4,680	6,897	18,644	13,618	9,841	8,340	6,223	**6,194**
1929	3,527	2,231	2,032	3,069	2,917	2,389	5,259	11,165	9,435	9,630	8,203	6,142	**5,500**
1930	3,479	2,147	2,027	666	887	659	6,024	7,483	8,892	9,989	8,257	6,229	**4,728**
1931	3,250	504	488	488	540	488	4,913	8,242	8,683	8,085	5,716	3,408	**3,734**
1932	1,703	504	488	511	522	488	2,510	6,675	8,020	9,065	8,368	6,340	**3,766**
1933	3,492	2,183	2,163	488	540	488	2,835	7,055	8,590	9,222	8,289	6,176	**4,293**
1934	3,564	1,940	1,936	488	540	488	4,768	7,574	8,239	6,585	20,004	5,658	**5,149**
1935	1,887	690	2,159	1,741	1,927	1,061	2,798	7,176	8,549	9,566	7,795	6,200	**4,296**
1936	3,527	2,086	2,062	572	746	488	2,927	7,879	8,746	9,504	8,359	6,352	**4,437**
1937	3,584	2,054	2,016	488	541	488	4,996	8,216	8,345	7,431	6,108	3,698	**3,997**
1938	1,496	504	488	488	540	488	4,614	10,371	8,722	9,565	8,276	7,072	**4,385**
1939	3,838	2,083	2,025	2,768	3,154	2,656	8,675	11,641	9,059	8,798	7,296	4,529	**5,544**
1940	1,343	504	488	1,859	2,090	1,268	4,858	8,758	9,155	7,922	7,261	4,276	**4,149**
1941	1,452	504	535	488	620	488	4,910	8,496	8,378	8,751	7,090	5,089	**3,900**
1942	3,365	772	594	488	540	488	2,826	6,779	8,027	9,229	8,285	6,130	**3,960**
1943	3,395	504	724	3,610	4,165	3,916	16,374	8,546	11,818	10,923	9,357	7,304	**6,720**
1944	4,612	2,083	7,262	4,229	3,193	2,819	4,921	8,513	8,349	9,014	8,293	5,940	**5,769**
1945	3,168	504	520	488	540	488	2,792	7,111	8,694	9,306	8,356	6,798	**4,064**
1946	4,070	2,261	2,175	4,603	5,234	8,201	14,888	13,144	9,171	9,463	8,240	6,115	**7,297**
1947	3,378	504	488	3,295	3,710	6,673	6,843	11,846	8,834	9,465	8,185	6,209	**5,786**
1948	3,508	2,022	1,946	3,619	4,017	2,839	5,381	14,637	14,634	9,557	8,215	6,262	**6,386**
1949	3,605	2,051	2,014	1,081	1,139	659	6,746	16,987	14,280	9,892	8,247	6,255	**6,080**
1950	3,203	608	600	4,473	4,797	7,727	11,150	10,173	11,906	10,971	9,446	7,530	**6,882**
1951	4,401	3,961	8,001	8,930	8,444	9,620	12,061	10,642	9,678	9,718	8,136	7,055	**8,387**
1952	3,870	4,235	7,407	7,132	6,101	5,046	10,648	18,832	15,125	11,461	8,393	6,317	**8,714**
1953	3,327	2,079	2,044	2,375	2,578	1,391	3,854	10,921	10,754	9,573	8,241	7,186	**5,360**
1954	4,114	2,034	2,078	1,692	1,588	2,896	6,368	12,947	8,766	9,471	8,280	6,389	**5,552**
1955	3,541	1,823	1,946	1,088	1,138	488	3,590	7,395	8,728	9,315	8,096	6,060	**4,434**
1956	3,537	504	488	5,838	6,333	5,011	13,038	14,331	15,762	10,960	8,108	6,970	**7,573**
1957	3,950	2,054	2,073	5,323	6,003	4,253	6,898	13,806	13,900	9,655	8,261	6,991	**6,931**
1958	3,920	2,079	1,944	3,344	3,703	2,746	4,812	15,254	9,669	9,743	8,259	5,642	**5,926**
1959	3,344	504	488	488	540	590	2,702	7,668	9,143	9,633	7,503	5,596	**4,017**
1960	3,410	1,999	1,868	488	522	488	4,815	8,642	9,100	8,121	6,340	4,405	**4,183**
1961	1,651	504	488	488	540	488	4,953	8,398	8,980	7,629	4,659	2,495	**3,439**
1962	1,480	504	488	2,378	2,679	1,651	10,906	11,977	8,712	9,556	8,531	6,362	**5,435**
1963	3,396	1,918	1,989	1,718	1,751	601	2,750	10,846	12,312	9,373	8,237	6,405	**5,108**
1964	3,687	2,068	2,103	488	522	488	6,558	11,569	15,125	9,796	8,257	6,899	**5,630**
1965	3,812	2,146	2,521	7,476	8,218	6,918	12,661	10,339	13,788	10,927	9,151	7,350	**7,942**
1966	4,659	1,954	6,859	5,994	4,716	3,171	4,959	11,174	9,472	8,727	7,273	4,300	**6,105**
1967	1,363	504	488	4,682	5,009	3,346	5,947	10,368	13,676	9,422	8,231	7,398	**5,870**
1968	4,151	2,048	2,679	4,913	5,047	3,415	2,710	11,871	12,133	9,053	7,981	6,832	**6,069**

Modsim Model Output of monthly average flows below Minidoka under Alternative A: No Action													
1969	3,910	1,972	2,129	6,047	5,480	3,686	9,787	18,544	11,405	9,878	8,022	6,221	**7,257**
1970	3,246	504	558	3,186	3,101	4,197	4,918	13,225	15,942	10,586	8,035	6,939	**6,203**
1971	4,052	2,156	4,855	9,985	10,643	9,092	17,467	21,065	16,884	14,637	10,634	7,617	**10,757**
1972	5,814	8,615	7,227	12,491	11,268	10,057	12,331	15,737	22,317	13,427	9,264	7,318	**11,322**
1973	4,366	3,566	7,772	6,215	5,914	4,108	6,687	14,326	10,079	9,104	8,003	6,105	**7,187**
1974	3,537	737	607	9,552	10,522	8,103	11,487	15,973	22,821	13,224	9,391	7,344	**9,442**
1975	4,650	3,091	3,419	10,478	7,097	5,126	5,846	11,704	15,125	15,183	10,366	7,300	**8,282**
1976	4,921	6,618	8,554	8,479	8,552	10,846	10,700	18,271	16,361	11,848	8,024	6,775	**9,996**
1977	4,079	3,910	6,704	3,472	3,586	1,413	4,909	8,834	9,438	8,180	6,129	2,991	**5,304**
1978	1,534	504	488	1,023	2,741	1,914	4,953	12,208	9,639	11,082	9,638	7,456	**5,265**
1979	4,537	2,084	2,131	4,149	4,163	2,593	4,063	14,276	10,413	9,619	8,303	5,693	**6,002**
1980	3,171	504	488	2,300	2,147	2,340	6,947	16,032	14,071	10,475	8,812	6,376	**6,139**
1981	3,727	2,171	2,153	2,338	2,409	871	4,749	8,666	11,948	10,006	8,818	5,979	**5,320**
1982	3,006	517	547	5,132	5,857	5,103	14,766	14,764	12,950	14,521	9,733	7,700	**7,883**
1983	6,789	8,167	7,073	12,661	12,032	9,815	9,142	14,118	15,821	13,434	9,359	7,327	**10,478**
1984	8,464	10,283	9,758	11,424	11,999	10,396	11,029	17,649	22,756	14,171	8,634	10,749	**12,276**
1985	6,340	9,052	8,702	5,742	6,297	4,622	10,476	17,731	9,906	9,799	8,210	6,195	**8,589**
1986	3,288	504	488	9,875	11,524	9,636	25,645	17,593	15,656	13,388	9,523	7,320	**10,370**
1987	4,277	4,100	5,952	7,490	4,581	2,490	6,412	8,819	9,488	7,957	7,343	4,527	**6,120**
1988	1,395	504	488	488	522	779	4,758	8,213	8,751	8,048	7,446	4,700	**3,841**
1989	1,428	504	488	488	540	655	3,443	11,636	9,602	9,802	8,500	6,628	**4,476**
1990	3,399	2,174	2,089	488	540	655	5,102	8,263	8,351	8,685	8,400	5,839	**4,499**
1991	2,774	504	489	488	540	607	2,798	7,321	9,433	9,925	9,195	6,712	**4,232**
1992	2,701	2,094	1,999	488	522	488	4,975	7,836	7,751	7,145	6,496	2,317	**3,734**
1993	1,793	504	488	488	597	488	899	14,530	8,564	9,819	8,405	6,808	**4,449**
1994	3,539	2,110	1,958	793	1,098	646	5,176	7,909	9,415	9,454	7,404	5,681	**4,599**
1995	1,833	514	491	825	971	488	6,339	12,436	14,121	10,090	8,558	7,376	**5,337**
1996	3,993	2,339	6,990	8,899	10,330	7,965	15,649	15,281	13,091	11,544	9,581	7,571	**9,436**
1997	4,936	2,296	2,185	11,278	11,540	10,096	18,717	27,000	26,690	14,637	9,572	7,500	**12,204**
1998	9,958	7,822	6,964	12,677	7,590	5,788	10,347	14,825	16,319	12,527	8,934	7,122	**10,073**
1999	4,033	5,830	6,521	9,220	10,305	11,819	10,605	14,637	19,955	13,826	9,778	7,781	**10,359**
2000	4,946	2,128	2,035	4,058	4,919	4,743	7,674	8,777	10,235	9,837	8,498	6,300	**6,179**
AVERAGE	**3,587**	**2,207**	**2,666**	**3,961**	**3,975**	**3,488**	**7,369**	**11,949**	**11,812**	**10,134**	**8,424**	**6,258**	**6,319**
note: for months with 31 days, the minimum flow calculation is slightly less than the 500cfs stipulated in the model constraints.													

Modsim Model Output of monthly average flows below Minidoka under Alternatives B and C

UNITS: cfs

Water Year/Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	**Annual Average**
1928	1,367	529	671	1,252	1,590	5,244	6,985	18,644	13,617	9,841	8,340	6,223	**6,192**
1929	3,527	1,236	2,032	3,069	2,917	3,268	5,346	11,164	9,435	9,630	8,203	6,142	**5,497**
1930	3,479	1,152	2,027	666	887	1,537	6,111	7,483	8,892	9,990	8,257	6,229	**4,726**
1931	3,250	605	585	512	567	512	4,913	8,242	8,683	8,085	5,640	3,322	**3,743**
1932	1,703	529	512	585	626	585	2,510	6,675	8,020	9,062	8,366	6,340	**3,793**
1933	3,492	1,189	2,163	585	648	585	2,835	6,991	8,523	9,347	8,289	6,242	**4,241**
1934	3,564	944	1,936	512	567	512	4,768	7,574	8,239	6,904	20,028	5,697	**5,104**
1935	1,887	529	1,380	1,741	1,927	1,939	2,798	7,176	8,549	9,571	7,823	6,200	**4,293**
1936	3,533	1,091	2,062	585	746	585	2,927	7,879	8,745	9,517	8,359	6,352	**4,365**
1937	3,584	1,060	2,016	512	567	512	4,996	8,192	8,321	7,615	6,108	3,698	**3,932**
1938	1,496	529	512	585	648	585	5,217	10,606	9,584	9,446	8,276	7,072	**4,546**
1939	3,838	1,089	2,025	2,769	3,155	3,536	8,762	11,642	9,060	8,797	7,296	4,529	**5,542**
1940	1,343	529	512	1,522	1,730	1,809	4,858	8,758	9,155	7,922	7,261	4,283	**4,140**
1941	1,452	529	535	512	620	512	4,910	8,498	8,379	8,751	7,058	5,089	**3,904**
1942	3,365	605	594	585	648	585	2,826	6,778	8,027	9,232	8,285	6,130	**3,972**
1943	3,395	605	724	3,267	3,785	4,451	16,462	8,546	11,818	10,922	9,358	7,304	**6,720**
1944	4,612	1,089	7,172	4,229	3,193	3,697	4,921	8,513	8,349	9,014	8,293	5,945	**5,752**
1945	3,176	605	585	585	648	585	2,792	7,112	8,694	9,305	8,356	6,798	**4,103**
1946	4,070	1,267	2,175	4,481	5,099	8,957	14,976	13,145	9,171	9,462	8,240	6,115	**7,263**
1947	3,378	605	585	2,872	3,303	7,184	6,930	11,847	8,834	9,465	8,185	6,209	**5,783**
1948	3,508	1,027	1,946	3,619	4,017	3,718	5,468	14,637	14,634	9,557	8,215	6,262	**6,384**
1949	3,605	1,056	2,014	1,081	1,139	1,537	6,833	16,987	14,279	9,891	8,247	6,255	**6,077**
1950	3,203	605	600	4,154	4,443	8,285	11,237	10,174	11,906	10,972	9,446	7,530	**6,880**
1951	4,401	2,966	8,001	8,929	8,444	10,498	12,148	10,643	9,678	9,717	8,135	7,055	**8,385**
1952	3,870	3,241	7,407	7,132	6,101	5,516	11,156	18,833	15,125	11,462	8,393	6,317	**8,713**
1953	3,327	1,085	2,044	2,375	2,578	2,269	3,941	10,920	10,754	9,574	8,241	7,186	**5,358**
1954	4,114	1,039	2,078	1,692	1,588	3,774	6,455	12,946	8,765	9,471	8,280	6,389	**5,549**
1955	3,541	829	1,946	1,089	1,138	779	4,283	7,395	8,728	9,314	8,096	6,060	**4,433**
1956	3,537	605	585	5,452	5,921	5,504	13,124	14,331	15,762	10,960	8,108	6,970	**7,572**
1957	3,950	1,060	2,073	5,323	6,003	5,132	6,985	13,807	13,901	9,655	8,261	6,991	**6,928**
1958	3,920	1,085	1,944	3,344	3,703	3,625	4,899	15,254	9,669	9,743	8,259	5,642	**5,924**
1959	3,344	605	585	585	648	585	2,702	7,668	9,143	9,632	7,502	5,596	**4,050**
1960	3,410	1,005	1,868	512	548	512	4,815	8,642	9,100	8,121	6,379	4,405	**4,110**
1961	1,651	529	512	512	567	512	4,953	8,420	9,002	7,765	4,701	2,675	**3,483**
1962	1,480	529	512	1,984	2,242	2,135	11,000	12,019	8,711	9,555	8,531	6,362	**5,422**
1963	3,396	924	1,989	1,731	1,766	851	3,499	10,845	12,312	9,372	8,237	6,405	**5,111**
1964	3,687	1,074	2,103	585	626	585	7,248	11,568	15,125	9,796	8,257	6,899	**5,629**
1965	3,812	1,151	2,521	7,476	8,218	7,797	12,748	10,339	13,788	10,927	9,151	7,350	**7,940**
1966	4,659	959	6,859	5,994	4,716	4,049	5,046	11,174	9,472	8,727	7,273	4,300	**6,102**

Modsim Model Output of monthly average flows below Minidoka under Alternatives B and C

1967	1,363	529	512	4,345	4,636	3,888	6,034	10,368	13,676	9,422	8,231	7,398	**5,867**
1968	4,151	1,053	2,679	4,913	5,047	4,293	2,710	11,955	12,132	9,053	7,981	6,832	**6,067**
1969	3,910	978	2,129	6,047	5,480	4,565	9,874	18,543	11,405	9,878	8,022	6,221	**7,254**
1970	3,246	605	585	2,823	2,699	4,712	5,005	13,225	15,942	10,586	8,035	6,939	**6,200**
1971	4,052	1,162	4,855	9,984	10,644	9,970	17,554	21,064	16,884	14,637	10,634	7,617	**10,755**
1972	5,814	7,621	7,227	12,490	11,267	10,935	12,418	15,737	22,318	13,426	9,264	7,318	**11,320**
1973	4,366	2,572	7,772	6,215	5,914	4,986	6,774	14,326	10,079	9,104	8,003	6,105	**7,185**
1974	3,537	605	607	9,274	10,214	8,702	11,574	15,974	22,821	13,225	9,391	7,344	**9,439**
1975	4,650	2,097	3,419	10,478	7,097	6,005	5,933	11,704	15,125	15,183	10,366	7,300	**8,280**
1976	4,921	5,624	8,555	8,480	8,553	11,724	10,787	18,271	16,360	11,848	8,024	6,775	**9,994**
1977	4,079	2,915	6,704	3,472	3,586	2,291	4,909	8,834	9,438	8,180	6,143	3,004	**5,296**
1978	1,533	529	512	678	2,359	2,447	5,040	12,208	9,639	11,082	9,637	7,456	**5,260**
1979	4,537	1,090	2,131	4,169	4,185	3,491	4,151	14,277	10,413	9,619	8,303	5,693	**6,005**
1980	3,171	605	585	1,914	1,734	2,833	7,034	16,032	14,071	10,475	8,812	6,376	**6,137**
1981	3,727	1,177	2,153	2,339	2,410	1,750	4,836	8,665	11,948	10,006	8,817	5,979	**5,317**
1982	3,006	605	585	4,770	5,456	5,619	14,853	14,765	12,949	14,521	9,733	7,700	**7,880**
1983	6,789	7,172	7,073	12,661	12,032	10,693	9,230	14,118	15,821	13,433	9,359	7,327	**10,476**
1984	8,464	9,289	9,758	11,424	11,998	11,274	11,117	17,649	22,756	14,171	8,634	10,750	**12,274**
1985	6,340	8,057	8,702	5,742	6,297	5,500	10,563	17,732	9,906	9,799	8,210	6,195	**8,587**
1986	3,288	605	585	9,489	11,097	10,129	25,731	17,594	15,657	13,389	9,523	7,320	**10,367**
1987	4,277	3,105	5,952	7,490	4,581	3,368	6,499	8,819	9,488	7,957	7,343	4,526	**6,117**
1988	1,395	529	512	512	548	779	4,758	8,213	8,750	8,048	7,446	4,700	**3,849**
1989	1,428	529	512	585	648	655	3,192	11,636	9,510	9,801	8,500	6,628	**4,469**
1990	3,399	1,179	2,089	512	567	953	5,737	8,263	8,351	8,686	8,425	5,883	**4,504**
1991	2,774	605	585	585	648	585	2,798	7,101	9,206	9,817	9,195	6,712	**4,218**
1992	2,701	1,099	1,999	512	548	512	4,975	7,840	7,754	7,195	6,573	2,495	**3,684**
1993	1,790	529	512	585	648	618	899	14,004	8,564	9,827	8,405	6,808	**4,432**
1994	3,539	1,115	1,958	854	1,248	923	6,024	7,909	9,415	9,454	7,413	5,681	**4,628**
1995	1,833	529	512	585	648	843	6,827	12,436	14,121	10,091	8,558	7,376	**5,363**
1996	3,993	1,344	6,990	8,900	10,331	8,843	15,735	15,280	13,092	11,544	9,581	7,571	**9,434**
1997	4,936	1,302	2,185	11,278	11,541	10,973	18,805	27,000	26,689	14,637	9,573	7,500	**12,202**
1998	9,957	6,827	6,964	12,677	7,590	6,667	10,434	14,825	16,320	12,528	8,934	7,122	**10,070**
1999	4,033	4,836	6,521	9,220	10,305	12,697	10,692	14,637	19,954	13,825	9,778	7,781	**10,357**
2000	4,946	1,133	2,035	4,058	4,919	5,621	7,761	8,777	10,235	9,837	8,498	6,300	**6,177**
AVERAGE	**3,587**	**1,606**	**2,669**	**3,905**	**3,914**	**4,037**	**7,488**	**11,943**	**11,818**	**10,142**	**8,426**	**6,264**	6,317

note: for months with 31 days, the minimum flow calculation is slightly less than the 600cfs stipulated in the model constraints.

Modsim Model Output of monthly average flows below American Falls Dam under Alternative A: No Action

UNITS: cfs

Water Year/Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Annual Average**
1928	1,367	550	671	1,567	1,926	4,680	6,897	18,644	13,618	9,841	8,340	6,223	**6,194**
1929	3,527	2,231	2,032	3,069	2,917	2,389	5,259	11,165	9,435	9,630	8,203	6,142	**5,500**
1930	3,479	2,147	2,027	666	887	659	6,024	7,483	8,892	9,989	8,257	6,229	**4,728**
1931	3,250	504	488	488	540	488	4,913	8,242	8,683	8,085	5,716	3,409	**3,734**
1932	1,703	504	488	511	522	488	2,510	6,675	8,020	9,065	8,369	6,340	**3,766**
1933	3,492	2,183	2,163	488	540	488	2,835	7,055	8,589	9,223	8,289	6,176	**4,293**
1934	3,564	1,940	1,936	488	540	488	4,768	7,574	8,239	6,586	20,004	4,666	**5,066**
1935	1,887	1,679	2,159	1,741	1,927	1,061	2,798	7,176	8,550	9,563	7,764	6,198	**4,375**
1936	3,524	2,086	2,062	572	746	488	2,927	7,879	8,746	9,503	8,359	6,352	**4,437**
1937	3,584	2,054	2,016	488	541	488	4,996	8,248	8,378	7,411	6,108	3,698	**4,001**
1938	1,496	504	488	488	540	488	4,628	10,371	8,722	9,565	8,276	7,072	**4,387**
1939	3,838	2,083	2,025	2,768	3,154	2,656	8,675	11,641	9,059	8,798	7,296	4,529	**5,544**
1940	1,343	504	488	1,857	2,514	867	4,858	8,758	9,155	7,922	7,261	4,276	**4,150**
1941	1,452	504	535	488	656	488	4,910	8,496	8,378	8,751	7,084	5,089	**3,903**
1942	3,365	772	594	488	540	488	2,826	6,779	8,027	9,229	8,285	6,130	**3,960**
1943	3,395	504	724	3,602	4,157	3,909	16,374	8,546	11,818	10,923	9,357	7,304	**6,718**
1944	4,612	2,083	7,253	4,229	3,193	2,819	4,921	8,513	8,349	9,014	8,293	5,940	**5,768**
1945	3,168	504	520	488	540	488	2,792	7,111	8,694	9,306	8,356	6,798	**4,064**
1946	4,070	2,261	2,175	4,603	5,234	8,201	14,888	13,144	9,171	9,463	8,240	6,115	**7,297**
1947	3,378	504	488	3,295	3,710	6,673	6,843	11,846	8,834	9,465	8,185	6,209	**5,786**
1948	3,508	2,022	1,946	3,619	4,017	2,839	5,381	14,637	14,634	9,557	8,215	6,262	**6,386**
1949	3,605	2,051	2,014	1,081	1,139	659	6,746	16,987	14,280	9,892	8,247	6,255	**6,080**
1950	3,203	608	600	4,473	4,797	7,727	11,150	10,173	11,906	10,971	9,446	7,530	**6,882**
1951	4,401	3,961	8,001	8,930	8,444	9,620	12,061	10,642	9,678	9,718	8,136	7,055	**8,387**
1952	3,870	4,235	7,407	7,132	6,101	5,046	10,648	18,832	15,125	11,461	8,393	6,317	**8,714**
1953	3,327	2,079	2,044	2,375	2,578	1,391	3,854	10,921	10,754	9,573	8,241	7,186	**5,360**
1954	4,114	2,034	2,078	1,692	1,588	2,896	6,368	12,947	8,766	9,471	8,280	6,389	**5,552**
1955	3,541	1,823	1,946	1,088	1,138	488	3,590	7,395	8,728	9,315	8,096	6,060	**4,434**
1956	3,537	504	488	5,838	6,333	5,011	13,038	14,331	15,762	10,960	8,108	6,970	**7,573**
1957	3,950	2,054	2,073	5,323	6,003	4,253	6,898	13,806	13,900	9,655	8,261	6,991	**6,931**
1958	3,920	2,079	1,944	3,344	3,703	2,746	4,812	15,254	9,669	9,743	8,259	5,642	**5,926**
1959	3,344	504	488	488	540	590	2,702	7,668	9,143	9,633	7,503	5,596	**4,017**
1960	3,410	1,999	1,868	488	522	488	4,815	8,642	9,100	8,121	6,340	4,405	**4,183**
1961	1,651	504	488	488	540	488	4,953	8,398	8,979	7,625	4,649	2,495	**3,438**
1962	1,480	504	488	2,380	2,681	1,653	10,894	11,977	8,712	9,556	8,531	6,362	**5,435**
1963	3,396	1,918	1,989	1,718	1,751	601	2,750	10,846	12,312	9,373	8,237	6,405	**5,108**
1964	3,687	2,068	2,103	488	522	488	6,558	11,569	15,125	9,796	8,257	6,899	**5,630**
1965	3,812	2,146	2,521	7,476	8,218	6,918	12,661	10,339	13,788	10,927	9,151	7,350	**7,942**
1966	4,659	1,954	6,859	5,994	4,716	3,171	4,959	11,174	9,472	8,727	7,273	4,300	**6,105**

Modsim Model Output of monthly average flows below American Falls Dam under Alternative A: No Action

1967	1,363	504	488	4,683	5,010	3,347	5,947	10,368	13,676	9,422	8,231	7,398	**5,870**
1968	4,151	2,048	2,679	4,913	5,047	3,415	2,710	11,871	12,133	9,053	7,981	6,832	**6,069**
1969	3,910	1,972	2,129	6,047	5,480	3,686	9,787	18,544	11,405	9,878	8,022	6,221	**7,257**
1970	3,246	504	558	3,186	3,101	4,197	4,918	13,225	15,942	10,586	8,035	6,939	**6,203**
1971	4,052	2,156	4,855	9,985	10,643	9,092	17,467	21,065	16,884	14,637	10,634	7,617	**10,757**
1972	5,814	8,615	7,227	12,491	11,268	10,057	12,331	15,737	22,317	13,427	9,264	7,318	**11,322**
1973	4,366	3,566	7,772	6,215	5,914	4,108	6,687	14,326	10,079	9,104	8,003	6,105	**7,187**
1974	3,537	737	607	9,552	10,522	8,103	11,487	15,973	22,821	13,224	9,391	7,344	**9,442**
1975	4,650	3,091	3,419	10,478	7,097	5,126	5,846	11,704	15,125	15,183	10,366	7,300	**8,282**
1976	4,921	6,618	8,554	8,479	8,552	10,846	10,700	18,271	16,361	11,848	8,024	6,775	**9,996**
1977	4,079	3,910	6,704	3,472	3,586	1,413	4,909	8,834	9,438	8,180	6,129	2,991	**5,304**
1978	1,534	504	488	1,028	2,747	1,919	4,953	12,203	9,639	11,082	9,638	7,456	**5,266**
1979	4,537	2,084	2,131	4,149	4,163	2,593	4,063	14,276	10,413	9,619	8,303	5,693	**6,002**
1980	3,171	504	488	2,300	2,147	2,340	6,947	16,032	14,071	10,475	8,812	6,376	**6,139**
1981	3,727	2,171	2,153	2,338	2,409	871	4,749	8,666	11,948	10,006	8,818	5,979	**5,320**
1982	3,006	517	547	5,132	5,857	5,103	14,766	14,764	12,950	14,521	9,733	7,700	**7,883**
1983	6,789	8,167	7,073	12,661	12,032	9,815	9,142	14,118	15,821	13,434	9,359	7,327	**10,478**
1984	8,464	10,283	9,758	11,424	11,999	10,396	11,029	17,649	22,756	14,171	8,634	10,749	**12,276**
1985	6,340	9,052	8,702	5,742	6,297	4,622	10,476	17,731	9,906	9,799	8,210	6,195	**8,589**
1986	3,288	504	488	9,875	11,524	9,636	25,645	17,593	15,656	13,388	9,523	7,320	**10,370**
1987	4,277	4,100	5,952	7,490	4,581	2,490	6,412	8,819	9,488	7,957	7,343	4,526	**6,120**
1988	1,395	504	488	488	522	779	4,758	8,213	8,751	8,048	7,446	4,700	**3,841**
1989	1,428	504	488	488	540	655	3,964	11,452	9,311	9,802	8,500	6,628	**4,480**
1990	3,399	2,174	2,089	488	540	655	5,052	8,263	8,351	8,685	8,400	5,839	**4,495**
1991	2,774	504	489	488	540	607	2,798	7,321	9,434	9,925	9,195	6,712	**4,232**
1992	2,701	2,094	1,999	488	522	488	4,975	7,836	7,751	7,145	6,496	2,316	**3,734**
1993	1,793	504	488	488	597	488	919	14,528	8,564	9,819	8,405	6,808	**4,450**
1994	3,539	2,110	1,958	791	1,095	646	5,174	7,909	9,415	9,454	7,404	5,681	**4,598**
1995	1,833	514	491	1,144	1,324	749	5,638	12,436	13,889	10,090	8,558	7,376	**5,337**
1996	3,993	2,339	6,990	8,899	10,330	7,965	15,649	15,281	13,091	11,544	9,581	7,571	**9,436**
1997	4,936	2,296	2,185	11,278	11,540	10,096	18,717	27,000	26,690	14,637	9,572	7,500	**12,204**
1998	9,958	7,822	6,964	12,677	7,590	5,788	10,347	14,825	16,319	12,527	8,934	7,122	**10,073**
1999	4,033	5,830	6,521	9,220	10,305	11,819	10,605	14,637	19,955	13,826	9,778	7,781	**10,359**
2000	4,946	2,128	2,035	4,058	4,919	4,743	7,674	8,777	10,235	9,837	8,498	6,300	**6,179**
AVERAGE	**3,587**	**2,220**	**2,666**	**3,965**	**3,986**	**3,487**	**7,366**	**11,947**	**11,805**	**10,133**	**8,423**	**6,245**	**6,319**

note: for months with 31 days, the minimum flow calculation is slightly less than the 350cfs stipulated in the model constraints.

Modsim Model Output of monthly average flows below American Falls Dam under Alternatives B and C

UNITS: cfs

Water Year/Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	**Annual Average**
1928	1,863	1,327	342	1,268	1,644	5,344	7,715	19,987	15,288	12,306	10,394	7,573	**7,088**
1929	2,788	2,017	1,952	2,475	2,802	2,952	5,530	12,497	11,444	12,342	10,286	7,209	**6,191**
1930	2,988	2,017	1,952	400	539	1,357	6,734	8,919	11,031	12,555	10,421	7,685	**5,550**
1931	2,583	1,648	603	500	478	591	6,469	10,327	11,154	10,285	7,454	2,590	**4,557**
1932	1,990	1,442	369	465	581	472	3,315	8,251	10,103	11,747	10,697	7,766	**4,766**
1933	2,867	2,017	1,952	580	651	489	3,492	8,231	10,509	12,018	10,755	7,605	**5,097**
1934	3,044	2,017	1,952	515	476	511	6,324	9,808	10,160	7,484	23,283	5,728	**5,942**
1935	2,157	1,479	1,218	1,590	1,709	1,922	3,356	8,646	10,782	12,285	9,083	8,101	**5,194**
1936	2,996	2,017	1,952	404	417	425	3,695	9,476	10,945	12,153	10,408	7,547	**5,203**
1937	2,948	2,017	1,952	626	404	443	6,277	10,151	10,660	9,995	8,155	3,698	**4,777**
1938	1,836	1,500	463	542	581	520	6,103	12,089	11,539	11,835	10,374	8,424	**5,484**
1939	3,365	2,017	1,952	2,657	3,039	3,361	9,341	12,987	11,315	11,094	9,322	4,517	**6,247**
1940	1,596	1,487	468	1,415	1,576	1,759	6,222	10,885	11,571	10,206	9,151	4,097	**5,036**
1941	1,500	1,374	342	403	378	507	6,316	10,752	10,489	11,370	9,207	6,101	**4,895**
1942	2,704	1,180	342	788	658	657	3,678	8,256	10,109	11,992	10,529	7,438	**4,861**
1943	3,046	1,473	342	2,974	3,525	4,212	16,987	9,873	13,696	13,375	11,347	8,573	**7,452**
1944	4,025	2,017	7,165	4,100	3,081	3,724	6,294	10,657	9,999	11,512	10,409	7,380	**6,697**
1945	2,712	1,489	407	625	573	576	3,163	8,513	10,703	11,741	10,453	7,970	**4,910**
1946	3,534	2,017	1,952	4,362	4,929	8,719	15,374	14,398	11,170	12,052	10,269	7,266	**8,003**
1947	2,761	1,486	548	2,731	3,111	7,038	7,712	13,313	10,746	12,056	10,328	7,587	**6,618**
1948	3,167	2,017	1,952	3,439	3,752	3,691	6,025	16,132	16,546	12,196	10,283	7,472	**7,223**
1949	3,112	2,017	1,952	870	977	1,274	7,282	18,030	16,270	12,651	10,427	7,640	**6,875**
1950	2,728	1,344	342	3,881	4,228	8,147	11,618	11,357	13,814	13,366	11,294	8,608	**7,561**
1951	3,908	3,831	7,919	9,029	7,906	10,509	12,690	11,992	11,507	12,134	10,124	8,450	**9,167**
1952	3,504	4,252	7,386	7,160	6,134	5,627	11,982	20,267	17,143	13,836	10,522	7,622	**9,620**
1953	2,872	2,017	1,952	2,221	2,489	2,165	4,346	11,891	12,575	12,049	10,357	8,515	**6,121**
1954	3,696	2,017	1,952	1,495	1,592	3,948	7,158	14,501	10,709	12,056	10,415	7,663	**6,433**
1955	2,942	2,017	1,952	1,060	1,114	874	5,032	8,850	10,796	11,925	10,260	7,365	**5,349**
1956	3,099	1,622	474	5,452	5,851	5,371	13,949	16,104	17,664	13,577	10,241	8,351	**8,480**
1957	3,433	2,017	1,952	5,246	5,730	5,060	7,703	15,322	15,923	12,315	10,490	8,336	**7,794**
1958	3,395	2,017	1,952	3,315	3,598	3,638	5,445	16,760	11,663	12,307	10,396	6,815	**6,775**
1959	2,766	1,606	710	560	672	686	3,361	9,204	11,183	12,253	9,808	6,735	**4,962**
1960	2,971	2,017	1,952	564	572	553	6,179	10,750	11,517	10,356	8,404	4,359	**5,016**
1961	1,951	1,606	510	430	509	534	6,408	10,419	11,401	10,305	6,562	2,432	**4,422**
1962	1,664	1,518	479	1,886	2,120	2,222	11,958	13,359	10,985	12,395	10,556	7,695	**6,403**
1963	3,007	2,017	1,952	1,668	1,683	948	4,242	12,211	14,290	12,151	10,398	7,602	**6,014**
1964	3,217	2,017	1,952	525	528	395	8,078	13,255	17,200	12,583	10,660	8,494	**6,575**
1965	3,342	2,017	1,952	7,470	8,329	7,695	13,627	11,765	15,824	13,365	10,873	8,792	**8,754**
1966	4,346	2,017	6,834	5,861	4,654	3,978	5,753	12,453	11,784	10,971	9,375	4,640	**6,889**

Modsim Model Output of monthly average flows below American Falls Dam under Alternatives B and C

1967	1,768	1,458	425	4,237	4,566	3,933	6,778	11,965	15,956	12,295	10,689	8,625	**6,891**
1968	3,481	2,017	2,552	4,738	4,910	4,322	3,324	13,344	14,740	11,836	9,842	8,242	**6,946**
1969	3,536	2,017	1,952	5,779	5,200	4,494	10,581	20,179	14,071	12,671	10,253	7,402	**8,178**
1970	2,665	1,532	369	2,316	2,353	4,634	5,320	14,348	18,574	13,125	10,182	8,065	**6,957**
1971	3,524	2,017	4,466	9,459	10,571	9,839	18,285	22,335	19,222	17,063	12,565	8,778	**11,510**
1972	5,255	8,684	6,899	12,172	11,071	10,262	12,209	16,378	23,864	15,289	10,917	8,261	**11,772**
1973	3,304	2,939	7,211	5,503	5,046	4,157	6,595	15,122	12,148	11,503	10,034	7,042	**7,550**
1974	2,583	1,216	342	8,634	9,511	8,427	11,726	17,167	25,073	15,543	11,162	8,723	**10,009**
1975	4,155	3,025	2,927	9,718	6,777	5,710	6,036	11,862	16,158	17,144	12,300	8,757	**8,714**
1976	4,687	6,614	8,347	8,268	8,388	11,556	10,987	19,530	18,232	14,292	10,027	8,017	**10,746**
1977	3,503	3,880	6,479	3,393	3,481	2,322	6,153	10,380	11,613	10,471	7,651	2,828	**6,013**
1978	1,767	1,508	466	556	2,252	2,564	5,906	12,896	11,483	13,306	11,625	9,053	**6,115**
1979	4,159	2,017	1,952	3,867	4,088	3,383	4,636	15,487	12,736	12,504	10,500	6,842	**6,848**
1980	2,578	1,514	472	1,500	1,408	2,791	7,563	15,709	15,159	12,066	10,697	7,827	**6,607**
1981	3,369	2,017	1,952	2,108	2,248	1,762	5,068	9,146	12,927	11,844	10,723	7,055	**5,851**
1982	2,424	1,435	380	4,634	5,297	5,566	14,373	15,160	15,196	16,555	11,346	8,564	**8,411**
1983	6,203	8,040	7,081	12,547	11,786	10,623	9,707	15,107	17,447	14,691	10,684	8,198	**11,009**
1984	7,077	9,127	8,915	10,842	11,603	10,874	10,727	17,455	23,851	16,865	10,616	12,052	**12,500**
1985	6,039	9,499	8,418	6,172	6,607	5,722	11,744	19,628	12,977	12,708	10,569	7,600	**9,807**
1986	2,706	1,505	857	9,609	10,801	9,826	25,467	18,296	17,754	15,743	11,592	8,596	**11,063**
1987	4,212	4,715	6,731	7,708	4,417	3,398	8,372	11,618	12,906	10,910	9,955	4,811	**7,479**
1988	1,563	1,488	475	472	497	746	6,374	10,669	11,605	10,753	9,894	4,891	**4,952**
1989	1,690	1,494	503	566	548	464	4,321	13,939	12,403	12,361	10,209	7,599	**5,508**
1990	2,754	2,017	1,952	432	551	948	7,165	10,360	11,054	11,485	10,176	6,581	**5,456**
1991	2,088	1,496	438	552	556	480	3,776	8,582	12,697	13,229	12,004	8,125	**5,335**
1992	2,264	2,017	1,952	465	492	593	7,116	10,736	9,928	9,208	7,449	2,362	**4,549**
1993	2,243	1,502	480	491	483	342	1,038	15,995	11,273	12,388	10,330	8,664	**5,436**
1994	3,061	2,017	1,952	766	907	947	7,242	9,730	11,814	11,407	9,478	6,100	**5,452**
1995	1,932	1,363	362	395	505	835	7,438	13,417	15,771	11,485	10,069	9,067	**6,053**
1996	3,325	2,017	6,901	8,686	10,313	9,000	16,464	16,786	16,178	14,096	11,772	9,060	**10,383**
1997	4,543	2,017	1,952	11,020	11,455	10,890	19,278	28,743	29,792	16,694	11,208	8,260	**12,988**
1998	8,970	7,673	6,709	12,483	7,483	6,744	11,129	16,292	18,524	14,842	11,066	8,386	**10,859**
1999	3,225	5,669	6,119	8,825	9,865	12,583	10,867	16,146	23,641	16,361	11,703	9,130	**11,178**
2000	4,306	2,017	1,952	3,907	4,688	5,612	8,501	10,508	12,826	12,412	10,323	7,238	**7,024**
AVERAGE	**3,197**	**2,515**	**2,538**	**3,759**	**3,758**	**3,962**	**8,208**	**13,393**	**13,997**	**12,580**	**10,457**	**7,305**	**7,139**

note: for months with 31 days, the minimum flow calculation is slightly less than the 350cfs stipulated in the model constraints.

Appendix E Fish and Wildlife Coordination Act Reclamation's Responses to Potential Mitigation Measures & Recommendations

Draft Planning Aid Memorandum

October 2009

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Reclamation's Responses to Potential Mitigation Measures and Recommendations from the Minidoka Dam Spillway Replacement Fish and Wildlife Coordination Act Draft Planning Aid Memorandum

Potential Mitigation Measures

The following Potential Mitigation Measures and Recommendations are draft in nature, and may not constitute the Service's final mitigation measures and recommendations under the FWCA. We will continue to coordinate with Reclamation, IDFG, and the Refuge to refine, clarify, add, or delete mitigation measures or recommendations to fully address our combined fish and wildlife resource concerns and issues. Any changes will appear in our Final Fish and Wildlife Coordination Act Report.

1. **Proposed drawdown operations are expected to benefit fish populations, but could be detrimental to waterfowl and could favor establishment of Eurasian milfoil. Consider consulting and working with IDFG and the Refuge to develop a strategy to implement a winter drawdown of the reservoir on some regular scheduled interval (e.g., every four years) for a duration (e.g., one month) sufficient to maintain abundance of sago pondweed, and to expose substrates to freezing conditions to prevent establishment and spread of Eurasian milfoil.**

   Reclamation will consult with IDFG and the Refuge to develop a strategy to implement a winter drawdown of the reservoir. The winter drawdown would be at a periodic scheduled interval and duration sufficient to maintain abundance of sago pondweed, and to expose substrates to freezing conditions to prevent establishment and spread of Eurasian milfoil.

2. **Reclamation has stated that monitoring of spillway wetlands should be conducted to determine what effects reduced water velocity through the wetlands in summer would have on wetland function. Consider determining current baseline conditions for water temperature; pH; total maximum daily load; dissolved solids; dissolved oxygen; sediment deposition and distribution; abundance, diversity, and distribution of aquatic macrophytes; and other parameters critical to wetland function, and compare to monitoring results after the proposed project is implemented.**

   Reclamation will determine current baseline conditions for water temperature. This would include pH; total maximum daily load; dissolved solids; dissolved oxygen; sediment deposition and distribution; abundance, diversity, and distribution of aquatic macrophytes; and other parameters critical to wetland function. This information will be compared to the monitoring results after the proposed project is implemented. These actions are dependent upon funding.

3. **Monitor the abundance, distribution, and associated habitat conditions of UV and SRP in the spillway wetlands. Include provision to alter flow rates or to make other operational changes if needed to avoid impacts to these species. Monitor wetland function and water quality parameters as in Number 2 above specific to UV and SRP requirements.**

Reclamation will monitor the abundance, distribution, and associated habitat conditions of UV and SRP in the spillway wetlands. Reclamation will, within its authorized operations, state water law, repayment contracts, flow augmentation commitments, and Biological Opinion requirements, consider provisions to redistribute flow rates through the working capacity of the water release gates to avoid impacts to species. However, during construction, the ability to redistribute flows and flow rates may be limited.

Reclamation will monitor wetland function and water quality parameters as in Number 2 above specific to UV and SRP requirements. These actions are dependent upon funding.

4. **With the potential for increased beaver populations, consider steps to protect and enhance existing cottonwood trees, such as protecting existing trees with wire. Also consider planting saplings (also protected with wire) to establish several age categories.**

Reclamation will take steps to protect and enhance existing cottonwood trees, such as protecting existing trees with wire on Reclamation land. Reclamation will consider planting saplings (also protected with wire) to establish several age categories on Reclamation land. These actions are dependent upon funding.

5. **Consider conducting monitoring of proposed project impacts to leopard frogs. The Service is currently conducting a status review of this species. There is a large population of leopard frogs around the reservoir, established at least in part under current operations. The effects of changing the length and timing of drawdowns are unknown.**

Reclamation will monitor the proposed project impacts to leopard frogs by using published or approved scientific research protocol. These actions are dependent upon funding.

6. **Consider restoring and reseeding construction staging areas on a 2 to 1 basis (i.e., restoring/reseeding/enhancing 2 acres of habitat for every acre disturbed), in keeping with reclaiming/restoring habitat disturbed during previous construction projects on the Refuge.**

Reclamation will restore and reseed construction staging areas on a 2 to 1 basis on Federal property adjacent to Minidoka Reservoir.

7. **Consider requiring use of bubble curtains in blasting BMPs to reduce or minimize mortality of fish from blasting operations.**

Reclamation will consider requiring use of bubble curtains or other acceptable methods in blasting BMPs to reduce or minimize mortality of fish from blasting operations.

8. **The existing fishery at Minidoka Dam and particularly the spillway is of considerable value to residents of Minidoka and Cassia counties. While angler use is perhaps lower than in other fishing areas in the Magic Valley, the spillway has a long-standing tradition as a popular local fishery. In addition, it is known as a traditional place to catch large rainbow trout. Consider working with IDFG to periodically monitor and track fishery use and success and agree on some form of mitigation and/or compensation, monetary or otherwise, to IDFG and the public should public use decrease or should the quality of the fishery decline as a result of changes in public access or due to changes in spillway operations under the proposed project.**

Under Alternative A, the 43 CFR Part 423 Regulations stipulating existing public use restrictions will remain in effect. For Alternatives B and C, Reclamation is proposing to designate Special Use Areas to allow the continuance of traditional uses which would otherwise be prohibited. Also, Reclamation is proposing in Alternative B and C to alter the existing spillway bridge to meet current accessibility standards. An adjacent parking area that is accessible to people with disabilities would be provided. Reclamation has determined in the Aquatic Biota Environmental Consequences evaluation that the fishery will either remain the same or improve with Alternatives B and C. Therefore, there will be no significant impacts to fishery access or success by implementing Alternatives B or C.

For the reason discussed above, Reclamation does not believe that periodic monitoring of fishery use and success; nor mitigation or compensation is necessary.

Recommendations

1. **Entrainment of significant numbers of fish into the canals represents a consistent loss of fishery resources to the State of Idaho and to the fishing public. The Service recognizes that including the cost of fish screen installation in the project could represent an economic burden to the irrigation districts contributing to canal headworks replacement. Under Section 1 of the FWCA, wildlife (including fish) conservation is to receive equal consideration with other features of Federal water resource development programs. The Service strongly recommends that Reclamation consider a third action alternative to**

Entrainment of fishes will continue through the canal headworks under Alternative A – No Action. For Alternatives B and C, entrainment of fishes would be the same as with Alternative A. Therefore, there will be no significant impacts to the fishes by implementing Alternatives B or C.

Because there is no change in entrainment compared to the No Action Alternative, Reclamation does not consider it necessary to consider a third action alternative which evaluates of installation of fish screens on the canals. This decision is also based on the expense of the screens and because there are no listed fish species or natural reproducing native game fish that would be impacted.

2. **The current summer spillway flow rates of between 1,300-1,900 cfs were established as part of mitigation for construction of the Inman Powerplant and the diversion of water through the Powerplant. The mitigation was written into a Finding of No Significant Impact (FONSI #912-2) in 1991 (McDonald, IDFG, pers. comm.). Since the proposed reductions in summer spillway flow rates could have potential impacts to fish, listed snails, water quality and wetland function, the Environmental Impact Statement (EIS) should list the documents and authorities governing commitments and changes to water delivery through the spillway since 1991, including the documents or authorities governing the proposed reductions.**

Reclamation will list all documents associated with the operation of the Minidoka project. This will include the authorities governing commitments and changes to water delivery through the spillway since 1991 and the documents or authorities governing the proposed reductions. The list of the documents will be included in the appendix of the Final EIS.

The original authorization for the Minidoka Project indicates operations and any change are authorized as long as it is within the framework of the authorization. The process to change operations or previous commitments is to conduct an environmental analysis on the proposed change, which is what this EIS does, and issue a Record of Decision outlining the decision. Or, to be directed to make changes under Section 7 consultation of the Endangered Species Act. The current flows and the flows outlined in the proposed action are consistent with the Biological Opinion. Potential impacts to fish, listed snails, water quality, and wetland function are evaluated in the EIS.

3. **Include in the EIS an analysis of the potential for any of the alternatives, including the No Action Alternative, to result in the establishment of exotic invasive aquatic invertebrates in the project area.**

Reclamation will include in the Final EIS an analysis of the potential for Alternative A, B, and C to result in the establishment of exotic invasive aquatic invertebrates in the project area.

4. **Of recent surveys for SRP in the Snake River, the highest numbers of SRP found in any location were in the large pool (snail pool) below the spillway. Little is known of SRP life history. Given the pool's easy access, relative isolation and relatively shallow depth, consider funding (or joint funding) a study of SRP in this pool for reproduction, feeding, daily/seasonal movements, and other useful information.**

Reclamation is currently involved in ongoing consultation related to SRP on the routine maintenance and operations at Reclamations facilities in the Snake River above Brownlee Reservoir. Any new research and or monitoring will have to be within the context of, or be made a part the ongoing consultation efforts and be wholly, or partially, dependant on funding.

5. **Reclamation proposes monitoring of several potential proposed project impacts to fish and wildlife resources. The Service has proposed additional monitoring above. Monitoring is not sufficient to conserve fish and wildlife resources without a strategy in place to rectify project impacts to those resources. Along with proposed monitoring, we recommend that Reclamation work with IDFG, the Refuge, and the Service to develop project adaptive management strategies that will allow conservation and/or enhancement of fish and wildlife resources consistent with the limitations imposed by required reservoir and spillway operations.**

If it is determined through monitoring that a fish and wildlife resource is being impacted by implementing a proposed alternative, Reclamation will work with IDFG, the Refuge, and the Service to develop project adaptive management strategies. Reclamation will consider conservation and/or enhancement of fish and wildlife resource within authorized reservoir operations, state water law, repayment contracts, flow augmentation commitments, Biological Opinion requirements, and within the proposed flows through the water release gates working capacity. These actions are dependent upon funding.

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OCT 14 2009

Memorandum

To: U.S. Bureau of Reclamation, Snake River Area Office, Boise, Idaho (Attn: Mr. Jerrold D. Gregg, Area Manager)

From State Supervisor, Idaho Fish and Wildlife Office, Fish and Wildlife Service, Boise, Idaho

Subject: Minidoka Spillway Replacement Project, Draft Fish and Wildlife Planning Aid Memorandum—Minidoka, Blaine, Cassia Counties, Idaho
1009.2500 2009-FA-0133

Attached with this memorandum is the Fish and Wildlife Service (Service) Draft Planning Aid Memorandum on the potential effects of implementing the Bureau of Reclamation's (Reclamation) proposed Minidoka Spillway Replacement project. We have relied heavily on information provided by the Idaho Department of Fish and Game (IDFG) and from staff from the Southeast Idaho National Wildlife Refuge Complex, regarding resident fish and wildlife resources present in the area of Reclamation's proposed action. Dwayne Winslow of my staff would be happy to discuss the draft with you at your convenience and is also available to answer questions you may have about its content and recommendations. Our goal is to send you a final Planning Aid Report for inclusion in your final NEPA documents. Please contact Dwayne Winslow at 378-5249 or Mark Robertson at 378-5287 if the need arises.

Attachment
cc: IDFG, Jerome (McDonald)
FWS-SEID, Chubbuck (Casselman)
FWS-MNWR, Rupert (Krueger)
BOR-SRA, Boise (Meuleman)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

DRAFT

PLANNING AID REPORT

On the

MINIDOKA DAM SPILLWAY REPLACEMENT, MINIDOKA PROJECT, IDAHO

October 2009

Prepared for U.S. Bureau of Reclamation
Idaho Fish and Wildlife Office

Prepared By:

Dwayne Winslow, Fish and Wildlife Biologist

Jeff Foss, State Supervisor
Idaho Fish and Wildlife Office

INTRODUCTION

Fish and Wildlife Service (Service) coordination with the Bureau of Reclamation (Reclamation) for the Minidoka Dam Spillway Replacement Project began in earnest in May of 2009 with the signing of an Interagency Acquisition. This agreement outlined tentative dates and products that would be required, and for which the Service's involvement would be needed, for Reclamation to proceed through the pubic process of authorizing their proposed spillway replacement actions, inclusive of the Fish and Wildlife Coordination Act (FWCA, as amended), the National Environmental Policy Act (NEPA), and the Endangered Species Act (ESA, as amended). The Service has prepared this Draft Fish and Wildlife Planning Aid Memorandum in response to Reclamation's request for coordination under the FWCA.

Reclamation is proposing to correct structural problems at the Minidoka Dam spillway and associated facilities on Lake Walcott, Idaho. The current structure, consisting of stoplogs and piers, is showing considerable signs of degradation.

The purpose of the proposed action is to prevent structural failure of the Minidoka Dam spillway and associated structures. After 103 years of continued use, the 2,385-foot-long concrete spillway has reached the end of its functional lifespan. The concrete that forms the spillway crest and stoplog structure piers has suffered extensive deterioration at numerous locations. Additionally, previous ice damage to the stoplog piers requires that the reservoir water levels be dropped each winter. The headworks at the North Side Canal and South Side Canal also show serious concrete deterioration similar to the spillway conditions. The current conditions of the Minidoka Dam spillway and headworks present increasingly difficult reliability and maintenance problems. The need is for Reclamation to be able to continue meeting its contractual obligations for water delivery, power generation, and commitments to provide flow augmentation water under the Nez Perce Settlement Agreement and the ESA. A partial or complete failure of the spillway or canal headworks could threaten Reclamation's ability to meet those obligations.

DESCRIPTION OF THE PROJECT

Location and Setting

Minidoka Dam is a combined diversion, storage and power structure located on the Snake River in south-central Idaho about 6 miles south of Minidoka, Idaho, and east of Rupert on County Road 400 North. The reservoir, Lake Walcott, extends 26 miles up the Snake River and has an active storage capacity of 95,200 acre-feet, with 80 miles of shoreline.

All of the proposed action area is within the Minidoka National Wildlife Refuge (Refuge). However, Reclamation has retained exclusive management of an area immediately upstream and downstream of Minidoka Dam (the Reclamation Zone) for operations, maintenance, and security purposes wherein the footprint of the proposed action lies. The Refuge is managed by the Service subject to a Memorandum of Understanding (MOU) signed between the two agencies on April 23, 1964. Lake Walcott State Park (State Park), a Reclamation-developed public recreation site with boating, day use, and camping facilities, is also located within the proposed action area. Reclamation has a lease agreement with Idaho Department of Parks and Recreation

(IDPR) to manage the 140-acre State Park for public recreation. The State Park is located within the Refuge, but is excluded from management by the Service.

The general area of the proposed action provides a variety of recreational opportunities. The State Park provides picnicking, boating, camping facilities, and other recreational activities. Fishing occurs along the Snake River, below the spillway, in portions of the canals, and in Lake Walcott. Boat access to the Snake River exists below Minidoka Dam on both sides of the river; local anglers frequently fish both the north and south banks of the river.

Vegetation in the area of the proposed action consists of a variety of trees, grasses, and shrubs in the State Park, to sagebrush, native grasses, and riparian areas along the reservoir and river, and below Minidoka Dam and spillway area. The 2,385-foot spillway creates a large wetland area below the structure, which provides fish and wildlife habitat for a variety of species.

Background and Existing Facilities

The Minidoka Project, one of the earliest Federal reclamation projects in Idaho, includes four other reservoir dams in the Snake River drainage upstream of Minidoka Dam. The Project serves lands north and south of the Snake River. The original Project included Minidoka Dam and spillway, the related reservoir (Lake Walcott), a hydroelectric powerplant, and two irrigation delivery units, one primarily served by gravity flow (North Side Canal) and the other using gravity diversions and aided by three lift stations (South Side Canal).

Built in 1904 to 1906, Minidoka Dam was the first structure completed by Reclamation for the Minidoka Project. The dam raises the level of the Snake River to reach the headworks for the canals that supply the two irrigation units. The dam also provides irrigation water storage and creates power that is delivered to Bonneville Power Administration (BPA) for marketing. The main North Side Canal headworks are located just north of the powerhouse, while the main South Side Canal headworks lie to the south of the dam, at the end of a 2,385-foot long spillway beginning at the facility’s south dike. The original powerplant, completed in 1910, immediately north of the dam’s north abutment, supplies electricity to run the Project pumping plants, including the lift stations for the South Side Canal. Lands around Lake Walcott are withdrawn by Reclamation and managed by the Service as part of the Refuge which was established in 1909.

The North Side Canal officially opened in 1907 and has been operated by Minidoka Irrigation District (MID) since January 1, 1917. The South Side Canal became officially open in November 1915. The ground on the south side of the Snake rises steadily to the south, resulting in the South Side Canal pumping unit relying on three electric pumping plants, or “lift stations,” to raise water from the main South Side Canal. Burley Irrigation District (BID) has operated the pumping unit, including the South Side Canal but not its gravity diversions, since January 1, 1917.

The Minidoka Dam spillway was designed to pass the largest flood that the facility would be expected to experience. Starting at the south abutment of the dam, a simple overflow spillway of the ogee weir type was to run southward for approximately 2,385 feet. The headworks for the main South Side Canal are located at the south end of the structure. To increase the capacity of Lake Walcott, Reclamation placed reinforced concrete piers fitted with 6-foot stoplogs along the top of the spillway during the winter of 1909 to 1910. A walkway along the top of the piers allowed workers to place and remove the stoplogs by hand, thus controlling the height of the reservoir.

Throughout much of the 20th century, modifications were made to Minidoka Dam facilities to increase efficiency at the dam and to improve the ability to convey water supplies to water users. In 1913, Reclamation removed several piers at the center of the spillway and installed four 10-by-12 foot motor-operated radial gates to better control the discharge. In 1989, these devices were replaced by three 20-by-15 foot radial gates. The remaining sections of the spillway (298 bays) still include hand-placed stoplog boards. As Reclamation expanded the pumping system in the 1910s and 1920s, they found they needed to increase power production to meet Project needs and keep abreast of a growing market for power in nearby towns. Therefore, Reclamation installed Unit 6 in 1927 and Unit 7 in 1942 to increase megawatt production.

Units 1 through 5 in the Minidoka Powerplant were decommissioned in 1993 to 1994 and are preserved in place in the powerplant. Unit 6 has been replaced and modern controls have been installed for both Units 6 and 7. Units 8 and 9 were added in 1997 with the completion of a new powerplant, the Allen Inman Powerplant (Inman Powerplant), constructed near the left abutment of the embankment portion of the dam. With these changes, the combined generating capacity was increased from 13,400 kilowatts to about 28,500 kilowatts. These activities were completed in 1997.

Current Operations

Minidoka Dam is operated as a run-of-the-river project with a few seasonal variations. Water is routed through turbines in the two powerhouses, through spillway gates, and over the spillway. Depending upon the water conditions and time of year, the flows between the powerhouse and spillway are partitioned differently. The minimum flow released over the spillway is 1,300 cubic feet per second (cfs) from April 15 to June 30 and from September 1 to September 15. From July 1 through August 31, the minimum flow is increased to 1,900 cfs. Water operations from April 1 to April 14 and again from September 16 until October 31, deliver the first 5,035 cfs of flow through the powerhouse. The next available 1,300 cfs is discharged over the spillway. Flows in excess of 6,335 cfs are routed through the powerhouse until it reaches its hydraulic capacity before additional flows are released over the spillway. Spillway releases travel through a constructed wetland. A portion of water supplying the wetlands is from subsurface seepage locally enhanced by the reservoir and seepage through the spillway structure. Additionally, the pipeline from the Inman Powerplant headworks feeds the wetland ponds that were constructed as mitigation for the Inman Powerplant.

There are no controlled spillway releases during the winter months. The physical condition of the existing spillway constrains winter operations because the ogee crest is not capable of resisting the loads imposed by ice on the reservoir surface. Additionally, if water was stored above the crest, leakage through the joints of hundreds of boards would cause an unmanageable accumulation of ice immediately below the structure. Construction joints and other voids in the existing concrete ogee pass some water from the reservoir to the spillway area.

The exact volume of water flowing through the spillway portion of Minidoka Dam via structural leakage and subsurface seepage is difficult to determine. A USGS gaging station is located in the Snake River below the spillway outlet to the river. By subtracting power plant flows from flows recorded at the gaging station, the flows have been estimated to range from 8 cfs to 55 cfs. These are also the approximate flow rates into the spillway wetlands in winter, when there are no controlled water releases through the spillway.

During the irrigation season, typically defined as April through October, the reservoir is maintained at full pool (elevation 4,245 feet). After irrigation season and during the winter months, the reservoir is held between elevation 4,239.5 and 4,240.0 (5.5 feet to 5.0 feet below full) because of the deteriorated structural condition of the existing spillway. Once the ice cover melts, or the threat of substantial freezing has passed, the reservoir is brought up to full pool elevation. Depending on demand and weather, this usually begins mid-March and is completed by the end of April. Reservoir draft and refill rates are dependent upon water year type, irrigation demands, and water availability.

In drier type years when system storage above the project is nearing depletion, reservoir drafting may begin as early as mid-August. If the upstream reservoirs are not severely depleted, water may be delivered from late September through mid-October for irrigation demands, thus keeping the reservoir at full pool longer. Capacity of the South Side Canal is reduced as Lake Walcott drops below elevation 4,243.0 feet and is severely constrained at elevation 4,240.0 feet. Because of the limited head available through the headgates, changes in water surface elevation are avoided to reduce headgate operations or fluctuations in canal flow. Drafting of Lake Walcott storage is avoided until diversion demand, especially on the South Side, is reduced.

The minimum flow measured below the project at the U.S. Geological Survey (USGS) gage (USGS 13081500 Snake River near Minidoka Idaho, at Howells Ferry) during the period between 2000 and 2008 is approximately 500 cfs during the winter months. This recorded minimum flow is comprised of both powerhouse and spillway flows as well as seepage.

Because of the deteriorated condition of the concrete in the spillway, a number of structural analyses of the spillway were completed in the 1980s and 1990s. Analyses results revealed stability problems in the overflow section of the spillway and the South Side Canal headworks. Designs for remediation of the overflow section were then completed and the repair work was conducted in the mid-1990s during the construction of the Inman Powerplant. No remediation work for the South Side Canal headworks was ever completed due to its low probability of failure; therefore, it will be necessary to continue the seasonal 5-foot drawdown. As the concrete in the spillway and headworks continue to deteriorate, maintenance requirements will increase, subsequently increasing annual maintenance costs. As the spillway concrete deteriorates further, a program of pier replacement will become necessary. The pier replacement program will involve replacing one or more piers annually to maintain the spillway in a usable condition. As material and labor costs increase and as the location of piers to be replaced becomes more difficult to access, the annual pier replacement costs will increase considerably.

Maintenance requirements and costs will also continue to escalate for the headworks due to the same deterioration and maintenance requirements cited for the spillway issue. Eventually, annual concrete repairs on the headworks will also become necessary. These repairs will continue until the headworks reach the end of their service life and full replacement becomes necessary.

Proposed Action—Spillway and Headworks Replacement, Alternative B (Reclamation Preferred Alternative)

New Structures & Improvements

This alternative consists of the following new structures and improvements:

- Overflow Spillway
- Gated Spillway
- Dike
- South Side Canal Headworks
- North Side Canal Headworks
- Public Use Improvements
- Designation of Special Use Areas

The new overflow and gated spillways and the dike would be constructed entirely downstream of the existing spillway, and the new canal headworks would be constructed downstream of existing headworks, allowing use of existing structures as cofferdams. The new overflow spillway would have a total length of approximately 1,316 feet with a uniform crest elevation of 4,245.0 feet and be constructed of roller compacted concrete.

Following completion of the new spillway, partial demolition of the existing spillway will be completed. The demolition would include removal of the metal walkway and handrails, and removal of the concrete piers above the ogee section. Portions of the pier removal may occur in wet conditions, depending on the reservoir elevation and the elevation of the surrounding ground surface. Total removal of the existing spillway would be necessary in certain areas such as upstream of the new gated spillway structure. Best management practices (BMPs), such as the use of silt curtains or other appropriate sediment control actions, would be employed to control sediment releases during pier removal in order to protect water quality and endangered snail habitat.

It is anticipated that construction of the new overflow spillway may reduce the current rate of structural leakage to the wetland. Therefore, as part of the new design to satisfy post-construction wetland flow needs, a total of five water release point features with slide gates and steel pipes would be constructed. The slide gates and steel pipe would be installed along the new overflow spillway to maintain the wetland habitat conditions downstream of Minidoka Dam's existing spillway over the full range of reservoir water surface elevations. The maximum design flow through four of the water release features is 100 cfs. The maximum design flow through the fifth water release feature is 300 cfs. The fifth water release structure, with the 300 cfs capacity, would be located in association with the north radial gate on the new gated spillway.

After construction of the new spillway, Lake Walcott's water surface would no longer be constrained to elevation 4,240.0 feet, or below, in winter. Water rights, provisions of spaceholder contracts, commitments to implement Biological Opinions, and Total Maximum Daily Loads (TMDL) would not change under this alternative. Late season drawdown time, corresponding with late season irrigation needs, is expected to last no more than 2 months (September through October) under the proposed action. Once irrigation demand is less than the natural supply and water is available for storage, and absent any extraordinary needs, Lake Walcott would be raised to its normal full capacity. Water rights allow refill of Lake Walcott in a matter of days once its water rights are in priority.

To replace the leakage which currently occurs across the spillway during the non-irrigation season, up to 100 cfs would be discharged through the spillway at release point 3. The non-irrigation season flows of 100 cfs would consist of a combination of structural leakage, subsurface seepage, and controlled releases. However, the winter release flow through the conduits would not exceed 100 cfs.

During the irrigation season, approximately April 1 through October 15, minimum spillway release flows would be 500 cfs. Spillway releases would be as follows: approximately 50 cfs through each of the four northern-most release points and approximately 300 cfs through the southern-most release point. Spillway flows would be increased if sufficient water is available after powerhouse hydraulic capacity is met. With construction of the new spillway, the minimum flow through the project outside of irrigation season would be approximately 600 cfs. This total minimum flow includes both powerhouse and spillway releases measured at the downstream USGS gage (USGS 13081500 Snake River near Minidoka Idaho, at Howells Ferry).

Included with the new spillway would be a new service road. The road would be located just downstream of the new overflow section and will be constructed in two sections. The first section would run from the existing Inman Powerplant headworks south to the existing gated spillway structure. The second section would run from the existing spillway access bridge north to the existing gated spillway structure. The service road would be constructed using roller-compacted concrete. In addition, the contractor would be required to remove the asphalt surface from the existing access bridge. The service road would be closed to the public for vehicle traffic.

The new gated spillway structure would be located between the new overflow spillway and dike structures. The spillway would extend approximately 320 feet south across an existing discharge channel and connect to the northern end of the new dike. The new radial gate would consist of twelve 20-foot 8-inch by 15-foot 6-inch gated sections separated by 5-foot-wide piers and 4-foot-wide end walls. Due to the expansive length of the new radial gate spillway, a new 6-ton capacity gantry crane would be provided for installation and removal of the spillway radial gate stoplogs. The crane would travel on steel rails along the entire length of the spillway.

It is anticipated that blasting would be required to remove rock for the foundation of the new gated spillway structure. In addition, blasting would be required to modify the channel upstream and downstream of the structure. In order to hold the winter reservoir to the current elevation, it would be necessary for the contractor to complete the upstream excavation partially in wet conditions. The blasting operation would be conducted mostly on the dry rock surface; however, the removal of the blasted material would occur in wet conditions. The blasting and material removal would be required to take place during the non-irrigation season when reservoir surface is at its lowest elevation. BMPs, such as the use of silt curtains, would be employed to control sediment releases during blasting and the removal of blasted material in order to protect water quality and endangered snail habitat. Depending on construction timing and methods, it may also be possible to move sediment laden water down the South Side Canal rather than through the spillway. In addition, blasting may be required to improve the channel upstream and downstream of the structure.

A 14-foot-wide gate hoist bridge would be constructed over the radial gate spillway structure. This bridge would accommodate setting the radial gate hoists and lift motors and allow maintenance personnel to cross the structure. Security fencing would be installed around the structures.

The new dike sections for this alternative would be constructed entirely downstream of the existing overflow spillway, which would serve as the cofferdam during construction. The dike sections would be constructed of roller-compacted concrete faced with structural concrete.

The first new dike section would extend approximately 190 feet from the southern end of the new gated spillway structure south, where it would connect to a new South Side Canal headworks structure. Included in this first dike reach is a section to widen the crest to allow for loading and crane equipment to access the new gated spillway and South Side Canal headworks. Additional roller-compacted concrete material would extend along the side of the South Side Canal headworks structure, connecting to the new embankment roadway, which would parallel the South Side Canal. The second new dike section would extend from the new South Side Canal headworks structure toward the existing south dike. Roller-compacted concrete material will extend along the South Side Canal headworks structure to connect to the new roadway embankment, which would parallel the South Side Canal.

The South Side Canal headworks would be reconstructed in the existing canal about 300 feet downstream of the existing headworks. The majority of the work would be performed during the non-irrigation season (October to March). The existing South Side Canal headworks gates would be closed during construction. Following completion of the new headworks, the majority of the existing structure, including metalwork, would be removed. The headworks would be constructed adjacent to new connecting dike sections. The new side embankments would extend approximately 1,050 feet downstream of the new headworks structure, paralleling the existing South Side Canal alignment.

The new canal headworks would use two new radial gates, each 20-feet wide by 15-feet high. Blasting may be required to remove rock from the upstream side of the new radial gates in preparation for the installation of and to provide footing for these gates. Two new 25,000-pound capacity, electrically-operated, dual-drum wire rope hoists would be furnished and installed on the hoist deck. Two sets of new stoplogs and one lifting beam would be included.

The new North Side Canal headworks would be reconstructed in the existing canal about 115 feet downstream of the existing headworks. Work would be performed during the non-irrigation season (October to March). Following completion of the new headworks, all metalwork would be removed from the existing headworks and the existing concrete structure would be permanently abandoned in place. The new canal headworks would use two new radial gates, each 20-feet wide by 17-feet high. Blasting may be required to remove rock from the upstream side of the new radial gates in preparation for the installation of, and to provide footing for, these gates. Compacted backfill would be placed along the exterior of the vertical sidewall to transition to the existing ground surface elevations. Two new 25,000-pound capacity, electrically-operated, dual-drum wire rope hoists would be furnished and installed on the hoist deck. Two sets of new stoplogs and one lifting beam would be included. Construction of the new North Side Canal headworks structure would require the removal of the existing bridge which spans the North Side Canal.

Currently, substantial fishing and birding opportunities exist in association with the existing spillway structure. Under Alternative B, some fishing and birding opportunities would be eliminated as a result of structural limitations and the closure of the new spillway structure and canal headgates to public access. Reclamation proposes altering the existing spillway access bridge to meet current accessibility standards. This bridge crosses the pool below where the new spillway radial gates would be located and is currently open to non-vehicular public use such as fishing and birding. Additionally, a parking area that is accessible to people with disabilities would be provided near the south end of the bridge.

Reclamation is proposing to designate Special Use Areas as provided for in 43 CFR Part 423 in order to allow the continuance of traditional uses which would otherwise be prohibited. Reclamation will restrict uses which affect public safety. The Special Use Areas would allow for wading and float tubing associated with fishing, birding, and ice fishing. Existing restrictions as described in 43 CFR Part 423, Subpart C, would remain in effect.

Construction

Construction is expected to take approximately 31 months and would involve one prime and numerous subcontractors. Due to the large size of the construction zone, the contractor would most likely require multiple staging and waste areas. Five staging and/or waste areas have been identified, three on the north end of the construction zone and two on the south end. Four of the five staging areas are proposed to be restored and reseeded post-construction.

It would be necessary for the contractor to stage construction in such a way that water delivery to the canals continues uninterrupted during the irrigation season. This would most likely be accomplished by conducting construction in and around the canals in winter months only. Water releases in the spillway area would be interrupted during the construction period. If spillway releases are necessary, they would be made in areas away from where the contractor is working. Throughout the entire construction period, flows would be maintained to and through the spillway. Spillway releases may be made at a variety of different locations to accommodate various stages of construction activities. However, multiple release points would be utilized to provide and maintain flows through the spillway to meet existing ESA requirements in the spillway wetlands during all construction.

ALTERNATIVE ACTIONS

The No Action Alternative, describing current operations, condition of existing spillway and canal structures, and expected consequences (increased maintenance and costs) if no new actions are authorized, is described above under Current Operations.

Alternative C would be the same as Alternative B (Preferred Alternative), except that the canal headworks would not be replaced. The two irrigation districts serviced by the Minidoka Dam would provide key funding to complete canal headworks replacement, and were concerned about potential costs of replacing the headworks. Consequently, Reclamation developed Alternative C to analyze the project without replacing the canal headworks.

FISH AND WILDLIFE RESOURCES

Vegetation

Upland vegetation within and surrounding the project area is a mix of agricultural land, fragmented disturbed habitat dominated by rabbitbrush (*Chrysothamnus spp*.) and cheatgrass (*Bromus tectorum*), and some areas in relatively good range condition with a shrub-steppe mix of native bunchgrasses and forbs, introduced crested wheatgrass (*Agropyron cristatum*), cheatgrass, and sagebrush (*Artemisia tridentata*). Scattered trees, open savannah, and closed stands of Rocky Mountain juniper (*Juniperus scopulorum*) and Utah juniper (*J. osteosperma*) occur on the north and south shores of the reservoir. Pockets of shrub-steppe vegetation are also interspersed among the pools, stream channels, and wetland vegetation in the wetlands below the spillway, and occur in some of the areas proposed for staging areas.

Existing riparian vegetation in the project area is currently found on about 41 acres (Martin and Mueleman 1989, Mueleman et al. 1991). A few riparian areas occur in larger pockets, but most riparian zones around the reservoir tend to be narrow and linear, usually only one tree wide between the water (full pool) and basalt rock. Typical riparian species include willows (peachleaf, Pacific, and coyote), skunkbush sumac, Russian olive, green ash, Chinese elm, and a few eastern cottonwood. Riparian invasive species and weed species include Russian olive, Canada and Scotch thistles, poison hemlock, hoary cress, and Russian and diffuse knapweeds.

Wetland vegetation, or aquatic macrophytes (divided into emergent, submersed, floating-leaved, and free-floating species), are found in the reservoir in coves, bays, protected shorelines, in the drawdown zone, and also occur in the spillway wetlands. Emergent vegetation may include reeds (*Phragmites*), bulrushes (*Scirpus* spp.), cattails (*Typha* spp.), and spikerushes (*Eleocharis* spp.). Submersed wetland vegetation includes such species as pondweeds (*Potamogeton* spp.), including sago pondweed (*P. pectinatus*). Floating-leaved vegetation, occurring in areas that do not periodically dry out, includes water lilies (*Nymphaea* spp.), spatterdock (*Nuphar* spp.), and watershield (*Brasenia*). Free-floating vegetation includes duckweed (*Lemna* spp.). Wetland vegetation provides habitat for both terrestrial and aquatic animal species.

Wildlife Resources

Large game mammals utilizing the uplands within and surrounding the project area generally include a small number of mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*). Mule deer are both resident and migrant, with migrant mule deer increasing to several hundred in the vicinity of the reservoir during severe winters.

Large fur-bearing mammals occurring in upland parts of the proposed action area include coyote (*Canis latrans*), red fox (*Vulves vulpes*), badger (*Taxidea taxus*), and striped skunk (*Mephitis mephitis*). Raccoons (*Procyon lotor*), muskrats (*Ondatra zibethica*), long-tailed weasels (*Mustela frenata*), beaver (*Castor canadensis*), and mink (*Mustela vison*) occur below the spillway and around the reservoir shoreline and wetlands. Small mammals common to the area include blacktailed jackrabbits (*Lepus californicus*), Nuttall's cottontail (*Sylvilagus nuttallii*), montane voles (*Microtus montanus*), and deer mice (*Peromyscus maniculatus*).

Amphibians and reptiles expected to occur in the proposed action area include long-toed salamanders (*Ambystoma macrodactylum*), pacific treefrogs (*Hyla regilla*), leopard frogs (*Rana pipiens*), western chorus frogs (*Pseudacris triseriata*), longnose leopard lizards (*Gambelia wislizenii*), side-blotched lizard (*Uta stansburiana*), racers (*Coluber constrictor*), gopher snakes (*Pituophis melanoleucus*), garter snakes (*Thamnophis spp.*), and western rattlesnakes (*Crotalus viridis*).

The Refuge has been designated an Important Bird Area (IBA). The international Important Bird Area Program designates areas of global importance for their high habitat value for birds. The Refuge was designated an IBA for its colonial nesting bird populations and for the numbers of molting waterfowl. Over 230 species of birds have been observed on the Refuge since 1950 (Fish and Wildlife Service 2002), and 85 species are known to nest there. Species groups attracted to the Refuge and surrounding area include neo-tropical migrants, waterfowl, shorebirds, wading birds, raptors, and upland bird species.

Common non-game upland species include common nighthawks (*Chordeiles minor*), western kingbirds (*Tyrannus verticalis*), sage thrashers (*Oreoscoptes montanus*), loggerhead shrikes (*Lanius ludovicianus*), and Brewer's sparrows (*Spizella breweri*). Upland game birds include pheasant (*Phasianus colchicus*), gray partridge (*Perdix perdix*), mourning dove (*Zenaida macroura*), sharp-tailed grouse (*Tympanuchus phasianellus*) and greater sage grouse (*Centrocercus urophasianus*).

Raptors that commonly nest on the Refuge include northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and burrowing owl (*Athene cunicularia*). Raptors less common during migration or summer include prairie falcon (*F. mexicanus*), Swainson's hawk (*B. swainsoni*), ferruginous hawk (*B. regalis*), turkey vulture (*Cathartes aura*), short-eared owl (*Asio flammeus*), Osprey (*Pandion halaietus*), and great horned owl (*Bubo virginianus*). The Refuge is important wintering habitat for raptors such as rough-legged hawk (*B. lagopus*), bald eagles (*Haliaeetus leucocephalus*), red-tailed hawk, and prairie falcon. Northern goshawks (*Accipiter gentilis*) and golden eagles (*Aguila chrysaetos*) may also be present during winter.

Waterfowl species most likely to utilize the project area include mallards (*Anas platyrhynchos*), gadwalls (*A. strepera*), and cinnamon teal (*A. cyanoptera*). Fewer numbers of redheads (*Aythya americana*), ruddy ducks (*Oxyura jamaicensis*), pintails (*A. acuta*), American wigeon (*A. americana*), and northern shovelers (*Anas clypeata*) breed in the Refuge area and may occasionally use drain water wetlands. Wintering waterfowl include Canada geese (*Branta canadensis*), mallards, pintails, gadwalls, American wigeon, northern shovelers, and green-winged teal (*A. crecca*). Tundra swans (*Cygnus columbianus*) forage in grain fields in relatively low numbers during migration, and trumpeter swans are occasionally observed in the project area. Based on aerial waterfowl surveys conducted by the IDFG, since 1966 fall-winter waterfowl numbers on Refuge have ranged as high as over 161,000, but have decreased in recent decades (numbers have not been over 50,000 since 1978).

Great blue herons (*Ardea herodias*), American avocets (*Recurvirosta americana*), long-billed curlews (*Numenius americanus*), killdeer (*Charadrius vociferous*), and other shorebirds and water birds use the larger wetlands, as do red-winged blackbirds (*Agelaius phoeniceous*). In addition, grebes, Sabine's gull (*Xema sabini*), and several other species of gulls use the area just below the dam during the summer. Several thousand white pelicans (*Pelicanus erythrohynchus*) nest on the Refuge. The adults fly long distances to forage, and Lake Walcott may be the sole nesting site for most white pelicans in southern Idaho.

Fish and Resources

Fish species in the project area will utilize not only wetlands (primarily wetland areas with emergent species such as cattails, bulrush, and sedges), but also shallow unvegetated bays and areas of rock and boulders. Emergent macrophytes provide spawning habitat and nursery areas for many of Lake Walcott's fish species. Small fish species and juveniles of larger species forage on aquatic invertebrates in the emergent beds, and the vegetation provides cover from fish predators. Rocky areas are also used as cover by many species. Shallow, unvegetated flats provide good habitat for the juveniles of many species.

Fish species common in Lake Walcott and in the spillway wetlands include common carp, rainbow trout, redside shiner, sculpin species, sucker species, smallmouth bass, chub species, and yellow perch. White sturgeon occur in Lake Walcott. The historic range of white sturgeon was below Shoshone Falls on the Snake River, but the IDFG has introduced them into areas of the mid-Snake River above Minidoka Dam. Rainbow trout populations in the reservoir are not self-reproducing; IDFG stocks only sterile rainbow trout. Yellowstone cutthroat trout may infrequently enter the upper end of Lake Walcott.

Threatened, Endangered, and Candidate Species

Five species of aquatic mollusks in the middle Snake River were listed as endangered or threatened in 1992 (57 FR 59244). The Banbury Springs lanx (*Lanx sp.*), the Idaho springsnail (*Pyrgulopsis idahoensis*), the Snake River physa (*Physa natricina*), and the Utah valvata (*Valvata utahensis*) were listed as endangered. The Bliss Rapids snail (*Taylorconcha serpenticola*) was listed as threatened. All five species are endemic to the Snake River and/or some springs and tributaries. These species were listed due to declining distribution within the

Snake River, adverse habitat modification and deteriorating water quality from hydroelectric development, peak-loading effects from water and power operations, water withdrawal and storage, water pollution, and inadequate government regulatory mechanisms. The Fish and Wildlife Service (1995) recovery plan for these species includes short- and long-term multi-agency objectives to restore viable, self-reproducing colonies of the listed snails. The Idaho springsnail was delisted in 2007. Two of the five listed species, Utah valvata (UV) and Snake River physa (SRP), are known to occur within the area of impact.

UV are usually found in lower velocity habitats of free-flowing river or spring habitat, or in reservoirs (Fish and Wildlife Service 1995; Weigel 2002, 2003; Newman 2007, 2008). They are typically associated with fine sediments (less than 0.25 mm diameter) or gravels mixed with interspersed fines and can tolerate a wide range of dissolved oxygen concentrations (Newman 2007, 2008). The species is absent from boulder and bedrock substrates. UV occur throughout the entire area of impact, with highest densities (up to 2,000 live individuals per square meter) found in Lake Walcott (Weigel 2002). Lake Walcott has a uniform bottom, dominated by fine substrates (Newman 2007; Weigel 2002) providing vast expanses of suitable habitat for UV. UV are also found below the spillway, in the same pool where SRP have been found (see below), occurring on fine substrates.

SRP are known only from the Snake River. At the time of their listing, SRP was thought to require clean, cold, well-oxygenated, swift water with low turbidity (Fish and Wildlife Service 1995), with boulders or rocks as substrate. More recent information indicates that SRP are primarily associated with sand-gravel-cobble substrates, and are more typically encountered in the river thelwag and in areas with steady current. The specific environmental conditions necessary for SRP reproduction and recruitment are unknown. At the time of listing, SRP was thought to have existed historically on the Snake River in Idaho from Grandview upstream through the Hagerman Reach (Fish and Wildlife Service 1995). Prior to 2009 only three colonies were believed to remain, including the colony located immediately downstream of Minidoka Dam spillway, found during surveys conducted by Reclamation in 2005. In 2009 a review of vouchered live-when-captured Physidae specimens collected between 1995-2003 from the Snake River extended the range of SRP from the previous downstream boundary near Grandview, Idaho, downstream to Ontario, Oregon (Keebaugh 2009a).

The bald eagle was removed from the Federal list of threatened and endangered species in June, 2007. Section 4(g)(1) of the ESA requires the Service, in cooperation with the States, to implement a monitoring plan for not less than 5 years for all species that have been recovered and delisted. The Service is currently recommending monitoring bald eagles for 20 years. Bald eagles use the Snake River in this area extensively in the winter and are primarily associated with black or narrowleaf cottonwood galleries between Palisades Dam and American Falls Reservoir.

There is one bald eagle nest on Bird Island in Lake Walcott. Otherwise, most bald eagle activity in the project area consists of migrating and foraging eagles. There are typically 10 to 20 bald eagles along Lake Walcott during the winter until the water freezes. When the reservoir freezes, the eagles located at the west end of the reservoir move below Minidoka Dam to forage on fish and waterfowl, and the remaining eagles travel to other foraging locations.

A petition to list the yellow-billed cuckoo (*Coccyzus americanus*) was filed in 1998. In July 2001, the Service announced a 12-month finding for a petition to list the yellow-billed cuckoo as threatened or endangered in the western United States, but listing was precluded by higher priorities. As of April, 2009, this species continues to have Candidate status. Most Idaho records are of isolated, non-breeding individuals (Fish and Wildlife Service 1985). Breeding populations of yellow-billed cuckoos in Idaho are believed to be extirpated (Reese and Melquist 1985). Suitable habitat may exist in the more dense riparian stands along Lake Walcott and in the spillway below Minidoka Dam.

Idaho State Species of Greatest Conservation Need

The IDFG has provided a list of Species of Greatest Conservation Need (SGCN) that are known to occur in the project area:

California Floater
Utah Valvata
American White Pelican
Black-crowned Night-heron
Trumpeter Swan
Bald Eagle
Franklin's Gull
California Gull
Black Tern
Caspian Tern
Cattle Egret
Snow Egret
Clark's Grebe
Western Grebe
Long-billed Curlew
White-faced Ibis
Yellow-billed Cuckoo
Northern Leopard Frog

Habitat has been previously described for species' guilds or for individual species listed as Idaho SGCN in the project area, with the exception of the California floater (*Anodonta californiensis*). A freshwater mussel, the California floater occurs in lakes and lake-like stream environments (NatureServe 2009). Its current range and ecological requirements are in question due to its uncertain taxonomic status.

FUTURE WITHOUT THE PROJECT

Wildlife Resources

Without the project, reservoir operations will essentially stay the same and the water levels will continue to fluctuate and be drawn down during the winter months. Upland vegetation will not be affected without the project.

Mammalian communities are not expected to be adversely impacted. The diversity, distribution, and relative abundance of mammals using the reservoir and spillway without the project are expected to remain the same. The spillway provides a diversity of habitats and food for a range of mammal species, and current conditions and trends in the spillway would be expected to continue. Large fur-bearing mammals occurring in uplands such as coyotes, red fox, badger, and striped skunk will continue to benefit from the drawdowns which create access onto mud flats and provide food and travel corridors. Raccoons, muskrats, long-tailed weasels, and mink will also be able to forage on and benefit from the drawdowns.

Some water fluctuation is beneficial for wetlands. The 5-foot winter drawdowns allow large areas to dry and/or freeze, killing many aquatic macrophytes and favoring early seral wetland vegetation. Sago pondweed, an early seral species, is a highly preferred waterfowl forage plant which responds to drying lake substrates. The extended drawdowns result in maintaining or increasing sago pondweed, benefitting waterfowl that use the reservoir. The current drawdown allows the lake bottom less than 5 feet deep to freeze annually. This prevents the establishment of Eurasian milfoil, a highly prolific, invasive submergent aquatic species. Eurasian milfoil is not currently known to be present on the Refuge. These conditions and trends would be expected to continue without the project.

Reptile and amphibian communities in the proposed action area are not expected to be adversely impacted without the project. The diversity, distribution, and relative abundance of reptiles and amphibians using the habitat around the reservoir are expected to remain the same as in current conditions.

Not implementing the project leaves the spillway and headworks in their present configuration. As the concrete in the spillway and headworks continues to deteriorate, maintenance requirements will increase. A program of pier replacement will probably become necessary, which will involve replacing one or more piers annually to maintain the spillway in a usable condition. Past pier replacement projects have resulted in localized and minor impacts to wildlife and vegetation, which would be expected for future pier replacement without the project. Annual concrete repairs will eventually be required for the canal headworks, as well. Similar to past pier replacement, impacts to wildlife and vegetation from headworks repair would be expected to be localized, minor, and short-term.

Fish Resources

Without the project, current reservoir and spillway operations would continue. Current stands of aquatic macrophytes and shallow, unvegetated flats would remain relatively unchanged in character. Lake Walcott is currently held at full pool during spring fish spawning periods and through August, providing fish spawning and nursery habitat, and habitat for juvenile fish in the vegetation beds, shallow flats, and lava rock and boulders. This would continue without the project.

Overwintering habitat is important for both young and juvenile fish, particularly for smallmouth bass which need adjacent cover for optimum survival. Without the project the 4 to 5 month drawdown beginning in September or October (depending on water type year) and continuing through winter until refill begins March 1st would continue. During this time all of the aquatic macrophytes and much of the rock and boulders would be exposed, and hence not available as cover. Young smallmouth bass and other species would continue to be at increased risk of predation because of the reduced amount of hiding cover.

Overall, fish populations in the reservoir would remain unchanged. Juvenile smallmouth bass would continue to be exposed to predation during drawdown periods. Rainbow trout populations are dependent on stocking levels; conditions in the reservoir would remain unchanged for rainbow trout.

Under current operations non-game and game fish are subject to entrainment through the Inman Powerplant, the spillway, and spillway radial gates. Neither of the canals are outfitted with fish screens, and significant numbers of fish are entrained into the canals annually, particularly the South Side Canal. IDFG has stated that numbers of fish entrained into the South Side Canal makes establishing a stable fish population in the reservoir difficult (Megargle, IDFG, pers. comm.). Entrainment through existing structures would continue to occur without the project. The current level of entrained rainbow trout and smallmouth bass into the spillway wetlands would continue. Existing fish habitat conditions and trends in the spillway wetlands would continue without the project.

Without the project pier, maintenance replacement projects would become increasingly necessary as concrete in the spillway deteriorates. This would result in temporary disturbance of fish habitat in the immediate construction area. As in past replacement projects, BMPs will be required for all work performed, and disturbance and impacts to fish and habitat, including sediment deposition, would be expected to be minor and short-term.

Threatened, Endangered, and Candidate Species

Current distribution, abundance, or colony viability of UV in the reservoir would not be expected to change without the project. At least some of the lake bottom above 5 feet that is exposed during the extended existing winter drawdowns represents potential habitat that UV cannot currently colonize because it cannot withstand drying or freezing conditions. This would remain unchanged. Current summer spillway flow rates and winter seepage result in deposition and maintenance of fine sediments into the pool below the spillway where UV are consistently found, and would likely continue to maintain substrate conditions selected by this species in the pool. This would likely continue without the project. The continued existence of SRP in the same pool where UV are found would be expected to continue without the project, due to current flows maintaining substrates selected by SRP in the pool. There is anecdotal evidence of the presence of what may be a type of mat algae on rocks in the spillway pools. A similar type of plant formation has been found on rocks elsewhere in the Snake River. Snails have generally not been found on rock covered with this same kind of matting (Keebaugh 2009b).

There would be no expected impacts to bald eagles without the project. Bald eagles would likely continue to nest in cottonwood trees on Bird Island. Bald eagle use of the reservoir and below the spillway would be expected to continue. Impacts to bald eagles from pier and canal headworks maintenance and replacement would be expected to be negligible to minor short-term impacts from noise and disturbance, and should not significantly impede foraging activities.

Small, isolated pockets of habitat suitable to yellow-billed cuckoos occur along Lake Walcott and below the spillway. Yellow-billed cuckoos have never been observed to occupy this habitat, and would not be expected to do so in the future due to the habitat isolation and lack of connectivity.

Idaho State Species of Greatest Conservation Need

Current abundance and distribution and habitat condition and trends for Idaho Species of Greatest Conservation Need would be expected to continue without the project.

FUTURE WITH THE PROJECT

Fish and Wildlife Resources

Installation of fish screens is not part of the project design for replacing the canal headworks. Annual entrainment of significant numbers of game and non-game fish would continue to occur under the proposed action.

Several impacts expected to occur under the proposed action are associated with the change in length, timing, and depth of reservoir drawdowns; and with changes in spillway flow rates and timing.

The shorter period of time that the reservoir would be below full pool (expected to be no more than two months between September and October) would reduce the time that beds of aquatic macrophytes and rocks and boulders are unavailable as cover to young smallmouth bass and juveniles of other species, thus reducing the period of time they are exposed to predation. This is expected to result in higher survival rates and increases in some fish species' populations, including smallmouth bass.

The proposed change in annual drawdowns would be expected to favor aquatic macrophytes species tolerant of inundation. Abundance of species requiring extended periods of drying substrates, such as sago pondweed, would be expected to decrease. As a preferred waterfowl forage plant, decreases in sago pondweed would likely negatively impact waterfowl.

Reduced drawdown times are expected to result in increases in beaver and muskrat populations. Under current operations, muskrat houses and beaver lodges are above the water line for several months, exposing them to predation. Shorter drawdown times and occasional shallower drawdowns would reduce exposure to predation, likely increasing survival rates and populations of muskrats and beaver. There are few mature cottonwood trees at the Refuge. If beaver numbers increase, there would be increased potential for beaver to forage on and kill existing cottonwood trees, including the one tree currently capable of supporting the bald eagle nest. Muskrat houses are used by nesting geese and swans. Moderate increases in muskrats could benefit nesting waterfowl, but large numbers of muskrats can also decrease or eliminate emergent vegetation, reducing benefits to waterfowl.

Eurasian milfoil is not known to occur on the Refuge, probably because, if it becomes established, the annual 5-foot winter drawdown exposes it to freezing substrates, which kills the plant. Under the proposed project, drawdowns will take place for shorter periods during warming months, increasing the possibility of Eurasian milfoil becoming established.

Shorter drawdown periods and occasional reduced drawdown levels could result in UV becoming established on some areas of the lake bed not currently available to them during the 5-foot winter drawdown.

With the proposed project, winter spillway flow rates will increase from the range of 8 to 55 cfs from seepage to a targeted minimum flow rate of 100 cfs from a combination of seepage and release points. However, summer spillway flow rates will be reduced from 1,300 to 1,900 cfs to a minimum target rate of 500 cfs. Reduced flow rates could result in changes in wetland function below the spillway. Wetland function and water quality parameters such as water temperature; dissolved oxygen; pH; total maximum daily limit; dissolved solids; sediment deposition and distribution; and the abundance, distribution, and diversity of aquatic macrophytes could be impacted. Changes in these parameters could result in changes in UV and SRP abundance and distribution in the one spillway pool where they consistently occur. Conditions which contribute to the spread of mat algae on rocks in certain areas of the Snake River are unknown. Therefore, it must be considered that changes in spillway flow rates could potentially result in the spread of mat algae in the pool where UV and SRP are currently found, with potential impacts to SRP abundance and distribution in the pool.

Five construction staging areas are proposed with the project, totaling over 23 acres. Use of staging areas would result in loss of upland habitat. Reclamation has proposed restoring and reseeding four of the five staging areas.

Construction would likely result in introduction and/or spread of noxious weeds or undesirable invasive plant species into and around construction areas and staging areas.

Blasting associated with construction would be expected to result in mortality of reservoir fish in the vicinity of the blast area. Reclamation has proposed in-kind replacement of fish killed during blasting.

Reclamation expects that generally the fishery below the spillway will retain its current quality. Entrainment rates through the new radial spillway gates are expected to be similar to existing rates, since the new gates will release reservoir water from about the same depth. Some public access both above and below the spillway will be removed due to changes in spillway structure and safety regulation enforcement. However, new accesses will be created below the spillway.

POTENTIAL MITIGATION MEASURES

The following Potential Mitigation Measures and Recommendations are draft in nature, and may not constitute the Service’s final mitigation measures and recommendations under the FWCA. We will continue to coordinate with Reclamation, IDFG, and the Refuge to refine, clarify, add, or delete mitigation measures or recommendations to fully address our combined fish and wildlife resource concerns and issues. Any changes will appear in our Final Fish and Wildlife Coordination Act Report.

1. Proposed drawdown operations are expected to benefit fish populations, but could be detrimental to waterfowl and could favor establishment of Eurasian milfoil. Consider consulting

and working with IDFG and the Refuge to develop a strategy to implement a *winter* drawdown of the reservoir on some regular interval (e.g., every four years) for a duration (e.g., one month) sufficient to maintain abundance of sago pondweed, and to expose substrates to freezing conditions to prevent establishment and spread of Eurasian milfoil.

2. Reclamation has stated that monitoring of spillway wetlands should be conducted to determine what effects reduced water velocity through the wetlands in summer would have on wetland function. Consider determining current baseline conditions for water temperature; pH; total maximum daily load; dissolved solids; dissolved oxygen; sediment deposition and distribution; abundance, diversity, and distribution of aquatic macrophytes; and other parameters critical to wetland function, and compare to monitoring results after the proposed project is implemented.

3. Monitor the abundance, distribution, and associated habitat conditions of UV and SRP in the spillway wetlands. Include provision to alter flow rates or to make other operational changes if needed to avoid impacts to these species. Monitor wetland function and water quality parameters as in Number 2 above specific to UV and SRP requirements.

4. With the potential for increased beaver populations, consider steps to protect and enhance existing cottonwood trees, such as protecting existing trees with wire. Also consider planting saplings (also protected with wire) to establish several age categories.

5. Consider conducting monitoring of proposed project impacts to leopard frogs. The Service is currently conducting a status review of this species. There is a large population of leopard frogs around the reservoir, established at least in part under current operations. The effects of changing the length and timing of drawdowns are unknown.

6. Consider restoring and reseeding construction staging areas on a 2 to 1 basis (i.e., restoring/reseeding/enhancing 2 acres of habitat for every acre disturbed), in keeping with reclaiming/restoring habitat disturbed during previous construction projects on the Refuge.

7. Consider requiring use of bubble curtains in blasting BMPs to reduce or minimize mortality of fish from blasting operations.

8. The existing fishery at Minidoka Dam and particularly the spillway is of considerable value to residents of Minidoka and Cassia counties. While angler use is perhaps lower than in other fishing areas in the Magic Valley, the spillway has a long-standing tradition as a popular local fishery. In addition, it is known as a traditional place to catch large rainbow trout. Consider working with IDFG to periodically monitor and track fishery use and success and agree on some form of mitigation and/or compensation, monetary or otherwise, to IDFG and the public should public use decrease or should the quality of the fishery decline as a result of changes in public access or due to changes in spillway operations under the proposed project.

RECOMMENDATIONS

1. Entrainment of significant numbers of fish into the canals represents a consistent loss of fishery resources to the State of Idaho and to the fishing public. The Service recognizes that including the cost of fish screen installation in the project could represent an economic burden to the irrigation districts contributing to canal headworks replacement. Under Section 1 of the FWCA, wildlife (including fish) conservation is to receive equal consideration with other features of Federal water resource development programs. The Service strongly recommends that Reclamation consider a third action alternative to include environmental and economic analyses of installation of fish screens on the canals as part of canal headworks replacement. This would be in keeping with the intent of the FWCA, and would complement Alternative C, which analyzes the project without replacing the canal headworks.

2. The current summer spillway flow rates of between 1,300-1,900 cfs were established as part of mitigation for construction of the Inman Powerplant and the diversion of water through the Powerplant. The mitigation was written into a Finding of No Significant Impact (FONSI #912-2) in 1991 (McDonald, IDFG, pers. comm.). Since the proposed reductions in summer spillway flow rates could have potential impacts to fish, listed snails, water quality and wetland function, the Environmental Impact Statement (EIS) should list the documents and authorities governing commitments and changes to water delivery through the spillway since 1991, including the documents or authorities governing the proposed reductions.

3. Include in the EIS an analysis of the potential for any of the alternatives, including the No Action Alternative, to result in the establishment of exotic invasive aquatic invertebrates in the project area.

4. Of recent surveys for SRP in the Snake River, the highest numbers of SRP found in any location were in the large pool (snail pool) below the spillway. Little is known of SRP life history. Given the pool's easy access, relative isolation and relatively shallow depth, consider funding (or joint funding) a study of SRP in this pool for reproduction, feeding, daily/seasonal movements, and other useful information.

5. Reclamation proposes monitoring of several potential proposed project impacts to fish and wildlife resources. The Service has proposed additional monitoring above. Monitoring is not sufficient to conserve fish and wildlife resources without a strategy in place to rectify project impacts to those resources. Along with proposed monitoring, we recommend that Reclamation work with IDFG, the Refuge, and the Service to develop project adaptive management strategies that will allow conservation and/or enhancement of fish and wildlife resources consistent with the limitations imposed by required reservoir and spillway operations.

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Appendix F Environmental Commitments

The following mitigations actions are considered to be commitments being made by Reclamation. In addition, the recommendations provided in the Fish and Wildlife Service's Planning Aid Memorandum to which Reclamation agreed, are also considered commitments. Refer to (Appendix E).

Hydrology and Reservoir Operations

Under Alternatives B and C, Reclamation is proposing to reduce irrigation-season spillway flows from the current 1,300 to1,900 cfs flow range down to a minimum flow of 500 cfs. As mitigation, Reclamation would no longer make surface releases from the reservoir into the spillway. Instead, releases would be made from lower in the water column of the reservoir which would likely increase entrainment of trout into the spillway. This mitigation would result in flows sufficient to maintain the ESA-listed snails in the spillway area as well as improved trout fishing. In addition, the new structure would likely reduce or eliminate structural leakage, as currently exists. Reclamation is proposing to provide non-irrigation season flows of up to 100 cfs as mitigation for the likely reduction or elimination of the existing structural leakage. This mitigation would result in year-round flows through the new spillway.

Under both Alternatives B and C, construction activities would be conducted upstream of the spillway pool containing ESA-listed snails. Reclamation is proposing to maintain flows to the pool containing ESA-listed snails throughout the duration of the construction project.

Groundwater

Due to a potential increase of seepage from the sand layer downstream of the North Side Canal, slope stabilization or drainage mitigation may be required. Mitigation would depend on the location of any new seepage. If the new seepage can be captured by existing measurement devices (flumes), then no mitigation would be necessary. However, if additional seepage daylights in new areas, then channelization or installation of new measurement devices might be required.

Water Quality

On-site actions are incorporated or required under several water quality permitting and certification processes. These include CWA Section 404 dredge and fill permits issued by the Corps, Section 401 water quality certification by the State of Idaho, and stormwater discharge National Pollution Discharge Elimination System (NPDES) permit issued by EPA. Other activities that are incorporated into Alternatives B and C include the use of the existing spillway and headworks as bulkheads or cofferdams during construction.

Aquatic Biota

Reclamation requires that contractors comply with the following mitigation requirements:

Construction Practices

1. Use appropriate construction methods to isolate in-channel construction areas from flowing water to minimize turbidity and sediment released from site.
2. Insure that petroleum products, chemicals, or other harmful materials are not allowed to enter the water.
3. Perform as much machine work as possible from the streambanks to minimize disturbance to the streambed.
4. Minimize disturbance to riparian vegetation.
5. Restore the site to near-original conditions/grade. Remove spoils from the construction area when it is not possible to shape them to near-original conditions.
6. Dispose of construction spoils and waste materials at proper sites away from the stream channel.
7. Use silt screens to minimize the overland flow of fine sediments from construction sites into the stream during precipitation events.
8. Capture game fish that are inadvertently trapped in sections of ditch or river isolated for construction, and liberate them into adjacent flowing water.
9. Obtain all required Federal, State, and local permits.
10. Enumerate game fish incidentally killed during blasting operations and replace in kind after construction is completed.

Site Recovery

1. Stabilize disturbed upland, riparian and wetland areas with native grasses and vegetation.
2. Vacate construction sites leaving a positive visual impact blending with the natural landscape.

Terrestrial Biota

Mitigation measures for the following species will be addressed for this project:

Western and Clark's Grebes: Effects of the new operation on emergent vegetation will be monitored according to published or approved scientific research protocol to determine impacts to these species. If it is determined that the species is being impacted, appropriate mitigation measures will be considered.

Great Blue Heron: The proposed operation would allow higher winter water levels, which would favor increased beaver population. Since beavers like to eat cottonwood bark, the grove of cottonwoods that supports the great blue heron colony will be protected with wire to prevent girdling by beavers after construction.

Franklin's Gull: There should be no effect on the birds from construction or operation if new flow through the dam does not affect the caddisfly population. The caddis hatch may need to be monitored according to published or approved scientific research protocol to determine affects to the gull’s food source. Once it is determined that the species is being impacted, appropriate mitigation measures will be considered.

Trumpeter Swan: There should be no effect on the trumpeter swan from construction or proposed operations. The emergent vegetation may need to be monitored according to published or approved scientific research protocol to determine if the proposed operations will affect trumpeter swans. If it is determined that the species is being impacted, appropriate mitigation measures will be considered.

Bald Eagle: The proposed operation would allow higher winter water levels, which would favor increased beaver population. Beavers like to eat cottonwood bark, and since there is only one tall tree suitable for nesting on one of the islands on the reservoir, it will be protected from beavers with wire.

Mammalian Communities

Recent attempts to increase the number of cottonwoods by planting cuttings failed, primarily because of beaver predation on the cuttings before they could root. Existing trees will be protected with wire as discussed above.

Wetlands

Recent aerial photos taken by Reclamation in August 2009 of the spillway wetlands during a 500 cfs release indicates the extent of the wetlands would not significantly change when compared to the No Action alternative. However, the velocity of water flowing through this wetland would be reduced. As it is uncertain what effects velocity reduction may have on wetland function, monitoring will be conducted to determine any effects that would occur.

Additionally, the extent of aquatic macrophytes and species composition of those stands along the littoral zone of the reservoir (which serves critical habitat functions for both fish as well as wildlife species) will be monitored.

Threatened and Endangered Species

Under Alternative B, Reclamation is proposing to reduce irrigation-season spillway flows from the current 1,300 to 1,900 cfs flow range down to a fixed flow of 500 cfs. It is not anticipated this reduction in irrigation-season spillway flows would have negative effects on ESA-listed species known to occur within the spillway area. In addition, the new structure would likely reduce or eliminate structural leakage, as currently exists. Reclamation is proposing to provide non-irrigation season flows of up to 100 cfs as mitigation for the likely reduction or elimination of the existing structural leakage. This mitigation would result in year-round flows through the new spillway.

Under each action alternative, construction activities would be conducted upstream of the spillway pool containing ESA-listed snails. Reclamation is proposing to maintain flows to the pool containing ESA-listed snails throughout the duration of the construction project. Further, Reclamation is proposing to require contractors to implement standard BMPs so as to ensure construction materials do not enter the pool containing ESA-listed snails. Table F-1 below summarizes potential mitigation measures for each alternative.

Table F-1. Potential mitigation measures for No Action and action alternatives.

Spillway		
Alternatives	**Action**	**Associated Mitigation**
A – No Action	None	None
B – Spillway and Headworks Replacement	Reduce spillway flows, reduce or eliminate structural leakage	Reclamation no longer makes surface releases from the reservoir into spillway. Releases would be made from lower in the reservoir water column to increase entrainment of trout into the spillway. Result in flows sufficient to maintain the ESA-listed snails, as well as improves trout fishing. Provide over-winter flows of 100cfs.
C – Spillway Replacement	Reduce spillway flows, reduce or eliminate structural leakage	Reclamation no longer makes surface releases from the reservoir into spillway. Releases would be made from lower in the reservoir water column to increase entrainment of trout into the spillway. Result in flows sufficient to maintain the ESA-listed snails, as well as improves trout fishing. Provide over-winter flows of 100cfs.
Reservoir (Lake Walcott)		
Alternatives	**Action**	**Associated Mitigation**
A – No Action	None	None
B – Spillway and Headworks Replacement	Earlier pre-irrigation season fill	None
C – Spillway Replacement	Earlier pre-irrigation season fill	None
Construction		
Alternatives	**Action**	**Associated Mitigation**
A – No Action	None	None
B – Spillway and Headworks Replacement	Work above snail pool	Implement BMPs; maintain flows
C – Spillway Replacement	Work above snail pool	Implement BMPs; maintain flows

Geology, Soils, and Flood Plain

Following the abandonment of the staging and waste areas after construction of Alternative B some reclamation effort would be necessary to prevent wind erosion of soil and permit revegetation. Heavily-compacted areas of soil may require scarifying the ground to break up the surface prior to reseeding with natural vegetation.

Excavation of canal and road embankments may generate reusable fill materials. Some stockpiling of the fill material is anticipated. High winds could produce dust that would call for dust abatement procedures through the construction period. The piles of unconsolidated fill may need to be covered or kept damp.

Cultural Resources

Archaeological Resources

No mitigation would be necessary under any of the alternatives. Mitigation for adverse effects resulting from future Reclamation undertakings at Minidoka Dam will be addressed on a case by case basis through Section 106 consultation.

Historical Resources

Alternative A – No Action

No mitigation will be required under the No Action alternative. Mitigation for adverse effects resulting from future Reclamation undertakings at Minidoka Dam will be addressed on a case by case basis through Section 106 consultation.

Alternative B – Spillway and Headworks Replacement

Consultation pursuant to the 36 CFR 800 regulations has been initiated with the Idaho SHPO over effects of the spillway replacement on the historic features of Minidoka Dam. Reclamation and the SHPO concur that the undertaking, as proposed under Alternative B, would have direct and indirect adverse effects on the Minidoka Dam historic site, requiring specific action by Reclamation to mitigate those effects. The mitigation measures enumerated below have been developed by Reclamation in coordination with the SHPO. These measures would be formalized in a memorandum of agreement (MOA) between Reclamation and the SHPO. The National Advisory Council on Historic Preservation has chosen not to participate in the development of the MOA.

Reclamation agrees to perform the following actions to mitigate the adverse effects of the proposed project to the Minidoka Dam historic property:

1. Prepare large-format (4 X 5) black and white contact prints, archival processed, of the historic bridge that crosses the North Side Canal, early 20th century concrete lining and Civilian Conservation Corps (CCC) period lining along the North Side Canal, and close-up views of existing spillway piers and bays and action views of the process of pulling and placing stoplogs;

2. Create a publically accessible informational display near Minidoka Dam (possibly in the State Park), using salvaged sections of piers, bays, stoplogs, walkway, and ogee, removed from the original spillway, if possible. The display will inform visitors about the history, construction, and function of the overflow spillway being replaced. Blueprint drawings, historic photographs, and narrative text will supplement the spillway display;
3. Retain, as agency museum property, the traditional hand tools used in the process of manually pulling and placing stoplogs.

Alternative C – Spillway Replacement

Same as Alternative B, except that large-format prints of the historic North Side Canal bridge and North Side Canal lining would not be necessary. These features will remain unaltered under Alternative C.

Recreation

During construction, signs may be posted with maps showing the availability of recreation opportunity alternatives outside the construction zone.

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Appendix G Tribal Correspondence

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«AddressBlock»

Subject: Intent to complete and Environmental Impact Statement for Minidoka Dam Spillway

«GreetingLine»

Pursuant to section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969: as amended, the Bureau of Reclamation intends to prepare an Environmental Impact Statement (EIS) on the proposed Minidoka Dam Spillway Replacement. Alternatives currently being considered are: No Action as required under NEPA, total replacement of the spillway and headgate structures, or replacement of just the spillway. Reclamation would like to request a special public meeting with the «Address_Line_1» to receive comments specific to tribal interests.

The purpose of the proposed spillway replacement action is to prevent a structural failure of the Minidoka Dam spillway and associated structures. The concrete that forms the spillway crest and the piers of the pier-and-stoplog structure shows extensive visible deterioration at numerous locations. In addition, the potential for ice damage to the stoplog piers requires that reservoir water levels be dropped each winter. The headgate structures at the North Side Canal and South Side Canal also show serious concrete deterioration similar to that seen along the spillway. The current conditions of the Minidoka Dam spillway and headgate structures present increasingly difficult reliability and maintenance problems. If structural problems are not corrected there is potential of partial or complete failure.

Minidoka Dam impounds Lake Walcott and is a feature of Reclamation's Minidoka Project. They are located on the main stem Snake River about 18 miles northeast of the city of Burley, and within the Minidoka Wildlife Refuge. After over 103 years of continued use, the over 2,000 foot long concrete spillway at the Minidoka Dam has reached the end of its functional lifespan. If the failures at the spillway occur, Reclamation may not be able to meet contractual obligations for water delivery, power generation, and Reclamation's commitments to deliver flow augmentation water under the Nez Perce Settlement Agreement and the Endangered Species Act.

Reclamation is requesting early tribal comment before requesting public and agency input. This information from the tribes will help to identify significant issues or other alternatives to be addressed in the EIS. Information obtained during the scoping period will help in developing information to be included in the EIS.

A draft EIS is expected to be provided for review by winter 2009 followed by opportunities to provide written and oral comments. The final EIS is scheduled for completion in winter 2010. A Record of Decision describing which alternative is selected for implementation and the rationale for its selection would then be issued following a 30 day waiting period.

Regular Public Scoping meetings will be held on the following dates and times:

- December 3, 2008 in Idaho Falls, ID: Open House Meeting 6:00 p.m. to 9:00 p.m. at the Red Lion Hotel, 475 River Park Way, Idaho Falls, ID 83402

- December 4, 2008 in Burley, ID: Open House Meeting 6:00 p.m. to 9:00 p.m. at the Burley Best Western Inn, 800 North Overland Avenue, Burley, ID 83318

Written comments will be accepted through December 19, 2008 for inclusion in the scoping summary document. Please direct requests for sign language interpretation for the hearing impaired or other auxiliary aids, to Ms. Allyn Meuleman by November 24, 2008, at 230 Collins Road, Boise, ID 83702-4520, 208-383-2258 or **Minidoka Dam eis@pn.usbr.gov.** Information on this project can also be found at: http://www.usbr.gov/pn/programs/eis/minidokadam/index.html

An additional public meeting is requested between the «Address_Line_1» and Reclamation to collect input and comments that pertain to issues important to the tribes. If you have any questions, please contact Ms. Teneal Jensen, Native American Affairs Coordinator, at 208-383-2252 or tjensen@pn.usbr.gov.

Sincerely,

Jerrold D. Gregg
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SRA-1104
ENV-6.00

«AddressBlock»

Subject: Additional Information That Will go Out to the Public November 7, 2008, concerning the Minidoka Spillway Environmental Impact Statement (EIS).

«GreetingLine»

A pre-scoping letter was sent to the «Address_Line_1» on October 31, 2008, regarding Reclamation's intent to complete an EIS for the Minidoka Dam Spillway replacement. The purpose of the proposed spillway replacement action is to prevent a structural failure of the Minidoka Dam Spillway and associated structures.

The enclosed scoping package is being mailed to the public It includes a letter of intent, a comment form, environmental compliance document, and a National Environmental Policy Act (NEPA) process chart.

In addition to providing you with the public scoping package, Reclamation is requesting a special meeting with Tribal resources and a public meeting with the Tribes. These meetings can be set up on the reservation or a location that is most convenient for the Tribes. Please contact Ms. Teneal Jensen, Native American Affairs Coordinator, at 208-383-2252 or tjensen@pn.usbr.gov at your earliest convenience to schedule this meeting or if you have any further questions about the project or the public scoping process.

Sincerely,

Jerrold D. Gregg
Area Manager

Enclosures – 4

cc: See next page.

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