



# IDAHO WATER RESOURCE BOARD

## NOTICE AND AGENDA

**C.L. "Butch" Otter**  
Governor

### STORAGE COMMITTEE MEETING NO. 1-12

**Terry T. Uhling**  
Chairman  
Boise  
District 2

**Idaho Water Center, 6th Floor  
Conference Rooms 602C & D  
322 E. Front St., Boise, Idaho**

**August 20, 2012  
9:00 am to 5:00 pm**

**Roger W. Chase**  
Vice-Chairman  
Pocatello  
District 4

**Bob Graham**  
Secretary  
Bonners Ferry  
District 1

**Charles "Chuck"  
Cuddy**  
Orofino  
At Large

**Leonard Beck**  
Burley  
District 3

**Vince Alberdi**  
Kimberly  
At Large

**Jeff Raybould**  
St. Anthony  
At Large

**Peter Van Der Meulen**  
Hailey  
At Large

1. Introductions
2. Public Comment –time period not to exceed 15 minutes for the public to discuss items not listed on the agenda.
3. Henrys Fork Basin Study Discussion – Reconnaissance-level Results of Analysis. Lesa Stark and Bob Schattin, Bureau of Reclamation
4. Next Steps, Next Meeting, and Adjourn
5. Weiser-Galloway Site Visit for Committee / Staff members

#### Committee Members:

Terry Uhling, Chairman, Chuck Cuddy, Peter Van Der Meulen, Leonard Beck, and Jeff Raybould

#### AMERICANS WITH DISABILITIES

The meeting will be held in facilities that meet the accessibility requirements of the Americans with Disabilities Act. If you require special accommodations to attend, participate in, or understand the meeting, please make advance arrangements by contacting the Department by email at [idwrinfo@idwr.idaho.gov](mailto:idwrinfo@idwr.idaho.gov) or by phone at (208) 287-4800.

# RECLAMATION

Managing Water in the West

In cooperation with:



Idaho Water  
Resource Board

&



Henry's Fork  
Watershed Council

## Henry's Fork Basin Study

### Reconnaissance-level Alternatives *comment in italics 8/17/2012*

#### Existing and New Surface Storage Alternatives

1. Lane Lake - *Reconfigured w/ multiple sources – Eliminate Bitch Creek*
2. Spring Creek (Canyon Creek) - *Natural flows only*
3. Moody Creek - *Natural flows only*
4. Upper Badger Creek)
5. Teton Dam – *Compare to other storage alternatives*
6. Island Park Enlargement – ~~with Cross-Cut Canal Enlargement~~ *Optimize Enlargement*
7. Ashton Dam Enlargement - ~~with Cross-Cut Canal Enlargement~~
8. ~~Moose Creek Surface Storage – with Cross-Cut Canal Enlargement~~

#### Managed Ground Water Recharge

9. ~~Expansion of Managed Recharge in Egin Basin – Evaluate local benefit, benefits to ESPA limited~~
10. ~~Evaluate Recharge in the Lower Teton through Development of New Facilities~~
11. ~~Recharge Using Existing Irrigation Canals~~

#### Agricultural Conservation and Management

12. Canal Automation
13. ~~On Farm Conservation Practices~~
14. Piping and Lining – *Only in North Fremont irrigated region*
15. ~~Demand Reduction~~

#### Municipal and Industrial Conservation Alternatives

16. ~~Municipal and Industrial Conservation Alternatives~~

#### Market Based Alternatives

17. Evaluate Existing and Potential Market Based Mechanisms - *Investigate use of water markets in conjunction with alternatives evaluated*



## HENRYS FORK BASIN STUDY - ALTERNATIVES FOR FURTHER STUDY

Existing and New Surface Water Storage Alternatives						
No.	Dam Site *	Type	Tributary	Storage Volume (af)	Total Estimated Construction Cost	Cost/af
1	Spring Creek	On stream - Spring Ck	Canyon Ck, Teton River	10,800	\$42,120,000	\$3,900
2	Moody Creek	On stream - Moody Ck	Teton River	15,000	\$55,500,000	\$3,700
3	Upper Badger	On stream - Badger Ck	Teton River	47,000	\$126,900,000	\$2,700
4	Lane Lake - Off-stream	Off stream	Off Stream (off Teton R.)	68,000	\$312,800,000	\$4,600
5	Teton **					
	Teton (Rockfill, no flood control)	On stream - Teton River	Henrys Fork River	288,000	\$159,329,000	\$553
	Teton (RCC, no flood control)	On stream - Teton River	Henrys Fork River	288,000	\$315,996,000	\$1,097
	Teton Small Dam - A	On stream - Teton River	Henrys Fork River	50,000	\$65,680,000	\$1,314
	Teton Small Dam - B	On stream - Teton River	Henrys Fork River	100,000	\$83,874,000	\$839
6	Island Park Raise (1 ft)	On stream - Henrys Fk	Snake River	8,000	\$800,000	\$100
7	Ashton Dam Raise (43 ft)	On stream - Henrys Fk	Snake River	24,000	\$45,600,000	\$1,900
<b>Agricultural Conservation and Management</b>						
8	Canal Automation					
9	Piping and Lining (North Fremont irrigated region only)					
<b>Market Based Alternatives</b>						
10	Evaluate Existing and Potential Market Based Mechanisms - Investigate use of water market in conjunction with other alternatives evaluated)					
* Multiple concepts at each site under consideration.						
** Teton Dam studies referenced in evaluation: Bureau of Reclamation, 1991. <i>Teton Dam Reappraisal Working Document</i> ; HDR Engineering, Inc. 1995. <i>Teton Dam Reconnaissance Study</i>						

**Henry's Fork Basin Study**  
**Idaho Water Resource Board**  
**Water Storage Projects Committee**

**Tour Itinerary**  
**Date: August 8, 2013**

---

- 8:00 – 8:30     Introductions and Tour Itinerary (meet outside SpringHill Suites Marriott  
1177 South Yellowstone Highway, Rexburg, ID 83440)
- 8:30 – 9:00     Travel to Teton Dam Site
- 9:00 – 9:30     **Teton Dam Site** – Discussion of study findings to date
- 9:30 – 10:30    Travel to Lane Lake Dam Site
- 10:30 – 11:15   **Lane Lake Dam Site** – Discussion of study findings to date
- 11:15 - 12:45   Travel to Island Park Dam
- 12:45 – 1:30    **Island Park Dam** (possible dam raise) – Discussion of study findings to date; site  
tour by Dale Swenson (FMID)
- 1:30 – 2:30     **Lunch** – Near Island Park (lunch provided)
- 2:30 – 3:30     Travel to Ashton Dam (60 min with construction)
- 3:30 – 4:00     **Ashton Dam** (possible dam raise) – Discussion of study findings to date; site tour by  
PacificCorp/Rocky Mountain Power Representative
- 4:00 – 4:45     Return to SpringHill Suites, Rexburg \*
- 6:30 – 8:30     **Water Storage Projects Committee Meeting** (SpringHill Suites Marriott, Rexburg)

\*    *The group will visit the Egin Bench Recharge Facilities if time permits.*



**Henrys Fork Basin Study**  
Idaho Water Resource Board

Water Storage Projects  
Committee Tour

August 8, 2013





**Henrys Fork Basin Study**  
**Idaho Water Resource Board**  
**Water Storage Projects Committee**  
**Project Background & Basin Information**  
**Date: August 8, 2013**

---

**Purpose of the Tour**

The Henrys Fork Basin Study is scheduled to be completed by the end of 2013. The study includes analysis of a variety of water management options to assist with water needs in the Upper Snake River system, including analysis of new potential surface water storage projects. The Committee tour is intended to give Idaho Water Resource Board (IWRB) members and others an opportunity to view parts of the Basin and several of the surface water storage sites evaluated in the study.

It is important that the Basin Study provide the information necessary for decision makers to identify promising projects with a clear understanding of how these projects could be advanced. The purpose of the tour and subsequent Committee meeting is to discuss the details of the projects under study and to obtain feedback from IWRB members so any questions or concerns can be addressed prior to completion of the Basin Study.

**Project Background**

The Idaho Water Resource Board (IWRB) and the U.S. Bureau of Reclamation (Reclamation) are partnering in a Basin Study in the Henrys Fork Basin (50/50 cost share). The WaterSMART Basin Study program is authorized under the SECURE Water Act and allows Reclamation work with state and local water managers in water resource planning efforts. The IWRB is authorized to investigate surface water storage in the Basin and statewide in accordance with HJM 8 (2008). Funding was appropriated to evaluate the replacement of Teton Dam through Senate Bill 1511 (\$400,000). The area of study was expanded to include surface water storage opportunities within the Henrys Fork Basin along with other potential alternatives to improve water supply conditions in the Eastern Snake Plan Aquifer (ESPA) and Henrys Fork River Basin.

The study has progressed in a couple of phases. Initially, a broad range of alternatives were identified and studied at a reconnaissance level. They included alternatives in a number of different categories: surface water storage, ground water recharge, water market, and agricultural conservation. A Water Needs Assessment was also completed to clarify water supply and demand in the Basin and the Upper Snake River system. An appraisal level analysis was then initiated to address specific technical issues for a shorter list of alternatives, including seven surface storage sites.

Reclamation and the State have coordinated with stakeholders primarily through the Henry's Fork Watershed Council. Representation within the Council includes agricultural entities, conservation and environmental organizations, local, state and federal agencies, universities, and members of the public. The Council has provided a significant amount of technical and scientific data as well as feedback on behalf of affected communities.

Through the Basin Study, the state would like identify technically promising projects with broad stakeholder support that provide opportunities to develop new water supplies and improve current conditions within the Henrys Fork Basin and the ESPA.

## HENRYS FORK BASIN STUDY

### COMPARISON STORAGE SITES EVALUATED IN RECONNAISSANCE ANALYSIS

Surface Water Storage						
No. *	Dam Site	Location	Tributary	Storage Volume (af)	Total Estimated Construction Cost	Cost/af
1	Island Park Dam Raise					
	Convert existing space to storage	On stream - Henrys Fk	Snake River	29,000	TBD	TBD
	Island Park Raise (1 ft)	On stream - Henrys Fk	Snake River	8,000	\$845,000	\$100
	Island Park Raise (8 ft)	On stream - Henrys Fk	Snake River	74,000	\$29,329,000	\$400
2	Lane Lake - Off-stream					
	Lane Lake (170 ft)	Off stream	Off Stream (off Teton R.)	68,000	\$307,790,00 - \$345,100,000	\$4,500 - \$5,100
	Lane Lake (205 ft)	Off stream	Off Stream (off Teton R.)	120,000	TBD	TBD
3	Teton **					
	Teton (rockfill embankment)	On stream - Teton River	Henrys Fork River	288,000	\$165,504,000	\$575
	Teton (RCC)	On stream - Teton River	Henrys Fork River	288,000	\$322,171,000	\$1,100
	Teton Small Dam - A	On stream - Teton River	Henrys Fork River	50,000	\$92,912,000	\$1,900
	Teton Small Dam - B	On stream - Teton River	Henrys Fork River	100,000	\$113,181,000	\$1,100
4	Ashton Dam Raise (43 ft)	On stream - Henrys Fk	Snake River	20,400	\$17,140,000	\$800
5	Moody Creek	On stream - Moody Ck	Teton River	37,000	\$155,390,000 - \$167,040,000	\$4,200 - \$4,500
6	Spring Creek	On stream - Spring Ck	Canyon Ck, Teton River	10,800	\$118,270,000 - \$230,720,000	\$5,900 - \$11,500
7	Upper Badger	On stream - Badger Ck	Teton River	47,000	\$128,940,000 - \$156,280,000	\$2,700 - \$3,300

\* Multiple concepts under each alternative may be studied. Alternatives are not listed in order of priority.

\*\* Teton Dam studies referenced in evaluation: Bureau of Reclamation, 1991. *Teton Dam Reappraisal Working Document*; HDR Engineering, Inc. 1995. *Teton Dam Reconnaissance Study*



# Henry's Fork Basin Study

## Teton Dam Site

### Fact Sheet

---

#### Project Description

- Location: New dam located at site of the original Teton Dam located on the Teton River east of Newdale, Idaho.
- Project Variations:
  - Reconnaissance analysis: Evaluated four alternatives for rebuilding the Teton Dam based on the 1991 *Teton Dam Reappraisal Working Document* (by Reclamation), and a 1995 *Teton Dam Reconnaissance Study* (by HDR Engineering, Inc.) which evaluated a smaller dam.
  - Appraisal analysis: Refining the Reconnaissance analysis to the Teton Dam Rebuild concepts to allow a better comparison with the analyses of the other storage sites. This effort is ongoing.

#### Engineering Results

	Teton Rebuild (rockfill embankment)	Teton Rebuild (Roller Compacted Concrete - RCC)	Teton Small Dam A	Teton Small Dam B
<b>Dam Configuration</b>				
Dam Type	rockfill embankment	RCC	RCC	RCC
Dam Height (ft)	302	405 (from bedrock)	140 (250 from bedrock)	190 (300 from bedrock)
<b>Reservoir (af)</b>				
Storage Capacity (af)	288,000	288,000	50,000	100,000
Hydropower (Avg annual energy, GWh)	80 GWh / reliable capacity 11 mW	80 GWh / reliable capacity 11 mW	28 - 65.1 GWh	Not available
<b>Cost Estimate *</b>				
Total Relative Construction Cost	\$165,504,000	\$322,171,000	\$92,912,000	\$113,181,000
Cost per acre-foot	\$575	\$1,100	\$1,900	\$1,100

\*Indexed from 1991 and 1995 studies

### **Potential Water Supply Benefits**

- Enhance water budget by diverting during period of high flow and storing until more critical, higher demand periods in summer and early fall.
- Satisfy unmet irrigation demands in the North Fremont, Lower Watershed (via Crosscut Canal), and Egin Bench irrigated regions.
- Stored water may be used to satisfy needs downstream in the ESPA.
- Reservoir releases could strategically be used to enhance ecological instream flows.

### **Environmental Benefits & Impacts**

- Change in connectivity:
  - Diversions likely to occur during excess spring runoff period.
  - Reservoir releases likely to occur during more critical low flow periods (summer and fall)
  - Potential impacts to connectivity in Teton River and tributary rivers above the dam site by acting as a barrier.
  - Improve connectivity of downstream river segments including North Fork Teton River, South Fork Teton River and Lower Henrys Fork River (all have been identified as having additional ecological streamflow needs).
  - Special Designation: Potential impacts to associated sections of Teton River potentially eligible for Wild and Scenic River status designation.
- State Aquatic Species of Special Concern:
  - Reservoir area not critical habitat for Yellowstone Cutthroat Trout (YCT).
  - Potential impacts to hydrology of Teton River downstream which contains “conservation populations” of YCT (less than 10 percent genetic introgression from other species).
  - Teton Rebuild alternative reservoir could back up to lower reach of Bitch Creek which a “core conservation population” of YCT (>99 percent cutthroat trout genes)
- Other Environmental Factors:
  - Wildlife habitat: Proposed inundation area contains winter range and migration corridors for big game
  - Federally Listed Species in the area: threatened grizzly bear; candidate species wolverine
  - At-Risk (BLM and USFS): trumpeter swan
  - Wetland/Habitat Value: no information at this time
  - Impacts resulting from canal and pipeline routes were not assessed

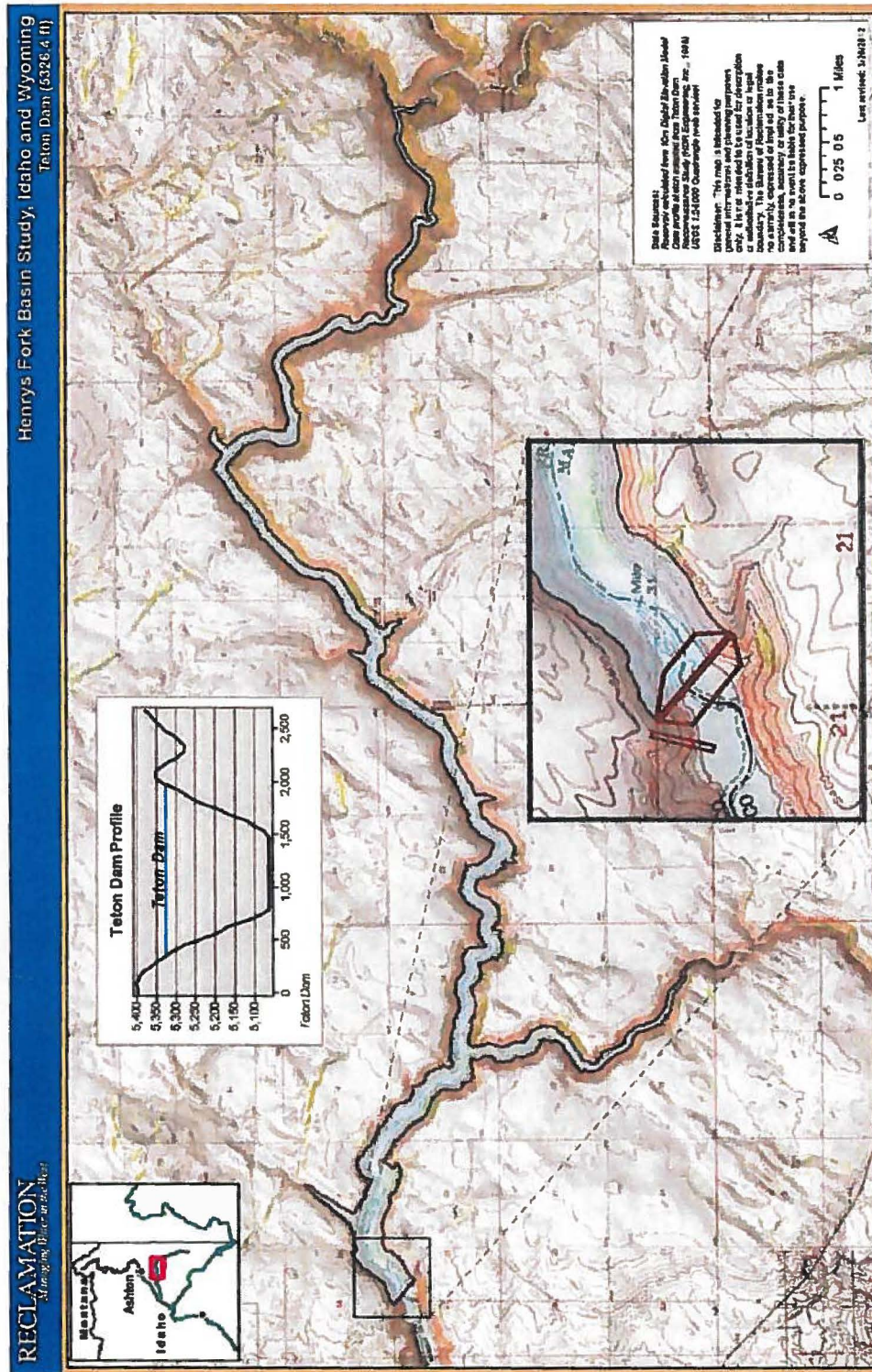


Exhibit 3. Topographic map showing the location of the dam and reservoir of the Teton Dam Rebuild Alternative, both construction options.



# Henrys Fork Basin Study

## Lane Lake Dam Site

### Fact Sheet

---

#### Project Description

- Location: Off-stream storage site in Hog Hollow dry impoundment within Teton watershed - approximately one mile north of the Teton River and five miles downstream of Bitch Creek confluence.
- Project Variations:
  - Reconnaissance analysis: 170 foot high dam with 68,000 acre-feet reservoir.
  - Appraisal analysis: evaluating a larger dam, approximately 205-foot-tall with 120,000 acre-feet reservoir (currently being evaluated) as well as additional geologic investigation.
  - Four different water-supply sources have been considered.

#### Engineering Results

- Dam Configuration:
  - Embankment – rockfill or granular earthfill dam assumed; central core with filter blanket drains and earthfill/rockfill shells; concrete grout curtain/cutoff to limit seepage through foundation.
  - Top of Dam Elevation: 5,585 feet (larger dam = approx 5,605 ft)
  - Dam Height: 170 foot high (larger dam = approx 205 ft)
  - Length of Crest: 3,100 feet
- Reservoir:
  - Full Pool Elevation: 5,570 feet
  - Full Pool Capacity: 68,000 acre-feet (larger dam = approx 120,000 af)
  - Maximum Reservoir Surface Area: 1,270 acres
- Conveyance:
  - Combination of pressurized pipelines, canals, siphons, stream diversions, intake and fish screen structures.
  - Conceptual and intended for relative cost comparison
- Hydrology/Source water options studied:
  - Hog Hollow – dry impoundment area for off-channel reservoir (natural runoff very low)
  - Teton River (pumped storage with no canal)
  - Conant Creek & Falls River (both gravity flow canals)
  - Falls River (gravity flow canal)
  - Bitch Creek (gravity flow canal) - eliminated as it provides “core conservation population” of Yellowstone Cutthroat Trout (>99 percent cutthroat trout genes)
- Hydropower Potential:
  - 3,100 kW
  - At full pool, 500-foot drop to hydropower facility on the Teton River

#### Cost Estimate

- \$4,500 - \$5,100 per acre-foot
- Total Relative Construction Cost \$307,790,000 - \$345,100,000
- An escalated foundation factor was included to account for measures to limit seepage (site potential prone to high seepage rates).

### **Potential Water Supply Benefits**

- Enhance water budget by diverting during period of high flow and storing until more critical, higher demand periods in summer and early fall.
- Satisfy unmet irrigation demands in Egin Bench (more water available in Henrys Fork by reducing diversions into Crosscut canal) and Lower Watershed irrigated regions.
- Stored water may be used to satisfy needs downstream in the ESPA.
- Reservoir releases could strategically be used to enhance ecological instream flows.

### **Environmental Benefits & Impacts**

- Change in connectivity:
  - Diversions likely to occur during excess spring runoff period.
  - Reservoir releases likely to occur during more critical low flow periods (summer and fall)
  - Potential impacts to connectivity in segments of supply sources including Teton River, Falls River, Conant Creek and Bitch Creek.
  - Improve connectivity of downstream river segments including North Fork Teton River, South Fork Teton River and Lower Henrys Fork River (all have been identified as having additional ecological streamflow needs).
  - Special Designation: Potential indirect impacts to associated sections of Teton River potentially eligible for Wild and Scenic River status designation and on Conant Creek designated as a State Natural and Recreational River.
- State Aquatic Species of Special Concern:
  - Potential impacts to source rivers which all contain “conservation populations” of Yellowstone cutthroat trout YCT (less than 10 percent genetic introgression from other species).
- Other Environmental Factors:
  - Wildlife habitat: Proposed inundation area contains winter range and migration corridors for big game
  - Federally Listed Species in the area: threatened grizzly bear; candidate species wolverine
  - At-Risk (BLM and USFS): bald eagle, Sandhill crane, sharp-tailed grouse, and trumpeter swan
  - Wetland/Habitat Value: Minimal impact to wetlands (less than 1 acre affected)
  - Impacts resulting from canal and pipeline routes were not assessed

### **Land Management, Recreation and Infrastructure Impacts and Benefits**

- Land Management: located on private land (low impact rating)
- Recreation/Economic Values: low impact rating
- Infrastructure: few impacts



# Lane Lake Dam Site View



0 0.25 0.5 Miles

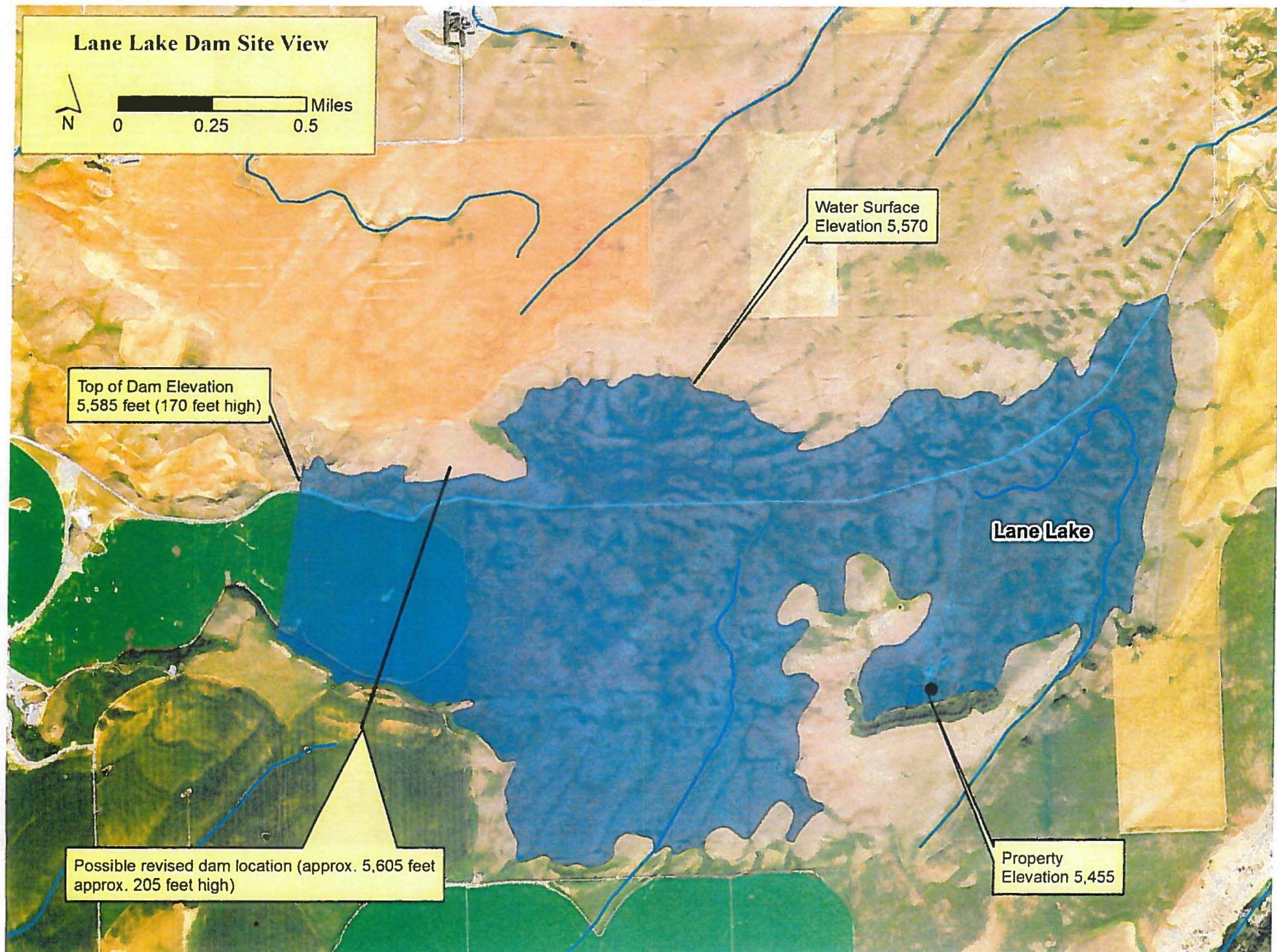
Water Surface  
Elevation 5,570

Top of Dam Elevation  
5,585 feet (170 feet high)

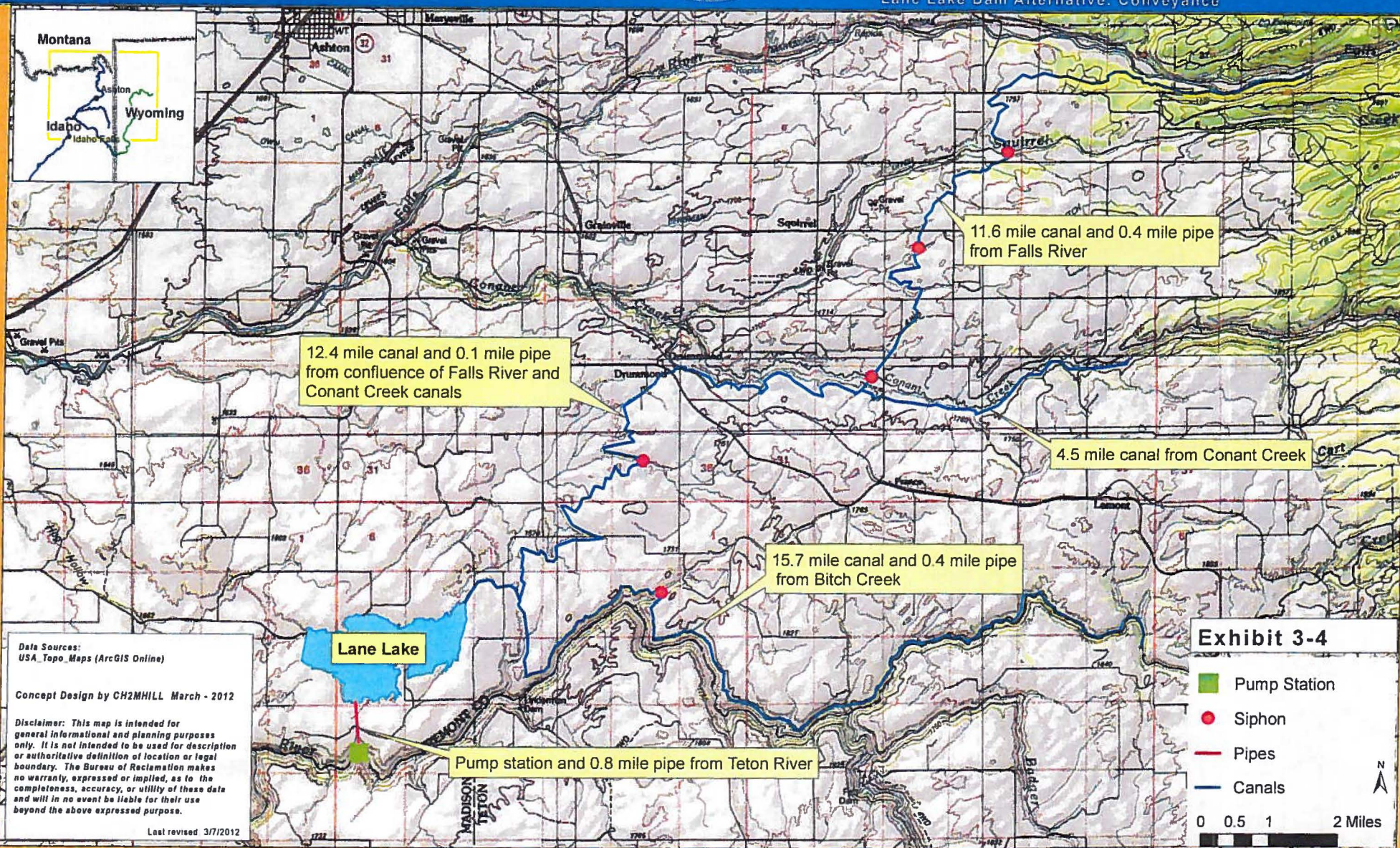
Lane Lake

Possible revised dam location (approx. 5,605 feet  
approx. 205 feet high)

Property  
Elevation 5,455









# Henrys Fork Basin Study

## Island Park Dam Raise

### Fact Sheet

---

#### Project Description

- Location: Island Park Dam is located directly on the Henrys Fork River at the town of Island Park.
- Project Variations:
  - Reconnaissance analysis: Two alternatives were studied including a 1-foot raise by increasing the elevation of the service spillway and an 8-foot raise by increasing the height of the dam (the latter was determined to be unreasonable).
  - Appraisal analysis: Evaluate options to convert flood surcharge capacity into water storage up to 29,000 acre-feet. Analysis is currently ongoing.

#### Engineering Results for 1-foot Raise

- Existing Dam Configuration:
  - Existing: zoned earthen embankment constructed between 1935 and 1938.
  - Top of Dam Elevation: 6,312 feet (raised 3 feet in 1985)
  - Structural/Hydraulic Height: 94 feet / 75 feet
  - Length of Crest: 1,607-foot-long crest and 7,950-foot-long dike
- Existing Reservoir:
  - Full Pool Elevation: 6,303 feet with 1 ft inflatable bladder, otherwise 6,302 ft
  - Full Pool Capacity: 135,205 acre-feet at elevation 6,303
  - Flood Surcharge: 6,306.6 feet elevation, 29,610 acre-feet capacity
  - Freeboard: 5.4 feet (Top of Dam to Top of Flood Surcharge)
  - Maximum Reservoir Surface Area: approx. 8,000 acres
- Existing Spillways/Outlet:
  - Service Spillway: 6,303 feet (top of concrete weir and bladder)
  - Emergency Spillway: 6,309 feet
- 1-foot Raise:
  - Raise service spillway crest 1 foot and replace existing 1-foot bladder with 2-foot bladder
  - Full pool elevation: 6,304 feet
  - Additional pool capacity: 8,000 acre-feet
- Conveyance: Existing dam on-stream
- Hydrology/Source water options studied:
  - Henrys Fork River (natural inflow to reservoir)
- Hydropower Potential:
  - Existing plant added in 1994.
  - 1-foot Dam Raise = 640 kW; 44 foot drop to existing hydropower facility
  - 8-foot Dam Raise = 1,087 kW; 51 foot drop to existing hydropower facility

#### Cost Estimate

- 1-foot Dam Raise = \$100 per af
- Total Relative Construction Cost: 1-foot Dam Raise = \$845,000

### **Potential Water Supply Benefits**

- Enhance water budget by diverting during period of high flow and storing until more critical, higher demand periods in summer and early fall.
- Satisfy unmet irrigation demands in North Fremont, Lower Watershed (via Crosscut Canal), and Egin Bench irrigated regions.
- Stored water may be used to satisfy needs downstream in the ESPA.
- Reservoir releases could strategically be used to enhance ecological instream flows.

### **Environmental Benefits & Impacts**

- Change in connectivity:
  - Diversions likely to occur during excess spring runoff period.
  - Reservoir releases likely to occur during more critical low flow periods (summer and fall)
  - Improve connectivity of downstream river segments including North Fork Teton River, South Fork Teton River and Middle and Lower Henrys Fork River (all have been identified as having additional ecological streamflow needs).
  - Special Designation: Henrys Fork has no special designations
- State Aquatic Species of Special Concern:
  - Potential impacts to Henrys Fork River – priority Rainbow Trout fishery
  - No substantial Yellowstone Cutthroat Trout population identified; reservoir area not critical habitat
- Other Environmental Factors:
  - Wildlife habitat: Proposed inundation area contains winter range and migration corridors for big game
  - Federally Listed Species in the area: threatened grizzly bear and Canadian lynx; candidate species wolverine and greater sage-grouse
  - At-Risk (BLM, USFS, and IDFG): American avocet, American white pelican, bald eagle, black-crowned night-heron, California gull, Caspian tern, common loon, Forster's tern, Franklin's gull, sandhill crane, sharp-tailed grouse, trumpeter swan, western grebe, and white-faced ibis, and Wyoming ground squirrel
  - Wetland/Habitat Value: Moderate impact to wetlands - expanded reservoir would impact wetlands in the lower reaches of several Henrys Fork River tributaries (affect between 1 and 200 acres)
  - Impacts resulting from canal and pipeline routes were not assessed

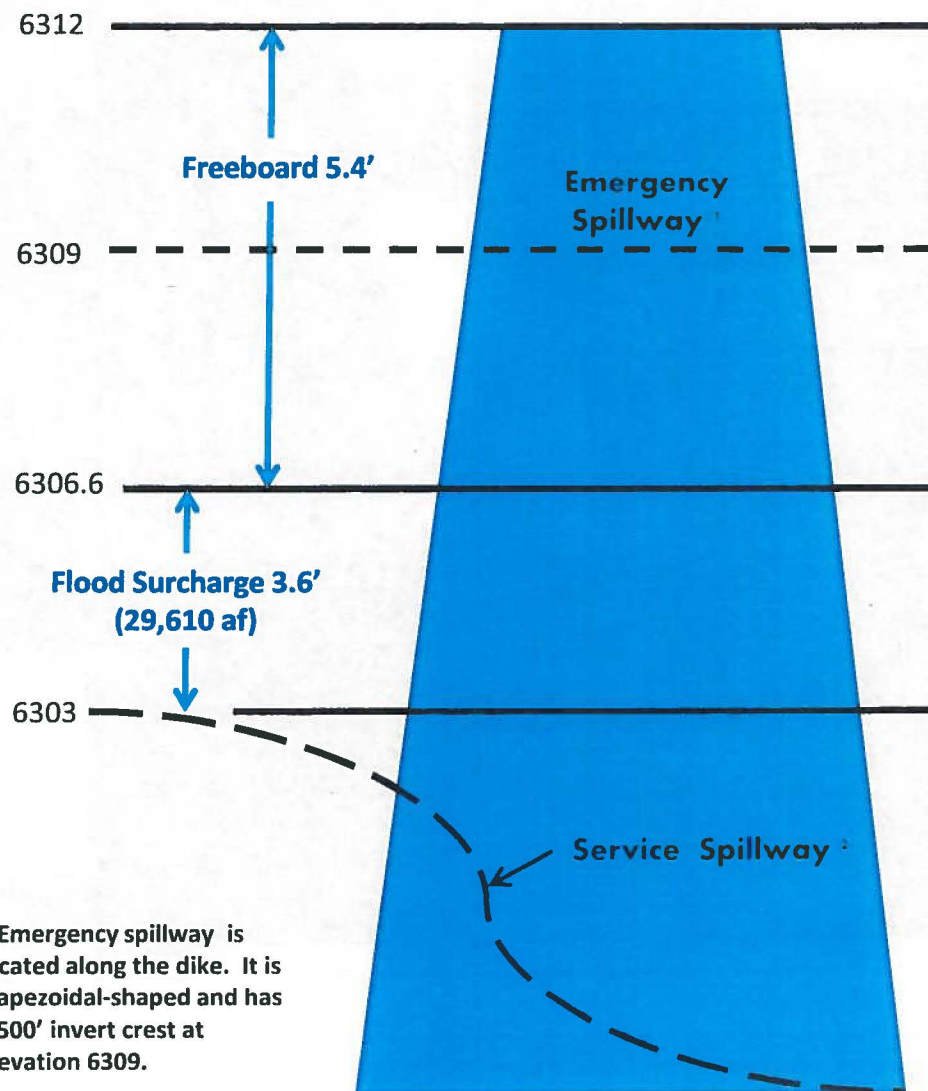
### **Land Management, Recreation and Infrastructure Impacts and Benefits**

- Land Management: located on private land, state, and federal (high impact rating)
- Recreation/Economic Values: low impact rating for 1 ft raise, moderate for 8 ft raise
- Infrastructure: moderate impact rating for 1 ft raise (primarily roads) and high impact rating for 8 ft raise (roads, docks, approx 100 structures)



# **HENRYS FORK BASIN STUDY - ISLAND PARK DAM** **EXISTING CONFIGURATION SCHEMATIC**

(not to scale)



Elevation (ft)	Description	Structures Impacted
6312	Crest of Dam	169
6311		110
6310		92
6309	Emergency Spillway	37
6308		18
6307		2
6306.6	Top Flood Surcharge Space	0
6305		0
6304		0
6303	Service Spillway with 1' Bladder	0
6302	Normal operating elevation	0

<sup>2</sup> Service Spillway is an uncontrolled "bathtub" spillway with ogee shaped inlet to 30' long tunnel through the dam. A horseshoe shaped spillway crest includes a 62' long concrete weir in the center with two 99' long 1' diameter inflatable bladders on either side. Top of the weir and bladders elevation is 6303 ft.

EXHIBIT 3-5  
Island Park Dam Raise Alternative: Service SpillwayRECLAMATION  
*Managing Water in the West*Henrys Fork Basin Study, Idaho and Wyoming  
Island Park Dam Raise Alternative: Service Spillway

# Henrys Fork Basin Study

## Ashton Dam Raise

### Fact Sheet

---

#### Project Description

- Location: Ashton Dam is located directly on the Henrys Fork River at the City of Ashton. It is an existing run-of-river hydropower project owned by PacificCorp (operating as Rocky Mountain Power in Idaho).
- Project Variations: Three alignments identified. Preferred concept involves construction of a new dam just downstream of existing structure - increase overall crest high by approximately 43 feet, increase normal pool elevation 28 feet (maintain a 15 ft freeboard), and increased the reservoir capacity by 30,200 acre-feet.

#### Engineering Results

- Dam Configuration:
  - New Embankment –
    - rockfill or granular earthfill dam assumed
    - existing = earth and rock-filled; downstream RCC face; upstream rock fill
    - A range of dam types could be considered (i.e. RCC would reduce necessary freeboard)
  - Top of Dam Elevation: 5,200 feet (existing = 5,157 ft at overflow spillway)
  - Dam Height: 43 foot raise to 100 feet (existing = 57 ft base to spillway crest)
  - Length of Crest: 1,120 feet (existing = 450 ft)
- Reservoir:
  - Full Pool Elevation: 5,185 feet (existing = 5,157 ft)
  - Full Pool Cap.: 30,200 acre-feet; 20,400 af additional storage (existing = approx 9,800 af)
  - Maximum Reservoir Surface Area: 1,250 acres (existing = 400 ac)
- Conveyance: Dam on-stream, existing run-of-river hydropower project
- Hydrology/Source water options studied: Henrys Fork River (natural inflow to reservoir)
- Hydropower Potential:
  - 250 kW (existing two generating plants rated 2,500 kW and 2,850 kW – 7,850kW total capacity). Estimated potential is significantly less than the existing plants, analysis did not optimize potential.
  - At full pool, 80-foot drop to updated hydropower facility at the base of the dam

#### Cost Estimate

- Dam Raise = \$800 per acre-foot
- Total Relative Construction Cost: Dam Raise = \$17,140,000



### **Potential Water Supply Benefits**

- Enhance water budget by diverting during period of high flow and storing until more critical, higher demand periods in summer and early fall.
- Satisfy unmet irrigation demands in North Fremont, Lower Watershed (via Crosscut Canal), and Egin Bench irrigated regions.
- Stored water may be used to satisfy needs downstream in the ESPA.
- Reservoir releases could strategically be used to enhance ecological instream flows.

### **Environmental Benefits & Impacts**

- Change in connectivity:
  - Diversions likely to occur during excess spring runoff period.
  - Reservoir releases likely to occur during more critical low flow periods (summer and fall)
  - Improve connectivity of downstream river segments including North Fork Teton River, South Fork Teton River and Middle and Lower Henrys Fork River (all have been identified as having additional ecological streamflow needs).
  - Special Designation: May impact segments of Henrys Fork River with State Natural River designation
- State Aquatic Species of Special Concern:
  - Potential impacts to Henrys Fork River – priority Rainbow Trout fishery
  - No substantial Yellowstone Cutthroat Trout population identified; reservoir area not critical habitat
- Other Environmental Factors:
  - Wildlife habitat: Proposed inundation area contains winter range and migration corridors for big game
  - Federally Listed Species in the area: threatened grizzly bear and Canadian lynx; candidate species wolverine and greater sage-grouse
  - At-Risk (BLM, USFS, and IDFG): bald eagle, black-crowned night-heron, California gull, Caspian tern, common loon, Forster's tern, Franklin's gull, sandhill crane, sharp-tailed grouse, trumpeter swan, western grebe, and white-faced ibis
  - Wetland/Habitat Value: Moderate impact to wetlands - expanded reservoir would impact wetlands in the lower reaches of several Henrys Fork River tributaries (affect between 1 and 200 acres)
  - Impacts resulting from canal and pipeline routes were not assessed

### **Land Management, Recreation and Infrastructure Impacts and Benefits**

- Land Management: located on private land, federal, and conservation easement land (high impact rating)
- Recreation/Economic Values: high impacts rating
- Infrastructure: impacts to roads and habitation rated high

EXHIBIT 4-4  
Ashton Dam Raise Alternative: Existing and Proposed Reservoir Footprints

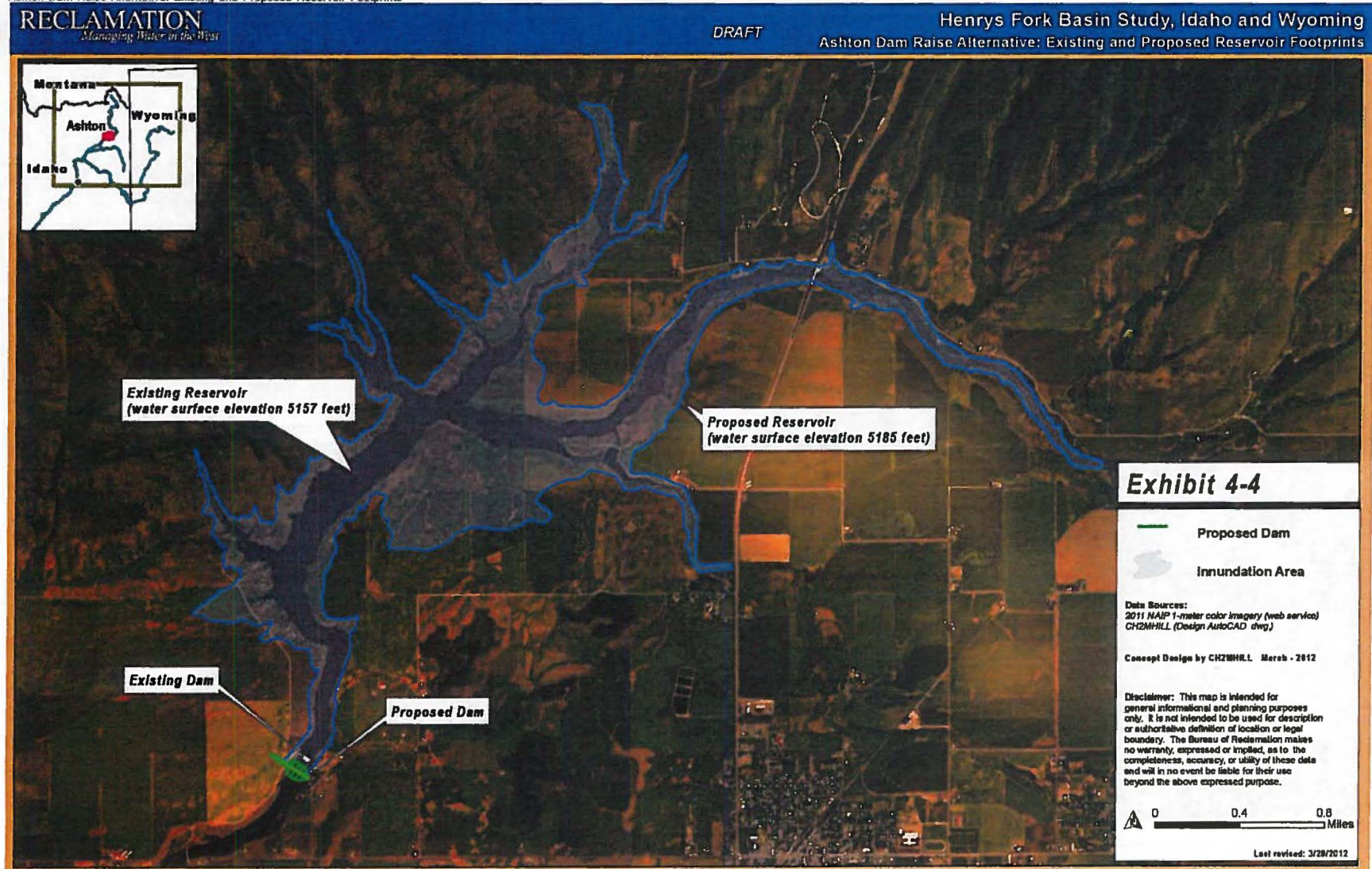
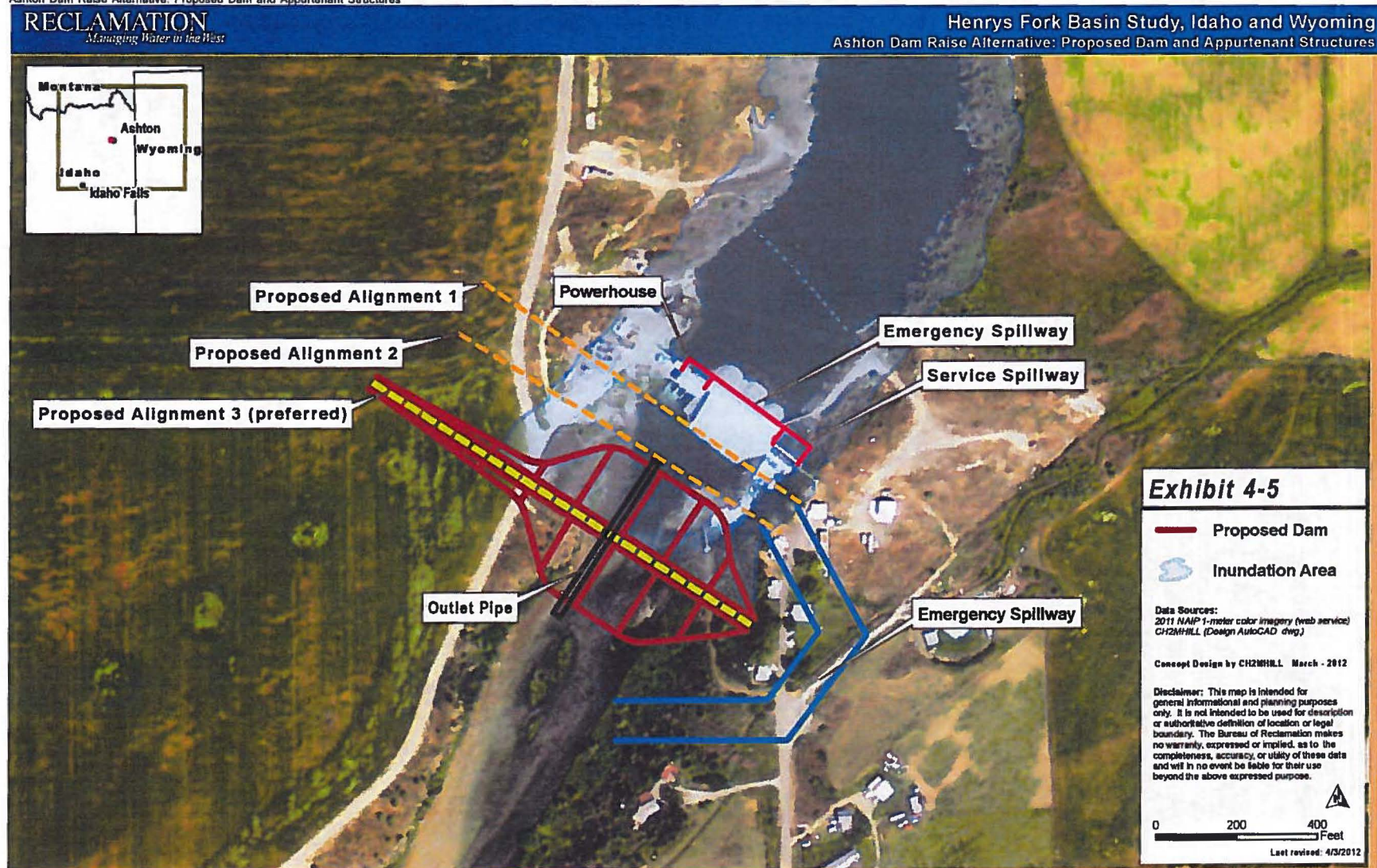




EXHIBIT 4-5  
Ashton Dam Raise Alternative: Proposed Dam and Appurtenant Structures



# Henrys Fork Basin Study

## Moody Creek Dam Site

### Fact Sheet

---

#### **Project Description**

- Location: Dam site located on in Teton watershed on Spring Creek on Moody Creek just downstream of confluence with Dry Canyon Creek.
- Project Variations: Proposed new 200-foot-tall dam with 37,000 acre-foot reservoir. Sub-alternatives evaluated with five different water-supply source combinations.

#### **Engineering Results**

- Dam Configuration:
  - Embankment – rockfill or granular earthfill dam assumed; central core with filter blanket drains and earthfill/rockfill shells; concrete grout curtain/cutoff to limit seepage through foundation.
  - Top of Dam Elevation: 5,405 feet
  - Dam Height: 220 foot high maximum
  - Length of Crest: 1,300 feet
- Reservoir:
  - Full Pool Elevation: 5390 feet
  - Full Pool Capacity: 37,000 acre-feet
  - Maximum Reservoir Surface Area: 520 acres
- Conveyance:
  - Combination of pressurized pipelines, canals, siphons, stream diversions, intake and fish screen structures.
  - Conceptual and intended for relative cost comparison
- Hydrology/Source water options studied:
  - Moody Creek (natural inflow to reservoir) – will not supply full annual storage
  - Moody Creek (natural inflow to reservoir) and Canyon Creek (gravity flow canal) – will not supply full annual storage
  - Moody Creek (natural inflow to reservoir) and Canyon Creek (combination pump station, pipe, and gravity flow canal) – will not supply full annual storage
  - Moody Creek (natural inflow to reservoir) and Teton River (gravity flow canal)
  - Moody Creek (natural inflow to reservoir) and Teton River (combination pump station, pipe, and gravity flow canal)
- Hydropower Potential:
  - Could vary from 307 kW – 758 kW (greater potential associated with more reliable source options)
  - At full pool, 200-foot drop

#### **Cost Estimate**

- \$4,200 - \$4,500 per acre-foot
- Total Relative Construction Cost \$155,390,000 - \$167,040,000



### **Potential Water Supply Needs**

- Enhance water budget by diverting during period of high flow and storing until more critical, higher demand periods in summer and early fall.
- Satisfy unmet irrigation demands in Egin Bench (more water available in Henrys Fork by reducing diversions into Crosscut canal) and Lower Watershed irrigated regions.
- Stored water may be used to satisfy needs downstream in the ESPA.
- Reservoir releases could strategically be used to enhance ecological instream flows.

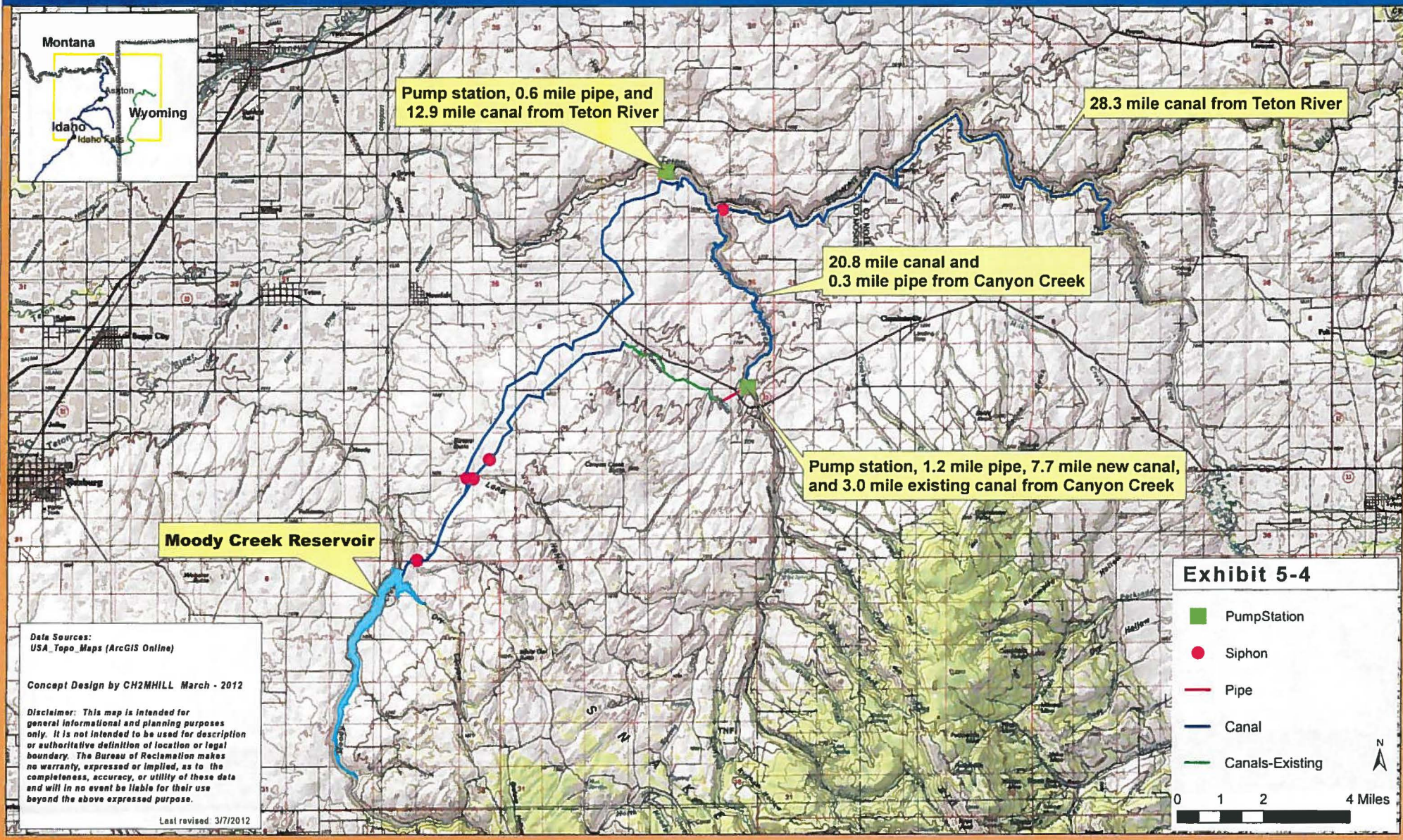
### **Environmental Benefits & Impacts**

- Change in connectivity:
  - Diversions likely to occur during excess spring runoff period.
  - Reservoir releases likely to occur during more critical low flow periods (summer and fall)
  - Potential impacts to connectivity in segments of supply sources including Moody Creek, Canyon Creek, and Teton River.
  - Improve connectivity of downstream river segments including Moody Creek, North Fork Teton River, South Fork Teton River and Lower Henrys Fork River (all have been identified as having additional ecological streamflow needs).
  - Special Designation: Potential indirect impacts to the sections of Teton River potentially eligible for Wild and Scenic River status designation.
- State Aquatic Species of Special Concern:
  - Yellowstone cutthroat trout (YCT) present in proposed reservoir area.
  - Potential impacts to source rivers which all contain “conservation populations” of Yellowstone cutthroat trout YCT (less than 10 percent genetic introgression from other species).
- Other Environmental Factors:
  - Wildlife habitat: Proposed inundation area contains winter range and migration corridors for big game
  - Federally Listed Species in the area: no threatened species
  - At-Risk (BLM and USFS): Sandhill crane and sharp-tailed grouse
  - Wetland/Habitat Value: Moderate impact to wetlands (1-200 acres affected)
  - Impacts resulting from canal and pipeline routes were not assessed

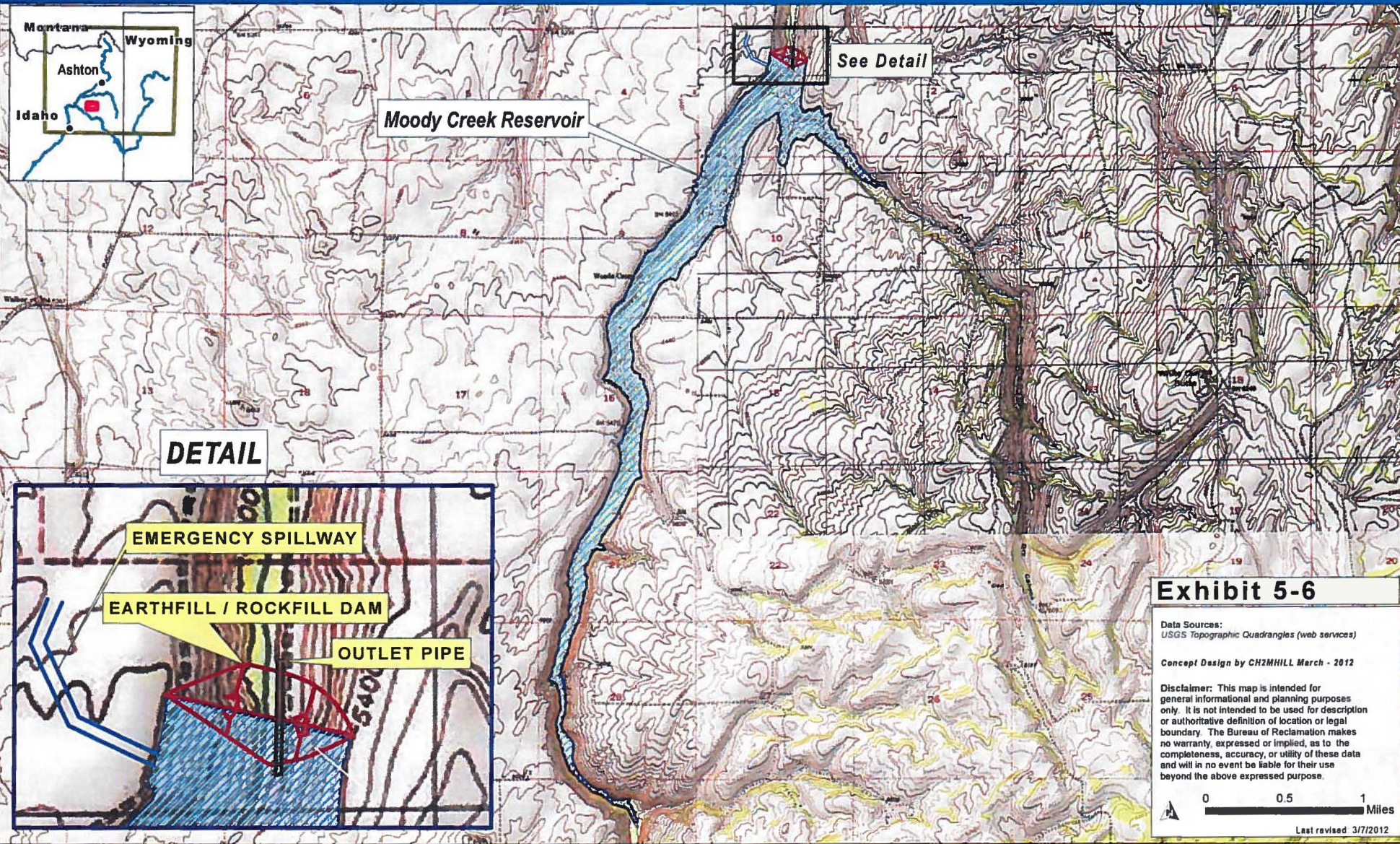
### **Land Management, Recreation and Infrastructure Impacts and Benefits**

- Land Management: located on private land (low impact rating)
- Recreation/Economic Values: low impact rating due to land-based recreation
- Infrastructure: few impacts











# Henrys Fork Basin Study

## Spring Creek Dam Site

### Fact Sheet

---

#### Project Description

- Location: Dam site located on in Teton watershed on Spring Creek headwater tributary at confluence with Canyon Creek.
- Project Variations: Proposed new 180-foot-tall dam with 20,000 acre-foot reservoir. Sub-alternatives evaluated with four different water-supply source combinations.

#### Engineering Results

- Dam Configuration:
  - Embankment – rockfill or granular earthfill dam assumed; central core with filter blanket drains and earthfill/rockfill shells; concrete grout curtain/cutoff to limit seepage through foundation.
  - Top of Dam Elevation: 6,145 feet
  - Dam Height: 180 foot high maximum
  - Length of Crest: 1,200 feet
- Reservoir:
  - Full Pool Elevation: 6,130 feet
  - Full Pool Capacity: 20,000 acre-feet
  - Maximum Reservoir Surface Area: 540 acres
- Conveyance:
  - Combination of pressurized pipelines, canals, siphons, stream diversions, intake and fish screen structures.
  - Conceptual and intended for relative cost comparison
- Hydrology/Source water options studied:
  - Spring Creek (natural inflow to reservoir) and Canyon Creek (gravity flow canal) – will not supply full annual storage
  - Spring Creek (natural inflow to reservoir), Canyon Creek (gravity flow canal), and Teton River (combination pump station, pipe, and gravity flow canal)
  - Spring Creek (natural inflow to reservoir) and Teton River (combination pump station, pipe, and gravity flow canal)
  - Spring Creek (natural inflow to reservoir) and Bitch Creek via Teton River (combination pump stations, pipe, and gravity flow canal) – Bitch Creek eliminated as it provides “core conservation population” of Yellowstone Cutthroat Trout (>99 percent cutthroat trout genes)
- Hydropower Potential:
  - 177 kW – 328 kW (greater potential associated with more reliable source options)
  - At full pool, 160-foot drop

#### Cost Estimate

- \$5,900 - \$11,500 per acre-foot
- Total Relative Construction Cost \$118,270,000 - \$230,720,000



### **Potential Water Supply Needs**

- Enhance water budget by diverting during period of high flow and storing until more critical, higher demand periods in summer and early fall.
- Satisfy unmet irrigation demands in Egin Bench (more water available in Henrys Fork by reducing diversions into Crosscut canal) and Lower Watershed irrigated regions.
- Stored water may be used to satisfy needs downstream in the ESPA.
- Reservoir releases could strategically be used to enhance ecological instream flows.

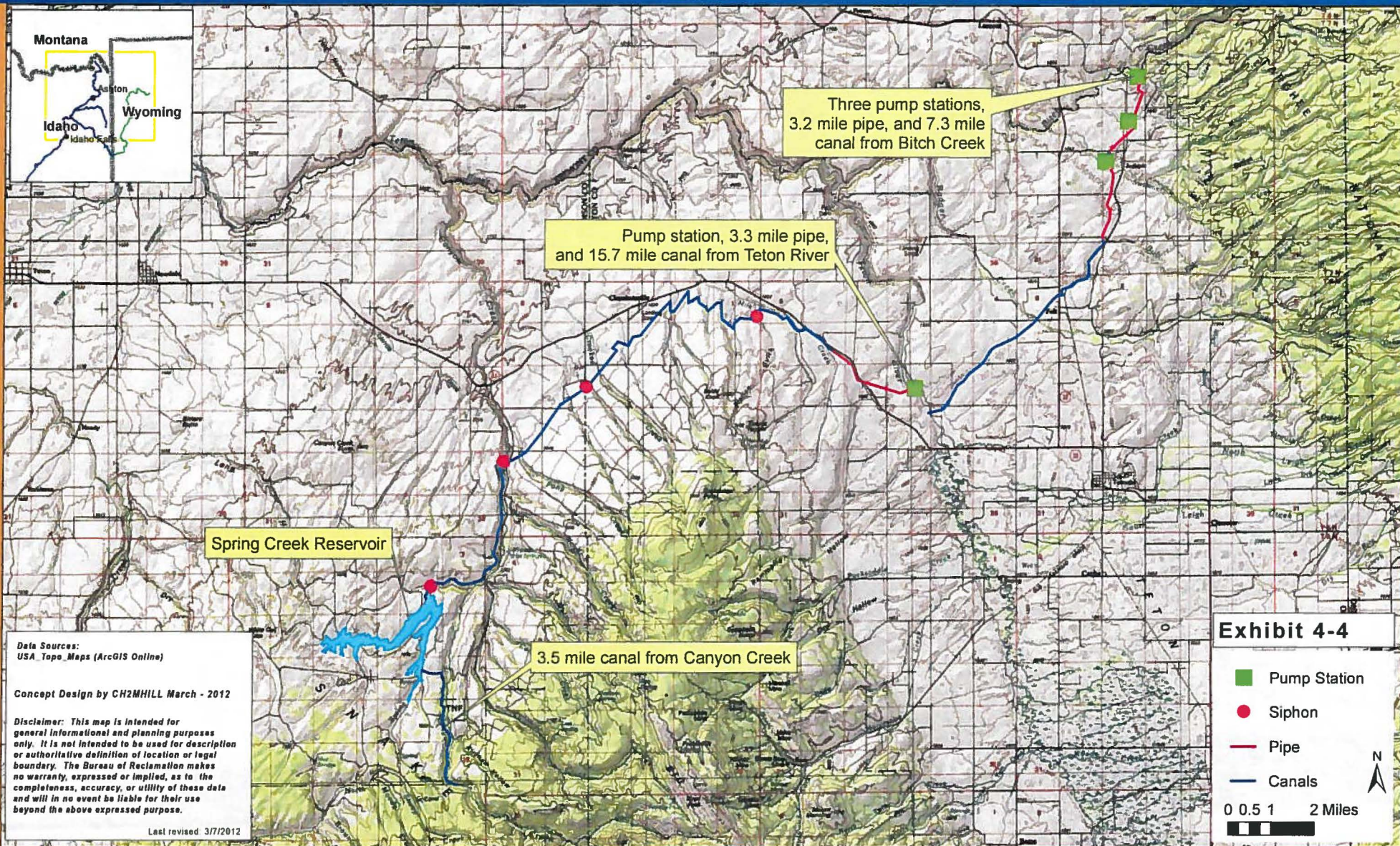
### **Environmental Benefits & Impacts**

- Change in connectivity:
  - Diversions likely to occur during excess spring runoff period.
  - Reservoir releases likely to occur during more critical low flow periods (summer and fall)
  - Potential impacts to connectivity in segments of supply sources including Spring Creek, Canyon Creek, Bitch Creek, and Teton River.
  - Improve connectivity of downstream river segments including Canyon Creek, North Fork Teton River, South Fork Teton River and Lower Henrys Fork River (all have been identified as having additional ecological streamflow needs).
  - Special Designation: Potential indirect impacts to the sections of Teton River potentially eligible for Wild and Scenic River status designation.
- State Aquatic Species of Special Concern:
  - Yellowstone cutthroat trout (YCT) present in proposed reservoir area.
  - Potential impacts to source rivers which all contain “conservation populations” of Yellowstone cutthroat trout YCT (less than 10 percent genetic introgression from other species).
- Other Environmental Factors:
  - Wildlife habitat: Proposed inundation area contains winter range and migration corridors for big game
  - Federally Listed Species in the area: threatened candidate species wolverine
  - At-Risk (BLM and USFS): Sandhill crane and sharp-tailed grouse
  - Wetland/Habitat Value: No wetlands identified
  - Impacts resulting from canal and pipeline routes were not assessed

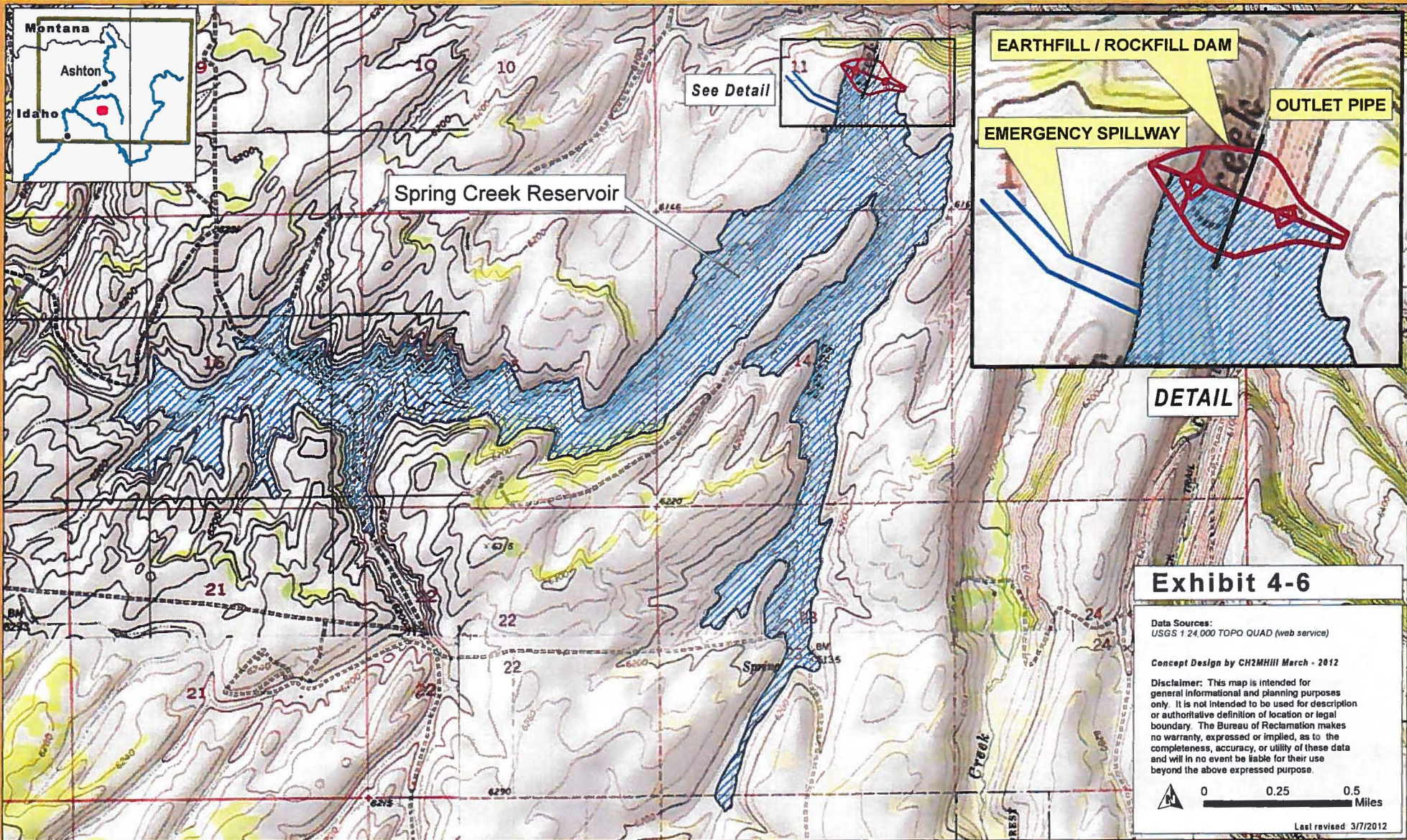
### **Land Management, Recreation and Infrastructure Impacts and Benefits**

- Land Management: located on private land and state land (moderate impact rating)
- Recreation/Economic Values: moderate impact rating due to land-based recreation (hunting & ATV use)
- Infrastructure: few impacts











# Henry's Fork Basin Study

## Upper Badger Dam Site

### Fact Sheet

---

#### Project Description

- Location: Dam site located on in Teton watershed on Badger Creek approximately 5 miles upstream of the Teton River.
- Project Variations: Proposed new 290-foot-tall dam with 47,000 acre-foot reservoir. Sub-alternatives evaluated with three different water-supply source combinations.

#### Engineering Results

- Dam Configuration:
  - Embankment – rockfill or granular earthfill dam assumed; central core with filter blanket drains and earthfill/rockfill shells; concrete grout curtain/cutoff to limit seepage through foundation.
  - Top of Dam Elevation: 5,985 feet
  - Dam Height: 290 foot high maximum
  - Length of Crest: 2,400 feet
- Reservoir:
  - Full Pool Elevation: 5,970 feet
  - Full Pool Capacity: 47,000 acre-feet
  - Maximum Reservoir Surface Area: 1,550 acres
- Conveyance:
  - Combination of pressurized pipelines, stream diversions, intake and fish screen structures.
  - Conceptual and intended for relative cost comparison
- Hydrology/Source water options studied:
  - Upper Badger Creek (natural inflow to reservoir) – will not supply full annual storage
  - Upper Badger Creek (natural inflow to reservoir) and Teton River (pump station and pipe)
  - Upper Badger Creek (natural inflow to reservoir) and Teton River (pump station and pipe at different point of diversion)
- Hydropower Potential:
  - Could vary from 840 kW – 2,430 kW (greater potential associated with more reliable source options)
  - At full pool, 590-foot drop to a facility on the Teton River

#### Cost Estimate

- \$2,700 - \$3,300 per acre-foot
- Total Relative Construction Cost \$128,940,000 - \$156,280,000



### **Potential Water Supply Needs**

- Enhance water budget by diverting during period of high flow and storing until more critical, higher demand periods in summer and early fall.
- Satisfy unmet irrigation demands in Egin Bench (more water available in Henrys Fork by reducing diversions into Crosscut canal) and Lower Watershed irrigated regions.
- Stored water may be used to satisfy needs downstream in the ESPA.
- Reservoir releases could strategically be used to enhance ecological instream flows.

### **Environmental Benefits & Impacts**

- Change in connectivity:
  - Diversions likely to occur during excess spring runoff period.
  - Reservoir releases likely to occur during more critical low flow periods (summer and fall)
  - Potential impacts to connectivity in segments of supply sources including Upper Badger Creek and Teton River.
  - Improve connectivity of downstream river segments including Badger Creek, North Fork Teton River, South Fork Teton River and Lower Henrys Fork River (all have been identified as having additional ecological streamflow needs).
  - Special Designation: Potential indirect impacts to associated sections of Teton River potentially eligible for Wild and Scenic River status designation and on Badger Creek designated as a State Recreational River.
- State Aquatic Species of Special Concern:
  - Upper Badger Creek contains a “core conservation population” of Yellowstone Cutthroat Trout (>99 percent cutthroat trout genes)
  - The reservoir area is a reach the currently provides a dry barrier during low flow periods that has prevented invasion of rainbow trout upstream. Reservoir may provide a site for establishment of rainbow trout or other species.
  - Changes to the Teton River hydrology could impact the “conservation populations” of Yellowstone cutthroat trout YCT (less than 10 percent genetic introgression from other species).
- Other Environmental Factors:
  - Wildlife habitat: Proposed inundation area contains winter range and migration corridors for big game
  - Federally Listed Species in the area: threatened grizzly bear and Canadian lynx; candidate species wolverine and greater sage-grouse
  - At-Risk (BLM, USFS, and IDFG): sandhill crane and sharp-tailed grouse
  - Wetland/Habitat Value: Moderate impact to wetlands (1-200 acres affected)
  - Impacts resulting from canal and pipeline routes were not assessed

### **Land Management, Recreation and Infrastructure Impacts and Benefits**

- Land Management: located on private land and conservation easement land (high impact rating)
- Recreation/Economic Values: high impact rating due to boating and fishing activities
- Infrastructure: few impacts



