UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Symbiotics, LLC Project No. 11879-001 – Idaho

NOTICE OF AVAILABILITY OF FINAL ENVIRONMENTAL ASSESSMENT

(April 10, 2008)

In accordance with the National Environmental Policy Act of 1969, as amended, and Federal Energy Regulatory Commission (Commission or FERC) regulations (18 CFR Part 380), Commission staff have reviewed the license application for the Chester Diversion Hydroelectric Project (FERC No. 11879) and have prepared a final environmental assessment (EA) on the proposed action. The project is located on the Henry's Fork of the Snake River in Fremont County, Idaho, downstream of some of the most well-known fly fishing areas in the country.

Symbiotics, LLC (applicant) filed an application for license with the Commission for an original license for the 3.3-megawatt (MW) Chester Diversion Hydroelectric Project, using the existing Cross Cut Diversion dam (Chester Diversion dam).[1] In this final EA, Commission staff analyzes the probable environmental effects of construction and operation of the project and have concluded that approval of the license, with appropriate staff-recommended environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

[1] The Chester Diversion dam was initially constructed as the "Cross Cut Diversion dam" because it served as the diversion dam for the Cross Cut irrigation canal. It now also serves as the diversion dam for the Last Chance irrigation canal, and because of its location near Chester, Idaho, is now referred to as the Chester Diversion dam. While both names are appropriate, we use the "Chester Diversion" moniker for consistency and clarity in this EA.

Copies of the final EA are available for review in Public Reference Room 2-A of the Commission's offices at 888 First Street, NE, Washington, DC. The final EA also may be viewed on the Commission's Internet website (www.ferc.gov) using the "eLibrary" link. Additional information about the project is available from the Commission's Office of External Affairs, at (202) 502-6088, or on the Commission's website using the eLibrary link. For assistance with eLibrary, contact FERCOnlineSupport@ferc.gov or call toll-free at (866) 208-3676, or for TTY contact (202) 502-8659.

Kimberly D. Bose,
Secretary.

FINAL ENVIRONMENTAL ASSESSMENT

CHESTER DIVERSION HYDROELECTRIC PROJECT

(Project No. 11879-001)

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, N.E.
Washington, DC 20426

APRIL 2008

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ACRONYMS AND ABBREVIATIONS

ADA	Americans with Disabilities Act
Advisory Council	Advisory Council on Historic Preservation
AIR	additional information request
APE	area of potential effects
applicant	Symbiotics, LLC
B.P.	years before present
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
Commerce	U.S. Department of Commerce
Corps	U.S. Army Corps of Engineers
CVM	contingent valuation method
DO	dissolved oxygen
EA	environmental assessment
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ERI	Ecosystems Research Institute
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Department of Agriculture, Forest Service
FPA	Federal Power Act
FWS	U.S. Department of Interior, Fish and Wildlife Service
HAER	Historic American Engineering Record
HPMP	Historic Properties Management Plan
DEQ	Idaho Department of Environmental Quality
Fish and Game	Idaho Department of Fish and Game
Parks and Recreation	Idaho Department of Parks and Recreation
Interior	U.S. Department of the Interior
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
mg/l	milligrams per liter
msl	mean sea level
MW	megawatts
National Register	National Register of Historic Places
NGO	nongovernmental organization
O&M	operations and maintenance
PA	Programmatic Agreement
REA	ready for environmental analysis
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Settlement	Settlement Agreement

Settlement Parties	Signatories to the Settlement Agreement (Symbiotics, Forest Service, FWS, Idaho Fish and Game, Idaho Parks and Recreation, Trout Unlimited, Henry's Fork Foundation, Great Yellowstone Coalition)
SD1	Scoping Document 1
SHPO	State Historic Preservation Officer
TCM	travel cost method
TMDL	total maximum daily load

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SUMMARY

On May 20, 2004, Symbiotics, LLC (applicant) filed an application for license with the Federal Energy Regulatory Commission (Commission or FERC) for an original license for the 3.3-megawatt (MW) Chester Diversion Hydroelectric Project, FERC No. 11879. The applicant proposes to use the existing Cross Cut Diversion dam (Chester Diversion dam) on the Henry's Fork of the Snake River in Fremont County, Idaho, downstream of some of the most well-known fly fishing areas in the country. The proposed project would not occupy any federal lands.[2]

On October 26, 2007, the applicant filed a comprehensive Settlement Agreement (Settlement) with the Commission that replaces the proposed action outlined in the license application and analyzed in the September 2007 EA. The terms of the Settlement include a range of measures to be included within the license for the proposed Chester Diversion Project and several measures to be implemented outside of any license order issued for the proposed project. The applicant also noted that mitigation measures in the Settlement negated the need for several measures initially proposed by the applicant or requested by signatories to the agreement. Some of the measures no longer included in the proposed action or agency recommendations included mitigation for the loss of riverine habitat, multi-year electrofishing surveys, upland steppe habitat mitigation, and underground placement of the transmission line.

The key environmental issues associated with the proposed Chester Diversion Project include maintaining suitable habitat for the Henry's Fork blue-ribbon trout fishery, protecting riparian vegetation, and providing public access to the project area. Installation of a powerhouse at the existing dam and redirection of flows could lead to increased entrainment and loss of fish. Furthermore, the installation of a rubber dam to increase water elevation would extend the existing reservoir further upstream in the Henry's Fork and further upstream in the Falls River tributary, leading to a loss of existing riparian habitat and riverine habitat. Screening the turbine intake and both canal intakes, restoring riparian habitat, and constructing new recreational access areas would mitigate for any project effects on these resources.

[2] The proposed project would use the existing Cross Cut Diversion dam (also known as the Chester Diversion dam), formerly part of the U.S. Bureau of Reclamation's (Reclamation) Minidoka Project. On September 10, 2004, Reclamation transferred to the Fremont-Madison Irrigation District (by quitclaim deed) Reclamation's title to the Chester Diversion dam, portions of the Cross Cut Canal, and related tracts of land. Reclamation did not retain any rights to oversee operations or safety of the dam or the other transferred properties. Thus, the ownership, operation, and maintenance of the dam, canal, and related lands are entirely under non-federal control.

The proposed project facilities would be located on an existing dam owned and operated by the Freemont-Madison Irrigation District. In addition to the existing reservoir and the Chester Diversion dam with a crest length of 355 feet and a structural height of 17 feet, the proposed project would include the following facilities to be constructed: (1) a 38-inch-high inflatable rubber dam bolted to the crest of the existing spillway, that, when inflated creates a reservoir with a water surface elevation of 5,043.7 feet; (2) a 50-foot-wide concrete intake structure on the south side of the existing spillway conveying water to the turbines; (3) a sluiceway/logway adjacent to the intake structure on the south end of the spillway; (4) fish screens to prevent entrainment into the turbines and canal intake structures; (5) a new Cross Cut irrigation canal headworks located approximately 20 feet upstream of the existing control gate structure; (6) two Kaplan-type turbine generator units with a combined generating capacity of 3.3 MW; (7) a low-profile powerhouse containing the two generating units; (8) a concrete wall, located immediately below the powerhouse; (9) a transmission line that would extend about 1.4-miles from the powerhouse along an access road right-of-way to connect to an existing substation; and (10) appurtenant facilities. The estimated average annual generation would be 16,800 MWh. Symbiotics proposes to operate the project in a run-of-river mode using water not utilized for irrigation that currently spills over the dam.

In this final environmental assessment (EA), we analyze and evaluate the environmental effects associated with the issuance of a license for construction and operation of the proposed hydropower project, and recommend conditions for inclusion in any licenses issued. For any licenses issued, the Commission must determine that the project adopted will be best adapted to a comprehensive plan for improving or developing the waterway. In addition to the power and development purposes for which licenses are issued, the Commission must give equal consideration to energy conservation and the protection and enhancement of fish and wildlife, aesthetics, cultural resources, and recreational opportunities. This final EA for the Chester Diversion Project reflects the Commission staff's consideration of these factors.

Based on our analysis of the environmental effects of the proposed project, we recommend licensing the project as proposed by Symbiotics in the Settlement, with additional measures proposed by staff. The recommended staff modifications and additional measures include, or are based in part on, recommendations made by federal and state agencies and other entities that have an interest in the resources potentially affected by project construction and operation. We recommend most of the measures proposed by Symbiotics[3] for the protection and enhancement of environmental resources in the project area, including:

[3] In some cases (italicized), we incorporated minor modifications to the applicants' proposal in order to include a more specific recommendation.

- Operate the project in run-of-river mode.
- Develop and implement an erosion control plan.
- Monitor water quality before, during, and after construction.
- Provide a 25-cfs bypass flow through the sluiceway (logway) to allow downstream fish passage.
- Install a 1.5-inch mesh screen at the turbine intake to prevent entrainment of downstream migrating adult trout.
- Install 0.25-inch mesh screens at the Last Chance and Cross Cut Canals to prevent entrainment of downstream migrating adult trout.
- Develop a landscape plan prior to ground disturbance which includes establishing foot and vehicle access routes to protect vegetation from trampling, planting native shrubs totaling 500 square feet to improve the aesthetics of the powerhouse and associated structures, and planting native bunchgrasses totaling 500 square feet to improve the aesthetics of developed areas; re-seed all disturbed areas with a native grass mix; control noxious weeds and introduced grasses in the project area to allow establishment of native plantings, including funding the maintenance of all plantings and control of noxious weeds in the project's O&M budget; retain all mature cottonwoods when possible. If avoidance is not possible, plant three cottonwoods at least 6 feet high for every one cottonwood that is harmed; minimize the duration of construction to curtail disturbance to all wildlife.
- Construct the project between May 16 and the end of February to minimize disturbance to nesting bald eagles.
- Mark the 15-kV primary transmission line to minimize avian collision hazards.
- To protect riparian vegetation, limit vehicle parking and traffic to established areas to minimize disturbance of remaining and re-established riparian vegetation; exclude grazing from the riparian zone to minimize trampling and allow establishment of new shoots; plant and protect native riparian shrubs along both banks where vehicle traffic and trampling have prevented establishment of vegetation; do not raise the forebay level following construction prior to the accustomed high water period of mid-May to protect early nesting waterfowl; provide onsite rehabilitation and plantings to protect riparian vegetation and allow for expansion of the riparian zone in conjunction with elevated water levels; consult with local agencies to determine best

management practices when controlling weeds and reed canary grass in proximity to moving water.

- Develop an information and education plan that identifies locations for maps, signs, information boards, brochures, and other materials informing the public about opportunities for recreation and aesthetic use in and adjacent to the project area. *Develop and construct an information and education kiosk at Chester Diversion dam.*

- Provide enhancements to the boat launches upstream and downstream of Chester dam to reduce erosion and improve stability (e.g., re-surface boat launches with concrete); upgrade angler access below Chester Diversion dam through the development of an improved trail to the river, between the boat launch and the powerhouse tailrace; grade and widen the roads and bridges, as necessary, to ensure safe use by passenger vehicles and vehicles with trailers; provide public access during construction via the development of a temporary recreation access management plan. *Expand and improve the parking area between the two upgraded boat launches to accommodate 20 cars and trailers, include trash receptacles, and install vault toilets at each launch site.*

- Design any buildings for the proposed project to be aesthetically pleasing and construct any facilities out of a material and in a design to blend with the natural environment, including vegetative screening.

After evaluating Symbiotics' proposal and recommendations from resource agencies and other interested parties, we considered what, if any, additional environmental measures would be necessary or appropriate to include in any license issued for the Chester Diversion Hydroelectric Project. For reasons outlined in sections V and VII of this final EA, we altered our list of additional recommended measures since the issuance of the September 2007 EA, including the addition of one measure (turbidity and water temperature monitoring). Other measures we recommended (marking the transmission line, providing access during construction, screening of the irrigation canals) are now included in the applicant's proposal as a result of the Settlement. In addition, several measures originally included in the September 2007 EA (mitigation for loss of upland steppe habitat) are no longer recommended.

The additional measures we recommend include:

- Inclusion of turbidity and water temperature as parameters in the proposed water quality monitoring program.

- Prepare a plan that includes testing to address the effectiveness of the screens and ensure the screens are meeting design objectives.

- Conduct additional multi-year electrofishing surveys periodically in the project vicinity both prior to and during project operation to document population size and size structure of resident trout. Additional information on presence, abundance, and spatial distribution of cutthroat trout in the project vicinity would be gathered during these surveys.

- Consult with Idaho Fish and Game on the preparation of a habitat enhancement plan for mitigation of the impacts of modification of up to 1,300 feet of riverine habitat in the Henry's Fork and in the Falls River as a result of raising the water surface level of the Chester dam pool by 38 inches. The plan should focus on habitat enhancement that could be completed in the immediate project area, and should include quantification of the habitat that would be modified in the Henry's Fork and in the Falls River.

- Expand the project boundary to include the entire Chester Diversion dam, all project recreational facilities and parking areas, as well as all of the additional backwatered areas upstream of the dam resulting from increased reservoir elevations.

- Within six months of license issuance, and in consultation with the Idaho SHPO, complete an archaeological survey on unsurveyed portions of the APE prior to any ground disturbance.

- Within one year of license issuance, revise, finalize, and implement the HPMP in consultation with the Idaho SHPO and Shoshone-Bannock Tribes.

Overall, these measures, along with the standard articles provided in any license issued for the project, would protect water quality, fisheries, wetlands, wildlife, recreation, visual, and cultural resources within the project area. In addition, the electricity generated by the project would be beneficial because it would reduce the use of fossil-fueled, electric generating plants; conserve non-renewable energy resources; and continue to reduce atmospheric pollution.

In section VI, *Developmental Analysis*, we estimate the annual net benefits of operating and maintaining the project as proposed by Symbiotics and as recommended by staff. Our analysis shows that the project power, as proposed by Symbiotics, at current power values, would cost annually $29,270, or $1.75/MWh, less than the likely cost of alternative sources of power. For the staff-recommended alternative, the project power would cost annually $20,800, or $1.25/MWh, less than the likely cost of alternative power.

On the basis of our independent analysis, we conclude that issuing a new license for the project, with the environmental measures that we recommend, would not be a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF ENERGY PROJECTS
DIVISION OF HYDROPOWER LICENSING

Chester Diversion Hydroelectric Project
FERC Project No. 11879-001
Idaho

I. APPLICATION

On May 20, 2004, Symbiotics, LLC (applicant) filed an application with the Federal Energy Regulatory Commission (Commission or FERC) for an original license for the 3.3-megawatt (MW) Chester Diversion Hydroelectric Project, FERC No. 11879, using the existing Cross Cut Diversion dam (Chester Diversion dam) on the Henry's Fork of the Snake River in Fremont County, Idaho (figure 1). The project would generate approximately 16,800 megawatt-hours (MWh) per year. The proposed project facilities would be located on an existing dam owned and operated by the Freemont-Madison Irrigation District and would not affect any federal lands.[4]

II. PURPOSE AND NEED FOR ACTION

A. PURPOSE OF ACTION

The Commission must decide whether to license the project and what conditions, if any, should be placed on any license issued. In this final environmental assessment (EA), we assess the effects of project construction and operation, alternatives to the proposed project, and a no-action alternative, and recommend conditions to become part of any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project would be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power

[4] When Symbiotics filed the license application for the Chester Diversion Hydroelectric Project, the diversion dam was owned by the U.S. Department of the Interior, Bureau of Reclamation; on September 10, 2004, the Bureau of Reclamation conveyed ownership of the diversion dam to the Fremont-Madison Irrigation District. The Bureau of Reclamation did not retain any rights to oversee operations, maintenance, or safety of the dam. *See* the August 10, 2007 Commission staff letter to the Bureau of Reclamation and the Bureau of Reclamation's reply letter, filed September 10, 2007. Thus, the ownership, operation, and maintenance of the dam, and related canal facilities and lands are entirely under non-federal control.

and developmental purposes for which licenses are issued (e.g., flood control, irrigation, and water supply), the Commission must give equal consideration to the purposes of energy conservation; the protection of and mitigation of damage to fish and wildlife (including related spawning grounds and habitat); the protection of recreational opportunities; and the preservation of other aspects of environmental quality.

B. NEED FOR POWER

The proposed Chester Diversion Project would provide hydroelectric generation to meet part of Idaho's power requirements as well as resource diversity and capacity needs. The project would have an installed capacity of 3.3 MW and generate approximately 16,800 MWh per year.

The North American Electric Reliability Council (NERC) annually forecasts electrical supply and demand nationally and regionally for a 10-year period. The Chester Diversion Project would be located in the Northwest Power Pool (NWPP) [5] region of the Western Electricity Coordinating Council. According to NERC's 2007 forecast, winter total internal demand for the NWPP region is projected to grow at an annual rate of 1.5 percent, from 2007 through 2016. Annual energy requirements are projected to grow at a rate of 1.7 percent for the U.S. areas.

NERC projects resource capacity margins (generating capacity in excess of demand) are expected to exceed 20 percent during the period 2006-2012, which includes estimated new capacity additions (NERC, 2006). Over the next 10 years, the NWPP estimates that about 8,811 MW of additional capacity will be brought on line in the region; however, almost all of the additional 1,278 MW of conventional hydroelectric capacity will be located in Canada.

We conclude that power from the Chester Diversion Project would help meet a need for power in the NWPP region in both the short term and long term. The project would provide low-cost power that displaces non-renewable, fossil-fired generation and contributes to a diversified generation mix. Displacing the operation of fossil-fueled facilities avoids some power plant emissions and creates an environmental benefit.

[5] The NWPP area is comprised of all or major portions of the states of Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming; a small portion of northern California; and the Canadian provinces of British Columbia and Alberta.

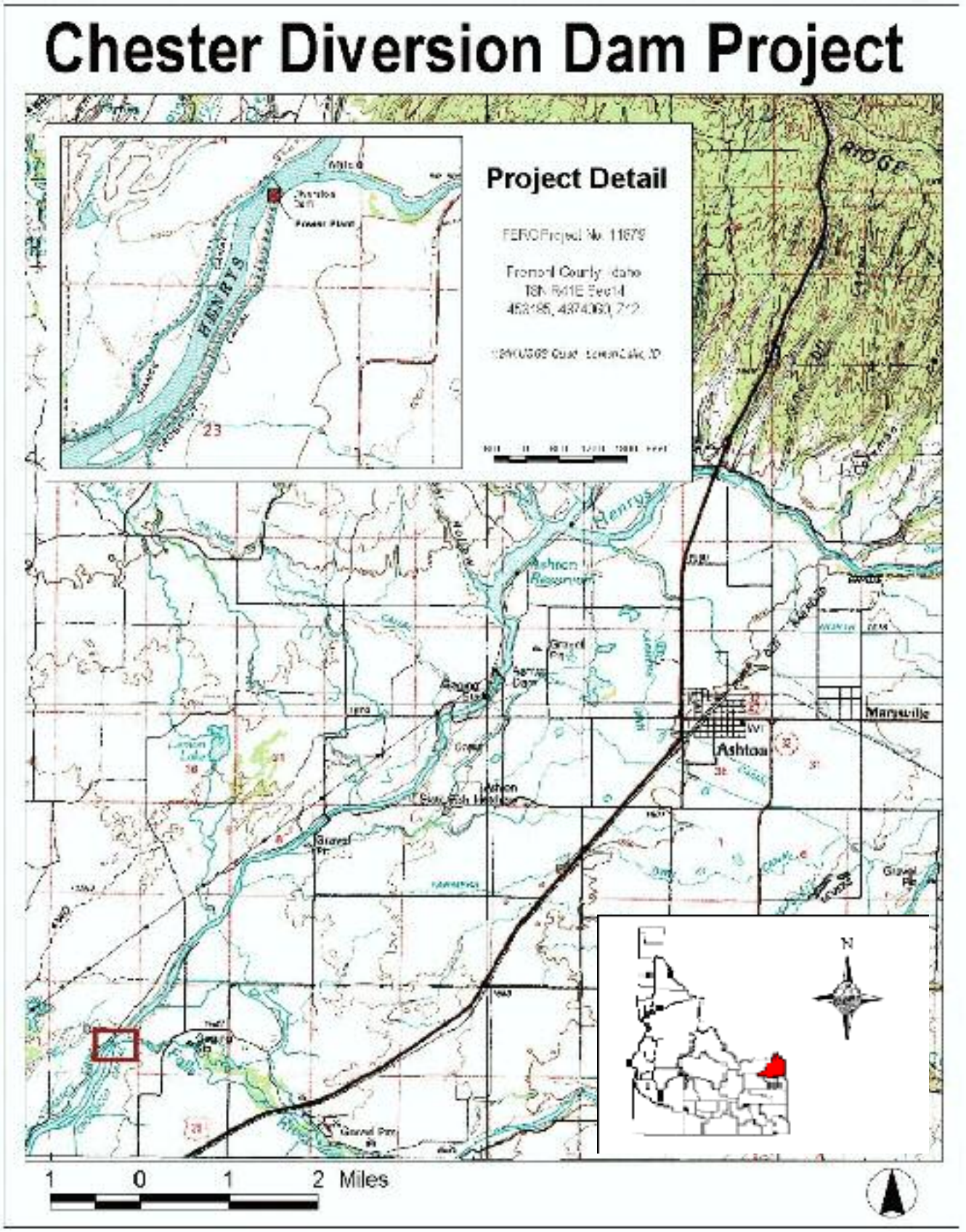


Figure 1. Chester Diversion Project location map. (Source: Symbiotics, 2004)

III. PROPOSED ACTION AND ALTERNATIVES

A. APPLICANT'S PROPOSAL

The applicant proposes to construct a new 3.3-MW hydroelectric station at an existing irrigation water supply dam (Chester Diversion dam) on the Henry's Fork of the Snake River between Ashton and St. Anthony, Idaho, immediately downstream of the confluence with the Falls River. Chester Diversion dam and associated canals were constructed in 1938 as part of the Minidoka Project by the U.S. Department of Interior, Bureau of Reclamation (Reclamation) to provide water for irrigation. On October 26, 2007, the applicant filed a comprehensive Settlement Agreement (Settlement) that included proposed measures to replace the applicant's proposed action as identified in the license application.

1. Project Description

The Chester Diversion dam is a concrete structure with a crest length of 355 feet and a structural height of 17 feet. The spillway crest elevation is 5,040.5 feet above mean sea level (msl). At a water surface elevation of 5,040.5 feet msl, the existing reservoir has a surface area of about 34 acres. The discharge capacity of the structure is greater than 12,000 cubic feet per second (cfs). There is one radial gate on the south side, which controls the flows into the Cross Cut irrigation canal with a maximum capacity of 591 cfs, and another smaller radial gate on the opposite side of the structure controlling flow to the Last Chance irrigation canal with a capacity of 225 cfs. The dam effectively raises the water level 10 feet above the stream bed of the Henry's Fork to provide diversion of waters to the Cross Cut and Last Chance irrigation canals. The Cross Cut irrigation canal is about 6 miles long and delivers water to the Teton River near Newdale, Idaho. The Teton River flows into the Henry's Fork about 10 miles downstream of Chester dam.

In addition to the existing reservoir and Chester dam, the proposed project (see figure 2) would consist of the following facilities to be constructed: (1) a 38-inch-high inflatable rubber dam bolted to the crest of the existing spillway, that, when inflated, creates a reservoir with a water surface elevation of 5,043.7 feet msl; (2) a 50-foot-wide concrete intake structure on the south side of the existing spillway conveying water to the turbines; (3) a sluiceway/logway adjacent to the intake structure on the south end of the spillway; (4) fish screens to prevent entrainment into the turbines and canal intake structure; (5) a new Cross Cut irrigation canal headworks located approximately 20 feet upstream of the existing control gate structure; (6) two Kaplan-type turbine generator units with a combined generating capacity of 3.3 MW; (7) a low-profile powerhouse containing the two generating units; (8) a concrete wall, located immediately below the powerhouse; (9) a primary transmission line that would extend about 1.4-miles from the powerhouse along the access road right-of-way to connect to an existing substation; and

(10) appurtenant facilities. The estimated average annual generation would be 16,800 MWh.

2. Proposed Project Operation

Operation of the proposed Chester Diversion Project would depend on flows in the Henry's Fork and on the irrigation season. The applicant proposes to operate the project in a run-of-river mode with limited storage. After irrigation needs are met, up to 3,500 cfs would be diverted into the proposed powerhouse for generation. Any flows greater than both irrigation and power needs would spill over Chester dam.

The applicant also proposes to provide a 25 cfs bypass flow through the sluiceway/logway to allow downstream fish passage. Flow used by the powerhouse would be released back into the Henry's Fork of the Snake River immediately below Chester dam. A concrete wall, located immediately downstream of the powerhouse, would direct flow back into the Henry's Fork. The same volume of flow would continue to flow passed the dam, but the project would move water currently spilling over the dam crest to a release location within the south abutment of the dam. Even with a proposed powerhouse hydraulic capacity of 3,500 cfs, on an average basis, flows would continue to spill over the structure between mid-April and July 1, with a typical peak spillage flow of 2,500 cfs over the diversion in mid-May. For most of the remainder of a typical year, flows would pass through the proposed powerhouse on the south side of the dam and into the irrigation canals during the irrigation season. With the use of the inflatable rubber dam, the proposed project would maintain a constant elevation at the high water mark of 5,043.7 feet msl (38 inches above the spillway crest of 5,040.5 feet msl). Currently, higher flows seasonally inundate the area up to elevation 5,043.7 feet msl.

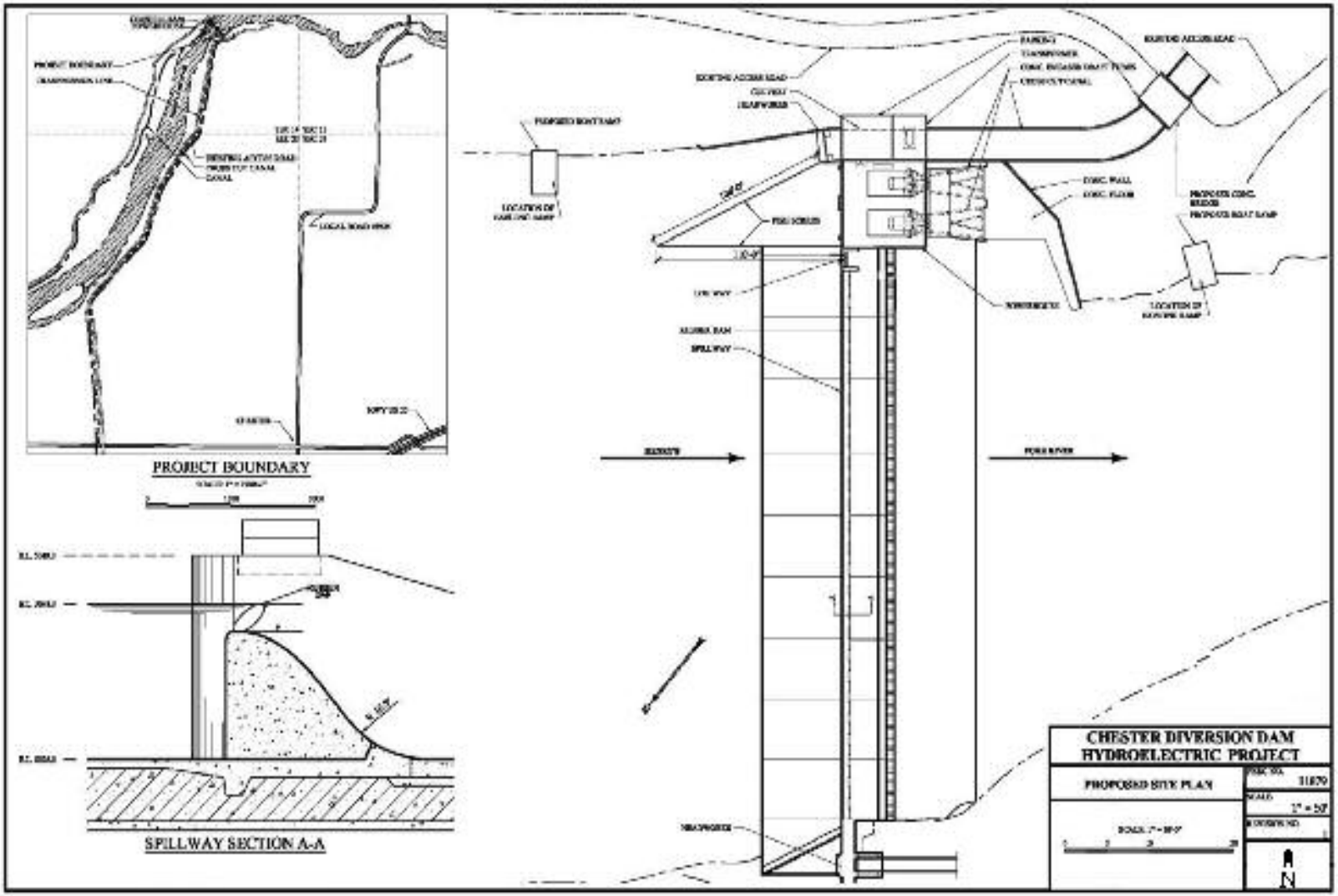


Figure 2. Proposed project facilities. (Source: Symbiotics, 2004)

3. Proposed Environmental Measures

Symbiotics proposes the following protection, mitigation, and enhancement measures:

Geology and Soil Resources

- Develop and implement an erosion control plan.
- Monitor water quality before, during, and after construction.

Aquatic Resources

- Install 1.5-inch mesh screens at the turbine intake to prevent entrainment of downstream migrating adult trout.
- Install 0.25-inch mesh screens across both the Last Chance and Cross Cut canals.
- Construct a downstream bypass facility that returns screened fish to the river and operate the project to provide continuous and sufficient bypass flows doe downstream fish migration.

Terrestrial Resources

- Develop a landscape plan prior to ground disturbance which includes establishing foot and vehicle access routes to protect vegetation from trampling, planting native shrubs totaling 500 square feet to improve the aesthetics of the powerhouse and associated structures, and planting native bunchgrasses totaling 500 square feet to improve the aesthetics of developed areas.
- Re-seed all disturbed areas with a native grass mix.
- Control noxious weeds and introduced grasses in the project area to allow establishment of native plantings, including funding the maintenance of all plantings and control of noxious weeds in the project's operations and maintenance (O&M) budget.
- Retain all mature cottonwoods, if at all possible.
- Plant three cottonwoods at least 6 feet high for every one cottonwood that is harmed, if avoidance is not possible.

- Minimize the duration of construction to curtail disturbance to all wildlife.
- Construct the project between May 16 and the end of February to minimize disturbance to nesting bald eagles.
- Limit vehicle parking and traffic to established areas to minimize disturbance of remaining and re-established riparian vegetation.
- Exclude grazing from the riparian zone to minimize trampling and allow establishment of new shoots.
- Plant and protect native riparian shrubs along both banks where vehicle traffic and trampling have prevented establishment of vegetation.
- Do not raise the forebay level following construction prior to the accustomed high water period of mid-May to protect early nesting waterfowl.
- Provide onsite rehabilitation and plantings to protect riparian vegetation and allow for expansion of the riparian zone in conjunction with elevated water levels.
- Consult with local agencies to determine best management practices when controlling weeds and reed canary grass in proximity to moving water.
- Mark the 15-kV primary transmission line to minimize avian collision hazards.

Recreational Resources

- Develop an information and education plan that identifies locations for maps, signs, information boards, brochures, and other materials informing the public about opportunities for recreation and aesthetic use in and adjacent to the project area.
- Provide enhancements to the boat launches upstream and downstream of Chester dam to reduce erosion and improve stability (e.g., re-surface boat launches with concrete); upgrade angler access below Chester Diversion dam through the development of an improved trail to the river, between the boat launch and the powerhouse tailrace; grade and widen the roads and bridges, as necessary, to ensure safe use by passenger vehicles and vehicles with trailers; provide public access during construction via the development of a temporary recreation access management plan.

Land Use and Aesthetic Resources

- Design any buildings for the proposed project to be aesthetically pleasing and construct any facilities out of a material and in a design to blend with the natural environment, including vegetative screening.

B. STAFF'S MODIFICATION OF THE APPLICANT'S PROPOSAL

Aquatic Resources

- Construct a continuous fish screen with 1-inch spacing that would screen both the proposed powerhouse intakes and the Cross Cut irrigation canal.

- Prepare a plan that includes testing to address the effectiveness of the project's screens to ensure the screens are meeting design objectives.

- Consult with Idaho Fish and Game and the U.S. Department of Interior, Fish and Wildlife Service (FWS) on the preparation of a habitat enhancement plan for mitigation of the impacts of modification of 1,300 feet[6] of riverine habitat in the Henry's Fork and in the Falls River as a result of raising the water surface level of the Chester dam pool by 38 inches. The plan should focus on habitat enhancement that could be completed in the immediate project area, and should include quantification of the habitat that would be modified in the Henry's Fork and in the Falls River.

Terrestrial Resources

- Develop a vegetation and wildlife management plan that provides details of the Symbiotics' proposed measures.

Recreational Resources

- Develop and construct an information and education kiosk at Chester Diversion dam and file a report within three years of license issuance indicating that all information and education measures have been implemented.

- Expand and improve the parking area between the two upgraded boat launches to accommodate 20 cars and trailers and install vault toilets at each launch site.

[6] The applicant estimated that raising the existing pool by 3 feet would extend the pool upstream by about 800 feet. Our analysis indicates that the higher pool may actually extend upstream as far as 1,300 feet in the Henry's Fork and by an unknown distance in the Falls River.

File a report within three years of license issuance indicating that all recreation measures have been completed.

Land Use and Aesthetic Resources

- Expand the project boundary to include the entire Chester Diversion dam, all project recreational facilities and parking areas, as well as all of the additional backwatered areas upstream of the dam resulting from increased reservoir elevations.

Cultural Resources

- Within six months of license issuance, and in consultation with the Idaho SHPO, complete an archaeological survey on unsurveyed portions of the APE prior to any ground disturbance.

- Within one year of license issuance, revise, finalize, and implement the HPMP in consultation with the Idaho SHPO and Shoshone-Bannock Tribes.

C. NO-ACTION ALTERNATIVE

Under the no-action alternative, the Commission would deny the license application and the project would not be constructed. There would be no disturbance of existing environmental conditions at the site. The no-action alternative serves as our baseline for comparing the effects of the applicant's proposal and other alternatives.

IV. CONSULTATION AND COMPLIANCE

A. SCOPING

We issued Scoping Document 1 (SD1) on September 9, 2005, and conducted two scoping meetings to identify potential issues associated with the Chester Diversion Project on October 6 and 7, 2005, in Rexburg, Idaho. Public notice of the scoping meetings and site visit was published in a local newspaper and in the Federal Register. We also held a site visit to the Chester dam and surrounding environment on October 6, 2005, which was attended by most of the individuals who attended the October 6, 2005, scoping meeting.

In addition to oral comments received at the scoping meetings, the following agencies, representatives, individuals, and non-governmental organizations (NGOs) filed written comments on SD1.

Entity	Date Filed
Snake River Cutthroats	November 2, 2005
Idaho Department of Fish and Game	November 15, 2005
Greater Yellowstone Coalition	November 7, 2005
Jim Mathias	November 7, 2005
U.S. Department of Agriculture, Forest Service	November 7, 2005
U.S. Fish and Wildlife Service	November 9, 2005

We reviewed the comments presented at the scoping meetings and the written comments filed during the scoping comment period. We concluded that no new substantive issues were raised in the comments, so our SD1 adequately presents our view of issues and alternatives to be considered in the September 2007 and final EA.

B. INTERVENTIONS AND COMMENTS

On May 12, 2006, the Commission issued a public notice accepting the application and soliciting motions to intervene. On October 13, 2006, the Commission issued a notice that the application was ready for environmental analysis (REA notice) and requesting final comments, recommendations, prescriptions, and terms and conditions by December 12, 2006. The following entities filed motions to intervene in response to the acceptance notice and REA notice.

Entity	Date Filed
Greater Yellowstone Coalition	July 11, 2006
State of Idaho	July 10, 2006
Henry's Fork Foundation	July 11, 2006
Idaho Rivers United	July 11, 2006
The Snake River Cutthroats	July 11, 2006
Trout Unlimited	July 11, 2006

The following entities filed comments, recommendations, and terms and conditions in response to the REA notice.

Entity	Date Filed
Mark White	December 4, 2006
T. Dylan Mikesell	December 4, 2006

Entity	Date Filed
Greg Hull	December 5, 2006
T. Dylan Mikesell	December 4, 2007
Matthew Daly	December 6, 2006
Carl Cooper	December 8, 2006
David Katz	December 8, 2006
Steven Galbraith	December 8, 2006
Larry Lightner	December 8, 2006
J. Morgan Lake	December 8, 2006
James D. Vincent	December 8, 2006
Mark Vegwert	December 8, 2006
Jeb Blakeley	December 9, 2006
Barry L. Ross	December 11, 2006
Eugene F. and Susan E. Quinn	December 11, 2006
Chad Price	December 11, 2006
Nike Stevens	December 11, 2006
Paul F. Dremann	December 11, 2006
Scott Blackham	December 11, 2006
Rene Harrop	December 11, 2006
Jeff Armstrong	December 12, 2006
Idaho Department of Fish and Game	December 12, 2006 January 9, 2007 February 28, 2007
Robert J. Rosenberg, DDS, DScD	December 12, 2006
Roger Sherman	December 12, 2006
Russell J. Johnson	December 12, 2006
H. Bud Smalley	December 12, 2006
Daniel D. Harmon, III	December 12, 2006
Dennis L. Butcher	December 12, 2006
Diane Hargreaves	December 12, 2006
Gregg B. Messel	December 12, 2006
William M. Berry	December 12, 2006

Entity	Date Filed
Kim B. Henrie	December 12, 2006
Mark Wehri	December 12, 2006
Layne M. Hepworth	December 12, 2006
Louis F. Lanwermeyer	December 12, 2006
Henry B. Ellis	December 12, 2006
Hugo J. Melvoin	December 12, 2006
Kathleen Boone	December 12, 2006
Jim Drake	December 12, 2006
James J. Mathias	December 12, 2006
State of Idaho	December 12, 2006
Trout Unlimited	December 12, 2006
Greater Yellowstone Coalition	December 12, 2006
Idaho Rivers United	December 12, 2006
Henry's Fork Foundation	December 12, 2006
Upper Snake River Fly Fishers, Ltd.	December 12, 2006
Stephen M. Born	December 12, 2006
Mike Gibbons	December 12, 2006
Steven J. Johnson	December 12, 2006
Jeff Armstrong	December 12, 2006
Scott Blackham	December 12, 2007
Scott Lammers	December 12, 2006
A. Thomas Williams	December 13, 2006
M.R. Mickelson, M.D.	December 13, 2006
Robert B. Lowe	December 13, 2006
Matt Woodard	December 13, 2006
John and Peggy Stanchfield	December 13, 2006
Steve Lookabaugh	December 13, 2006
Jerry Crabs	December 13, 2006
Jerry Troy	December 13, 2006
Jim F. Pruett	December 14, 2006

Entity	Date Filed
John Osgood	December 14, 2006
I.T. Schwartz	December 14, 2006
Dr. Ken W. Bosworth	December 14, 2006
Sabina V. Strauss	December 14, 2006
Dave Boyden	December 15, 2006
Samuel B. Howard	December 18, 2006
Quinn Grover	December 18, 2006
Mark K. McBeth	December 18, 2006
Henry's Fork Anglers	December 18, 2006
The Snake River Cutthroats	December 19, 2006 January 26, 2007
Meaghan	December 27, 2006
Chuck Harris and Karen Jerger	January 3, 2007
U.S. Department of Agriculture, Forest Service	January 22, 2007

By letter dated January 29, 2007, the applicant filed reply comments to the terms and conditions filed by other entities. We consider all comments and recommendations made during the scoping process and in response to the REA notice in the resource sections of this final EA.

C. SEPTEMBER 2007 ENVIRONMENTAL ASESSMENT

On September 28, 2007, the Commission issued a September 2007 EA for the proposed Chester Diversion Project. Comments on the September 2007 EA were due on October 29, 2007, and the following entities commented. Our responses to these comments may be found in Appendix A.

Entity	Date Filed
Greater Yellowstone Coalition	October 24, 2007
Symbiotics	October 27, 2007
Idaho Rivers United	October 29, 2007
Henry's Fork Foundation	October 29, 2007
Trout Unlimited	October 29, 2007
Idaho Department of Parks and Recreation	October 29, 2007

Idaho Department of Fish and Game	October 29, 2007
U.S. Fish and Wildlife Service	October 30, 2007
U.S. Geological Services	October 31, 2007
Snake River Cutthroats	October 31, 2007
USDA Forest Service	November 9, 2007
U.S. Environmental Protection Agency	November 9, 2007

D. SETTLEMENT AGREEMENT

In 2006, the applicant initiated settlement negotiations with agencies, non-governmental organizations, and other interested parties to develop an alternative that would be supported by these participants. Settlement negotiations continued through 2007 and the applicant filed a final Settlement with its comments on the September 2007 EA on October 26, 2007. The Settlement was signed by representatives from the Idaho Department of Fish and Game; the Idaho Department of Parks and Recreation; the U.S. Department of the Interior, Fish and Wildlife Service; the U.S. Department of Agriculture, Forest Service; Trout Unlimited; the Henry's Fork Foundation; and the Greater Yellowstone Coalition (collectively, the Settlement Parties).[7] In the cover letter transmitting the Settlement to the Commission, the applicant requested that the mitigation measures included in the Settlement be incorporated into the final EA and be included in any license order issued for the Chester Diversion Project. Accordingly, we consider the Settlement to represent the proposed action for this project, replacing the applicant's originally proposed action as identified in the Chester Diversion Project license application.

November 9, 2007, the Commission issued a Notice of Settlement Agreement and Soliciting Comments. The Settlement Parties and some of their constituents filed letters in support of the Settlement, stating that the applicant's obligations, as set forth in the Settlement, will resolve issues regarding fish, wildlife, recreational, and aesthetic resources associated with the proposed project. The commenting Settlement Parties requested that the Commission include all the terms and conditions included in the Settlement in any license issued for the proposed project. In addition to the letters in support of the agreement, one entity filed a letter opposing the agreement. The entities listed below filed comments in response to the Notice of Settlement. Our responses to these comments may be found in Appendix A

[7] The Snake River Cutthroats originally participated in the settlement negotiations but did not sign the agreement due to a belief that the measures included in the agreement did not provide adequate protections to the fishery and were not in the best interest of the river or the public.

Entity	Date Filed
Idaho Department of Fish and Game	November 13, 2007
Greater Yellowstone Coalition	November 20, 2007
Trout Unlimited	November 21, 2007
Idaho Department of Parks and Recreation	November 21, 2007
Henry's Fork Foundation	November 29, 2007
James Pruett	December 1, 2007
U.S. Fish and Wildlife Service	December 6, 2007
Snake River Cutthroats	December 19, 2007

E. STATUTORY REQUIREMENTS

1. Water Quality Certification

Section 401(a)(1) of the Clean Water Act and Commission regulations require that license applicants obtain either: (1) state certification that any discharge from the project would comply with applicable provisions of the Clean Water Act; or (2) a waiver of certification by the appropriate agency. The Idaho Department of Environmental Quality (Idaho DEQ) issued water quality certification for the project on May 24, 2005. In the water quality certification, Idaho DEQ states that it reviewed the Chester Diversion Project license application and, provided that the project operates as described in the application, there is reasonable assurance the project will comply with applicable requirements of the Clean Water Act and Idaho Water Quality Standards. Idaho DEQ did not attach any terms and conditions to the certificate.

2. Section 10(j) Recommendations

Under Section 10(j) of the Federal Power Act (FPA), each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying any agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

Idaho Fish and Game included 10(j) initial recommendations in its comment letter filed with the Commission on December 12, 2006. These agency-recommended measures originally included intake and turbine screening, upstream fish passage,

consultation requirements, habitat enhancement measures, and water quality plans. In comments filed on both the September 2007 EA and the Settlement, however, Idaho Fish and Game indicated that the collaboratively-negotiated Settlement contains commitments to address Idaho Fish and Game's concerns and mitigate for project effects on fish and wildlife resources. Idaho Fish and Game states that it fully supports the Settlement and requests that the Commission consider the protection, mitigation, and enhancement measures described in the agreement in the final EA and include the measures in any license issued for the proposed project.

On January 11, 2008, the Commission issued a Section 10(j) Preliminary Determination of Inconsistency letter, requesting clarification from Idaho Fish and Game regarding its section 10(j) recommendations. Idaho Fish and Game responded to the Commission's letter on February 1, 2008, indicating its comments filed on the September 2007 EA and the Settlement address the original section 10(j) recommendations and the agency reiterated its wishes that the Commission accept the Settlement as proposed by the signatories. Accordingly, we consider the measures to protect fish and wildlife resources set forth in the Settlement to represent Idaho Fish and Game's new section 10(j) recommendations, replacing the agency's original December 12, 2006, recommendations. Table 15, in Section VIII (below), lists each of the new recommendations subject to section 10(j) and whether the recommendations are recommended for adoption under the staff alternative. Recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA. All recommendations are addressed in the specific resource sections of this final EA.

3. Section 18 Prescription

Section 18 of the FPA provides that the Commission must require a licensee to construct, operate, and maintain such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, as appropriate. Neither Interior nor Commerce prescribed fishways for the project. Interior was a signatory to the October 26, 2007 Settlement filed by the applicant, however, and in the agreement, Interior states that it reserves its authority to prescribe fishways pursuant to section 18 of the FPA.

4. Endangered Species Act

Section 7 of the Endangered Species Act, 16 U.S.C. §1536(a), requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of threatened or endangered species, or result in the destruction or adverse modification of any designated critical habitat of such species. Federal agencies are required to consult with FWS when a proposed action may adversely affect listed species.

The project would have no effect on the federally-listed threatened Ute ladies'-tresses (*Spiranthes diluvialis),* the endangered Utah valvata snail *(Valvata utahensis),* or the whooping crane (*Grus americana*), which is considered an experimental population by FWS. See section V.C.5, *Threatened and Endangered Species,* for our analysis.

5. Section 4(e) Conditions

The Chester Diversion Hydroelectric Project would not occupy or affect any federal lands or reservations; therefore, no federal agency filed terms and conditions pursuant to section 4(e) of the FPA.

6. Section 106 Consultation

Licensing is considered an undertaking within the meaning of section 106 of the National Historic Preservation Act of 1966, as amended.[8] Section 106 requires that every federal agency "take into account" how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

As described further in section V.C.8, *Cultural Resources,* to meet the requirements of section 106, the Commission will execute a Programmatic Agreement (PA) for the protection of historic properties from the effects of the construction and operation of the Chester Diversion Project. The terms of the PA would ensure that the applicant addresses and treats all historic properties identified within the project area through an HPMP. The HPMP entails on-going consultation involving historic properties for the term of the license. On September 24, 2007, we issued our draft PA and no entities filed comments. Accordingly, we issued a final PA for signature on February 29, 2008.

V. ENVIRONMENTAL ANALYSIS

In this section, we first describe the general environmental setting in the vicinity of the project and any environmental resources that could be cumulatively affected by licensing the Chester Diversion Project. Then, we address each affected environmental resource. For each resource, we first describe the affected environment—the existing condition and the baseline against which to measure the effects of the proposed project and any alternative actions—and then the environmental effects of the proposed project, including proposed enhancement measures. Our final recommendations regarding each resource are found in section VII, *Comprehensive Development and Recommended*

[8] Public Law 89-665; 16 U.S.C. §470.

Alternative. Unless otherwise stated, information in the following sections is from the license application for the project (Symbiotics, 2004).

A. GENERAL DESCRIPTION OF THE LOCALE

The proposed project would be located on the Henry's Fork of the Snake River in Fremont County, between St. Anthony and Ashton, Idaho, just below the confluence of the Falls River. The project area is located in the upper Snake River Plain, which is a predominantly flat agricultural area at an elevation of about 5,000 feet, located to the west of the Grand Teton mountain range. The Henry's Fork of the Snake River flows generally towards the southwest to its confluence with the Snake River south of the city of Rexburg. The portion of the Henry's Fork in the project reach has a gradient of about 15 feet per mile and is excellent coldwater fisheries habitat, supporting a "blue-ribbon" trout fishery.

The local climate features cold winters and warm, relatively short summers. Annual precipitation ranges from near 15 inches in the immediate project area to more than 30 inches, most of which falls as snow, in the mountainous headwaters of the basin. Irrigated farmland and dry sagebrush plains surround the Henry's Fork, with a narrow riparian zone along the immediate river bank. Conifer forests cover the higher elevations of the headwaters which include portions of the Caribou-Targhee National Forest and Yellowstone National Park. Agricultural production has traditionally supported the local economy. Freemont County covers 1,877 square miles and had a population of 11,594 based on the 1996 census (Fremont County, 1996).

B. CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (50 CFR §1508.7), a cumulative effect is the effect on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities.

Based on information in the license application, agency comments, other filings related to the project, and preliminary staff analysis, we identified the resources that have the potential to be cumulatively affected by the operation of the proposed project in combination with other activities in the Henry's Fork Snake River sub basin. Those resources are water quality and fisheries.

1. Geographic Scope

The geographic scope of the analysis defines the physical limits or boundaries of the proposed action's effects on the resources. Because the proposed action would affect the resources differently, the geographic scope for each resource may vary.

For water quality, we consider cumulative effects in the Henry's Fork Snake River sub basin from the upstream Vernon (Fritz) Bridge (about 3 miles upstream) to the downstream Fun Farm Bridge (about 3 miles downstream). We chose this geographic scope because construction and operation of the project, in combination with the Freemont-Madison Irrigation District's operation of Chester Diversion dam, could affect water quality in this reach. The influence of the proposed project on water quality would not be felt upstream of the Vernon (Fritz) Bridge because the bridge is well upstream of the influence of the Chester dam impoundment. Fun Farm Bridge is immediately upstream of the next downstream diversion dam near Twin Groves, and any effects below that bridge would likely be a result of the lower diversion dam and not the Chester Diversion Project.

For fisheries, we consider the cumulative effects in the Henry's Fork Snake River sub basin from the upstream Ashton dam (7 miles upstream) to the downstream influence of project releases at Fun Farm Bridge (3 miles downstream). No tributaries enter the Henry's Fork between Chester dam and the downstream diversion dam near Fun Farm Bridge. We chose this geographic scope because rainbow and brown trout using this reach may be affected by the proposed project and other developments within the reach, and there may be connectivity for the reaches upstream and downstream of Chester dam.

2. Temporal Scope

The temporal scope of our cumulative effects analysis includes past, present, and future actions and their possible cumulative effects on each resource. Based on the license term, the temporal scope looks 30 to 50 years into the future, concentrating on the effect of reasonably foreseeable future actions on the resources. The historical discussion is, by necessity, limited to the amount of available information for each resource.

C. PROPOSED ACTION AND ACTION ALTERNATIVES

1. Geology and Soils

a. Affected Environment:

Geologic Setting

The project area is located in the upper Snake River Plain, which is a broad, flat arcuate depression (about 60 miles wide and 400 miles long) that is concave to the north

and covers one quarter of the State of Idaho. Elevations of the Snake River Plain decrease from 5,400 to 2,500 feet, from east to west.

The Henry's Fork originates within the Island Park caldera[9] at an elevation of 6,400 feet. The river cuts through the basalt flows creating narrow, deep canyons. Large waterfalls form as the river leaves the caldera and enters the Snake River Plain. From Ashton reservoir to St. Anthony, the average gradient of the Henry's Fork within the project vicinity drops about 15 feet per mile, or 150 feet over 10 miles. The bed elevation of the Chester dam site in the Henry's Fork is 5,026 feet. The Falls River originates in Wyoming, generally flowing west or southwest from the southwestern flank of the broad volcanic plateaus that form the core of Yellowstone National Park.

The eastern Snake River Plain is underlain by a series of Quaternary olivine basalt flows, each averaging 20 to 25 feet in thickness. Total thickness is as much as 5,000 feet. The top of each basalt flow, generally less than 6 feet thick, is highly vesicular and broken and has high hydraulic conductivity. Quaternary basalt in the eastern plain is typically within a few feet of the land surface. Near the margins of the plain, basalt is interbedded with unconsolidated sediments.

Sediment Supply to the Henry's Fork and Falls River

Both rivers feeding the Chester impoundment are controlled by dams, and as such, sediment supply to the impoundment is regulated. PacifiCorp's Ashton dam on the Henry's Fork (with a storage capacity of 9,800 acre-feet) is located 6.5 river miles upstream of the Chester impoundment and likely limits all but the finer portion of the suspended sediment load. Reclamation's much larger Island Park reservoir, upstream of Ashton dam, traps sediment from the 481 square mile drainage area upstream of Island Park dam. The largest impoundment on the Falls River, Reclamation's 15,500-acre-foot Grassy Lake reservoir, lies near the headwaters and captures just 3.65 square miles of watershed. Downstream, the diversion for the Marysville Hydroelectric Project (FERC No. 9885) is a 7-foot-high reinforced concrete dam that passes most sediment. Because of this, sediment supply into the Chester impoundment is probably dominated by the Falls River. Sediment input to the impoundment appears concentrated at the downstream end, immediately upstream of the proposed intake and powerhouse (Symbiotics, 2006).

In June 1992, during construction of the buried penstock for the Falls River Hydroelectric Project, the Marysville canal and penstock failed 12 miles upstream of the proposed project site. At that time, between 10,000 and 20,000 cubic yards of sediment (one report specifies 17,000 cubic yards [Stone and Webster Engineering Corporation, 1992]) entered the Falls River and subsequently were transported into the Henry's Fork.

[9] A caldera is a volcanic feature formed by the collapse of a volcano into itself, making it a small, special form of volcanic crater.

By August 1992, in a meeting held to discuss plans to assess environmental effects of the sediment input, it was agreed by Idaho Fish and Game, Idaho DEQ, Friends of the Falls River, the Commission, and others that "the majority of the sediments had already flushed out of the Falls River" (FERC, 1992). Reports acknowledge, however, that in the lower gradient reaches of the Falls River (near the confluence with the Henry's Fork), sediment deposition from the incident would be greater, and the transport of the material slower, than in upstream areas nearer the failure (Stone and Webster Environmental Services, 1992). The amount of sediment from the canal/penstock failure that is still stored in the channel or floodplain of the Falls River is unknown; however, most sediment has likely passed downstream of Chester dam in the 15 years since the incident. Any sediment (particularly fine sediment) in the impoundment is a function of the existing natural sediment load brought down the Falls River. This natural rate of sediment loading would be expected to continue to enter the Chester forebay.

Sediment within Chester Forebay

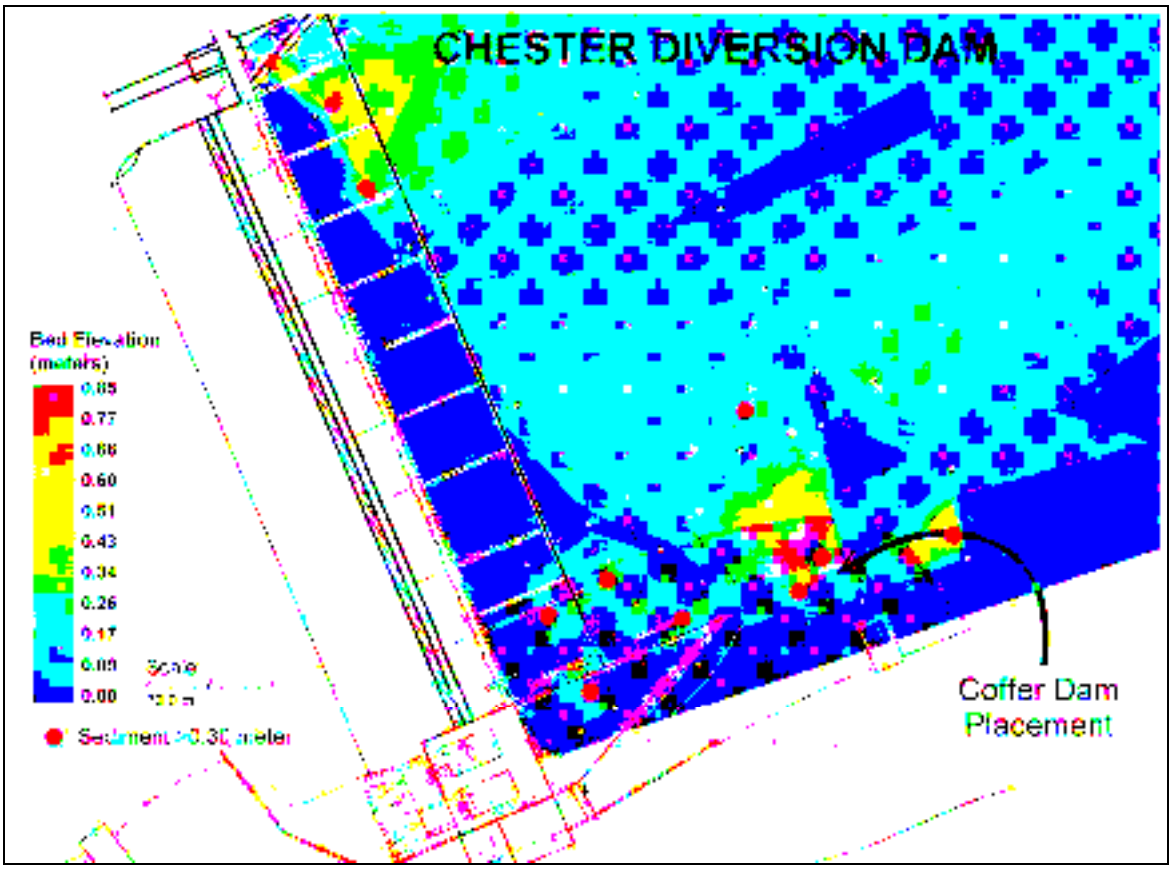
Symbiotics conducted bathymetric surveys of the river bed upstream and downstream of Chester Diversion dam in December 2004 and July 2005. It also measured bottom water velocities and sediment depths[10] at 96 locations within the Chester dam forebay. Results showed that 47 percent of the observations had no fine sediments and the bottom substrate at these sites consisted of hard compact gravels and cobbles. In addition, at 46 sites, fine sediments were less than 1 foot deep. Locations deeper than 1 foot were found at only five sites, concentrated in the area immediately upstream of the existing canal intake and downstream of the mouth of the Falls River (the downstream end of the Chester impoundment). Figure 3 shows the spatial distribution of these fine sediments.

b. Environmental Effects:

Staging for construction would occur within the already-disturbed area occupied by the existing access road and compacted area near the existing dam and canal headworks. The banks of the river immediately downstream of the dam are protected with bank revetment (boulders) about 2 to 3 feet in diameter. The lowermost one-third of the site, near the river and adjacent to the riprap banks, is characterized by cobble. The proposed concrete-lined tailrace channel would discharge flow into the river immediately downstream of the existing spillway stilling basin. Substrate in this area is large, and the banks are lined with the aforementioned boulder riprap.

[10] Although not stated in the license application, these measurements likely were made using a probe plunged into the river bed, to record the depth of fine sediment (that which could be penetrated).

Upstream of the existing dam, the stream banks are vegetated to the water's edge. Excavation of the existing bank and vegetation removal would be required to accommodate the new canal headworks (with the proposed transformer and parking area located atop the concrete headworks), and potentially for the improved boat ramp. The proposed 50-foot wide concrete intake structure (and fish screen) would be placed within the existing impoundment, upstream of the existing dam and canal intake. The powerhouse would be located on and adjacent to the dam, occupying the area of the existing canal headworks while also protruding out onto the area currently occupied by portions of the channel and dam.



Notes: Dots indicate a sediment depth of greater than about 1 foot.

Figure 3. Bed elevations and areas of fine sediment deposition within the lower Chester Diversion dam impoundment in the vicinity of the proposed project (project footprint is shown). (Source: Symbiotics, 2006)

Effects of Project Construction

Project construction presents the potential for adverse effects related to ground disturbance and sediment release, both upstream and downstream of the existing dam. Potential effects include the disturbance and/or release of sediment from the bed or banks of the river or forebay, to the Henry's Fork downstream of Chester dam. Ground surface

areas that would be disturbed include any staging areas, the access road, and the area where the proposed powerhouse and the relocated Cross Cut irrigation canal would be constructed. All of the aforementioned construction activities could release sediment to the river.

Symbiotics proposes to determine the amount and composition of sediment to be removed from the forebay during construction, and the degree of sedimentation to occur during construction; however, it also states that an estimated 980 cubic yards of material will be suction-dredged and removed to construct the fish screen and intake structure. Total depth of excavation below the elevation of the existing reservoir bottom would be about 10 feet. As mitigation for potential construction effects, Symbiotics intends to install a sheet pile cofferdam to isolate the area to be over-excavated and use a suction dredge to remove all fine sediments from the river bottom within that area. Symbiotics also proposes to prepare an erosion control plan but has not specifically proposed water quality monitoring during project construction.

The Idaho Fish and Game and the Forest Service recommend that Symbiotics conduct a study to predict sediment mobilization and transport through the forebay. Trout Unlimited and Snake River Cutthroats comment that the applicant should minimize sediment mobilization before and during construction. Trout Unlimited also requests that the sediment be stabilized in the forebay prior to construction, the applicant conduct water quality monitoring during and up to 5 years after construction, and that it mitigate for any observed impacts. Similarly, the Greater Yellowstone Coalition recommends that sediment be removed from the impoundment prior to construction and that the applicant be required to meet all water quality standards and conduct regular monitoring.

Our Analysis

Existing information indicates that some sediment accumulation occurs upstream of Chester dam, primarily located in the vicinity of the proposed powerhouse site (figure 3). The applicant, however, is proposing to isolate most of the area behind a coffer dam, and to remove that sediment by suction-dredging prior to construction. It appears unlikely that the limited sediment accumulation in the impoundment would be mobilized and passed downstream into the Henry's Fork during construction. Thus, a study to predict sediment mobilization, as recommended by Idaho and the Forest Service, and that the sediment be stabilized, as recommended by Trout Unlimited, would yield little information.

Land areas that would be disturbed during construction would have the potential to release some sediment, but the applicant is proposing to prepare and implement an erosion control plan. The erosion control plan should limit other sediment discharges to the river; however, it would be reasonable to require water quality monitoring during and after construction to ensure that water quality standards are maintained. If monitoring were to indicate violations of these standards, the applicant would be required to take

corrective actions to eliminate the violations. Trout Unlimited recommended water quality monitoring up to 5 years after construction is completed. We conclude that monitoring prior to construction (for up to 1 year) would establish baseline conditions, as would monitoring during construction (we assume a 2-year construction period), and for 2 years after construction. Two years is an adequate period for the site conditions to stabilize after completion of construction.

Effects of Project Operations

Potential operational effects would be associated with the consistently higher water levels in the existing impoundment, the release of sediment during operation of (or the cleaning and maintenance of) the intake/fish screen, changes in hydraulics downstream of the dam associated with project flow releases, and potential upland erosion because of facilities and roadways.

The recommendations of Idaho Fish and Game and the NGOs related to potential sediment effects were summarized above, associated with construction effects, although they also addressed operational effects, and included recommendations for longer-term water quality monitoring. The applicant agrees to water quality monitoring during project operation to ensure that State of Idaho turbidity standards are being met.

Our Analysis

The proposed project would maintain the Chester impoundment at an elevation of 5,043.7 feet msl using the proposed rubber dam. Based on the rating curve for the dam (see figure 4), a flow of approximately 7,200 cfs is required to raise the water level in the impoundment to an elevation of 5,043.7 feet msl under existing conditions. Based on the flow records in table 2 for USGS gage no. 13050500, Henry's Fork at St Anthony, flows in excess of 7,200 cfs only occur in the months of May and June (also see figure 5). Flows above 7,200 cfs have occurred approximately 10 percent of the days in May and less than 5 percent of the days in June. This consistently higher water surface elevation creates the potential for increased shoreline erosion in the impoundment. While the existing water surface elevation fluctuates above and below the proposed impoundment elevation depending on flow (e.g., flood events) and irrigation diversions, the proposed elevation would be sustained at a higher elevation than the current average pool elevation. Because of this, some amount of shoreline erosion is expected to occur. However, given the well-vegetated nature of the shoreline and the low, flat topography of the banks and adjacent floodplain, vegetation at the existing reservoir edge likely would adapt to inundation and vegetative succession further upslope would serve to protect the new water's edge.

The higher reservoir surface elevation also could influence sediment transport and deposition in the Henry's Fork and Falls River. We estimate that most of the sediment entering the forebay originates in the Falls River, and thus deposition is concentrated at

the downstream-most end of the reservoir. The higher water surface proposed for the project, however, could result in increased sediment deposition further upstream of the Henry's Fork than currently exists. Because flows capable of carrying sediment under current conditions (higher flows) are likely coincident with higher reservoir levels such as those proposed for this project, however, adverse effects from the change in depositional patterns are unlikely.

Project O&M could release some sediment into the impoundment or to the river downstream of the dam. Because the intake velocities at the base of the existing diversion exceed 5 feet per second and have swept adjacent fine sediments into the adjacent irrigation canal, we anticipate that flows through the powerhouse (with a 3,500-cfs capacity) would be capable of entraining sediment. With the intake located about 10 feet below the surrounding reservoir bottom (as shown in figure 2 of the Hydrodynamic Modeling study report[11]), the currently proposed configuration of the intake area is essentially a large pit in the bed of an alluvial river. We anticipate that without stabilization the steep slopes of this pit would slump over time, and also that fine sediment being transported downstream would be drawn down against, or through, the intake/fish screen. Both scenarios would result in the need to clean the screen/intake. It is unknown whether this cleaning would necessitate sediment dredging of the forebay, and if needed what measures would be taken to proceed with dredging without releasing sediment into the river below the dam. Symbiotics identifies in the license application that it would determine the amount and composition of sediment to be removed during construction. Symbiotics has not commented on sedimentation of the intake/fish screen during project operation, although it has agreed to long-term water quality monitoring during project operation. This monitoring, along with a requirement to mitigate for any violations of turbidity standards, should ensure that any operational effects related to sediment releases are minimized.

Because project operations with the proposed rubber dam would result in most of the river flows discharging from the powerhouse the majority of the time,[12] the project would change the pattern of flow passage downstream of the dam, with the potential for some erosion below the dam. Water discharging from the powerhouse would enter the river at approximately a right angle to the central axis of the river. Compared to existing

[11] Submitted to the Commission on September 2, 2005, by Symbiotics, in response to our request for additional information (Lamarra, 2005).

[12] On average, this would occur from July through the following March. During times when inflow to the impoundment exceeds the capacity of the irrigation diversions and the powerhouse (on average, from mid April through the end of June), the bladder dam would be lowered to pass those flows. At those times, water would be discharged over the dam in the same manner as under existing conditions.

conditions, discharge velocities[13] within the river under proposed conditions would decrease in areas immediately below the dam (where water was formerly passing over the spillway) and would increase as much as three times in areas near the far (right) bank and at the powerhouse outlet. Modeling for higher discharge rates follow a similar pattern, with the exception of the model run for flows at approximately 3,500 cfs (full powerhouse discharge), where the velocities are roughly comparable to those under existing conditions. Because the bed and banks of the river have been reinforced with boulder riprap revetment below the dam, we do not anticipate that bank erosion would be a substantial issue in that location. It is possible that some changes to bed topography would occur in response to the flow releases at right angle to the axis of the river, downstream of the boulder riprap revetment. This could include a switch in the thalweg (deepest part of the river chanal) from the left side of the river to the right side of the river. A shallow, submerged bar also may form immediately downstream of the powerhouse outlet and opposite the thalweg. The extent of these changes, however, would depend on the nature of the existing substrate. Based on historical pictures of the construction of Chester dam, the river bottom below the dam consists of large boulders that can make the river bottom resistant to flow-related alterations. The distance that these boulders extend downstream, however, is unknown.

Potential effects of project operation on upland areas would be primarily related to sediment release caused by concentrated runoff and erosion. The powerhouse and any surrounding paved areas would be constructed with impermeable surfaces that generate runoff. If improperly managed, that runoff could cause rill or gully erosion and transport sediment to the Henry's Fork. Similarly, any construction or staging areas, and the access road would also be susceptible to increased erosion were revegetation or recontouring work was not completed properly. However, the land surrounding the proposed site is low in gradient, substantially decreasing the potential for the concentration of flow and any resultant erosion. Additionally, all concrete areas (e.g., the powerhouse and boat ramp) would likely be designed to direct runoff into the river or canal, eliminating the potential for erosion.

Summary

The existing level of sediment loading into the Chester impoundment appears to be low to moderate. The large number of impoundments in the Henry's Fork watershed functions to trap sediments, thereby limiting the sediment supply to the proposed project area. Sediment in the Chester Dam forebay is concentrated in the vicinity of the mouth of the Falls River, leading us to conclude that the Falls River is the dominant source of sediment to the Chester Dam forebay. However, we differ with Symbiotics' belief that the fine sediment in the impoundment is a remnant of the 1992 construction accident at

[13] As shown in results of Symbiotics' hydrodynamic model (Lamarra, 2005) discharge velocities run at a flow of approximately 900 cfs.

the upstream Falls River Hydroelectric Project (FERC No. 9885). We base this on: (1) reports analyzing effects of that accident found most sediment was out of the Falls River system within the year of the accident; (2) more than 15 years have passed since the accident, providing sufficient time for any "sediment wave" to either translate and/or disperse through the system; and (3) water velocity[14] in the area of the existing Cross Cut irrigation canal diversion (which is immediately downstream of the highest concentration of fine sediment in the impoundment) is sufficient to entrain and mobilize existing sediment incoming from the Falls River into the Cross Cut irrigation canal and on through its distribution system. Because of this, we conclude that the source of fine sediment near the proposed intake structure is natural sediment, primarily from the Falls River. Because this sediment can be mobilized by average flows, it is likely replenished annually.

At a minimum, upstream sources likely contribute, on an average annual basis, a supply of fine sediment that is comparable to that surveyed in the intake area by Symbiotics. With this incoming sediment supply, we conclude that there is the potential for sediment to encroach and infill the relatively-deep area excavated to accommodate the upstream face of the intake and fish screens. If this occurred, it could pose limitations to the effectiveness of the screens and could even limit powerhouse operations. Sediment encroachment on the intake or screens could necessitate dredging to maintain conveyance and continual project operation.

c. Unavoidable Adverse Effects:

Streambank, streambed, and ground surface disturbances and/or stabilization measures—all elements of Symbiotics' proposal—may result in minor, unavoidable, short-term, localized increases in erosion.

2. Water Resources

a. Affected Environment:

Water Quantity

The project is located within the Henry's Fork River subbasin of the Snake River. The Henry's Fork of the Snake River flows generally towards the southwest to its confluence with the Snake River. Precipitation within the subbasin occurs throughout the year, but especially within the higher elevations of the watershed, where a substantial snowpack develops during the late fall, winter, and early spring. The snowmelt period,

[14] Symbiotics indicates that bottom water velocities in the area of the existing intake are 5 feet per second. We agree with Symbiotics' determination that these velocities are sediment-competent.

typically during the spring and early summer, normally provides the annual high flow period. Flow reaching Chester dam is partly regulated by dams at Henry's Lake and Island Park reservoir in the upper reaches of the watershed. In addition, the smaller Ashton dam and reservoir (normal storage of 9,800 acre-feet) is located about 6.5 river miles upstream of Chester dam.

At Chester dam, the Henry's Fork has a drainage area of 1,752 square miles as estimated by the U.S. Army Corps of Engineers' National Inventory of Dams database (Corps, 2007). The impoundment behind Chester dam extends about 3,200 feet upstream and has a maximum surface area of 34 acres. The shoreline of the impoundment generally follows the contours of the historical channel banks and is about 400 feet wide near the dam. Falls River, with a drainage area of 520 square miles, most of which is unregulated, enters the impoundment about 600 feet upstream of the dam. The dam crest is 355 feet long, and figure 4 shows the existing rating curve.

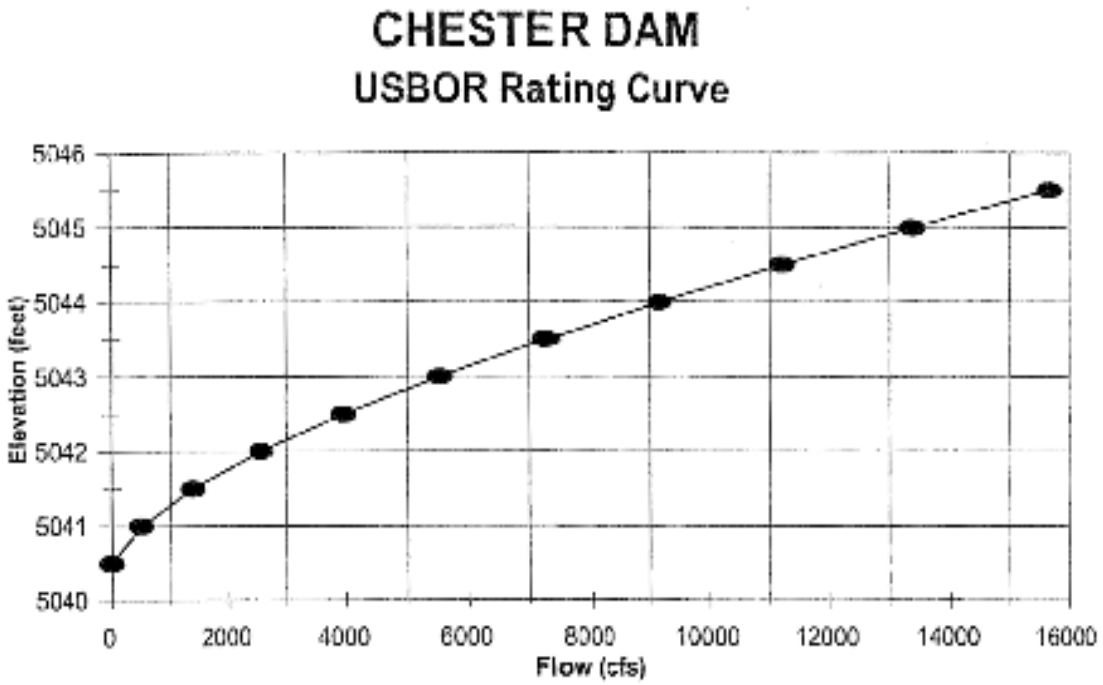


Figure 4. Rating curve for Chester Diversion dam. (Source: Symbiotics, 2006)

Intake structures for the irrigation canals are located on either side of Chester Diversion dam. The Last Chance irrigation canal structure is on the right (looking downstream) or west side of the dam and Cross Cut irrigation canal structure is on the left. The maximum hydraulic capacity is 590 cfs for Cross Cut irrigation canal and 225 cfs for Last Chance irrigation canal. Table 1 summarizes the stream flow records at gages near Chester Diversion dam; table 2 shows monthly statistics for these gages. Figure 5 graphs daily flows at the USGS gage at St Anthony, which is representative of flow over the Chester Diversion dam. This gage is below the dam and the irrigation

withdrawals associated with the Cross Cut and Last Chance irrigation canals, and has a drainage area only about 1 percent larger than the project site.

Table 1. Stream flow gages in the vicinity of the proposed Chester Diversion Project on the Henry's Fork River. (Source: USGS, 2006; Reclamation, 2006)

Gage Designation	Gage Name	Period of Record	Drainage Area (square miles)
USGS 13046000	Henry's Fork near Ashton at RM 44.2	04-01-1980 to current date	1,040
USGS 13049500	Falls River near Chester	05-18-1920 to current date	520
USGS 13050500	Henry's Fork at St Anthony at RM 32.4	03-01-1919 to current date	1,770
Reclamation CXCI	Cross Cut irrigation canal near Chester	01-01-1983 to current date	NA

Notes: Period of records contains periods, some lengthy, of missing data.
Chester Diversion dam is at about RM 38.5, about midway between USGS gage nos. 13046000 and 13050500. All three USGS gages are real-time gages.

Table 2. Monthly discharge statistics for gaging stations near Chester dam.[a] (Source: USGS, 2006; Reclamation, 2006)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Henry's Fork at Ashton, ID													
Mean	1,274	1,198	1,158	1,147	1,147	1,170	1,720	2,905	2,380	2,175	2,109	1,609	1,669
Median	1,270	1,120	1,145	1,110	1,130	1,140	1,560	2,750	2,180	2,170	2,050	1,610	1,510
Maximum	2,240	2,320	1,900	2,260	1,980	2,070	4,950	7,670	6,670	3,620	3,980	3,160	7,670
Minimum	171	405	510	375	544	582	704	1,160	1,220	1,400	1,220	769	769
10% Exceedance[b]	1,720	1,700	1,590	1,590	1,520	1,540	2,620	4,367	3,440	2,550	2,480	2,060	1,920
90% Exceedance	845	764	751	747	781	795	1,070	1,540	1,550	1,760	1,700	1,190	1,110
Falls River near Chester, ID													
Mean	466	534	511	475	462	480	833	2,117	2,038	571	301	375	764
Median	440	510	500	465	455	463	663	1,960	2,060	317	293	365	490
Maximum	1,420	1,360	1,200	1,040	705	1,130	2,880	5,210	6,050	4,190	1,050	901	6,050
Minimum	125	241	260	280	240	310	369	370	14	18	16	30	14
10% Exceedance	650	691	640	594	560	572	1,480	3,411	3,390	1,491	532	578	1,870
90% Exceedance	261	385	390	370	375	394	458	1,070	513	70	85	185	241
Henry's Fork at St Anthony, ID													
Mean	1,409	1,603	1,568	1,578	1,591	1,555	2,159	4,131	3,324	1,593	1,434	1,351	1,942
Median	1,355	1,490	1,515	1,500	1,550	1,500	1,915	3,950	3,145	1,300	1,355	1,330	1,570
Maximum	2,950	2,800	2,520	3,690	2,680	2,980	6,920	12,500	10,200	5,000	3,920	3,210	12,500[c]
Minimum	392	592	667	700	880	706	676	760	623	566	660	308	308

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
10% Exceedance	2,040	2,200	2,100	2,080	2,088	2,037	3,540	6,857	5,681	2,747	1,950	1,990	3,440
90% Exceedance	797	1,110	1,100	1,090	1,170	1,140	1,230	1,860	1,070	946	913	818	1,020
Cross-Cut Canal near Chester, ID													
Mean	94	24	11	14	10	2	41	125	233	375	349	222	180
Median	51	0	0	13	17	0	14	111	222	384	345	205	156
Maximum	401	280	256	31	27	18	228	390	596	623	593	484	623
Minimum	0	0	0	0	0	0	0	0	0	74	14	0	0
10% Exceedance	273	46	22	24	21	9	119	276	428	553	508	389	443
90% Exceedance	0	0	0	0	0	0	0	0	96	181	179	56	0

[a] USGS gage no. 13046000 Henry's Fork near Ashton, ID. Water Years 1962 to 2005.
USGS gage no. 13049500 Falls River near Chester, ID. Water Years 1962 to 2005.
USGS gage no. 13050500 Henry's Fork at St. Anthony, ID. Water Years 1962 to 2005.
Reclamation gage CXCI Cross Cut irrigation canal near Chester, ID. January 1, 1983 to September 30, 2005 (no flow many days during the non irrigation season).

[b] Percent exceedance means that 10 or 90 percent of all daily mean flows for the period of record have been greater than the value shown.

[c] Peak instantaneous streamflow for this gage during water years 1962 to 2005 is 13,200 cfs on May 16, 1984.

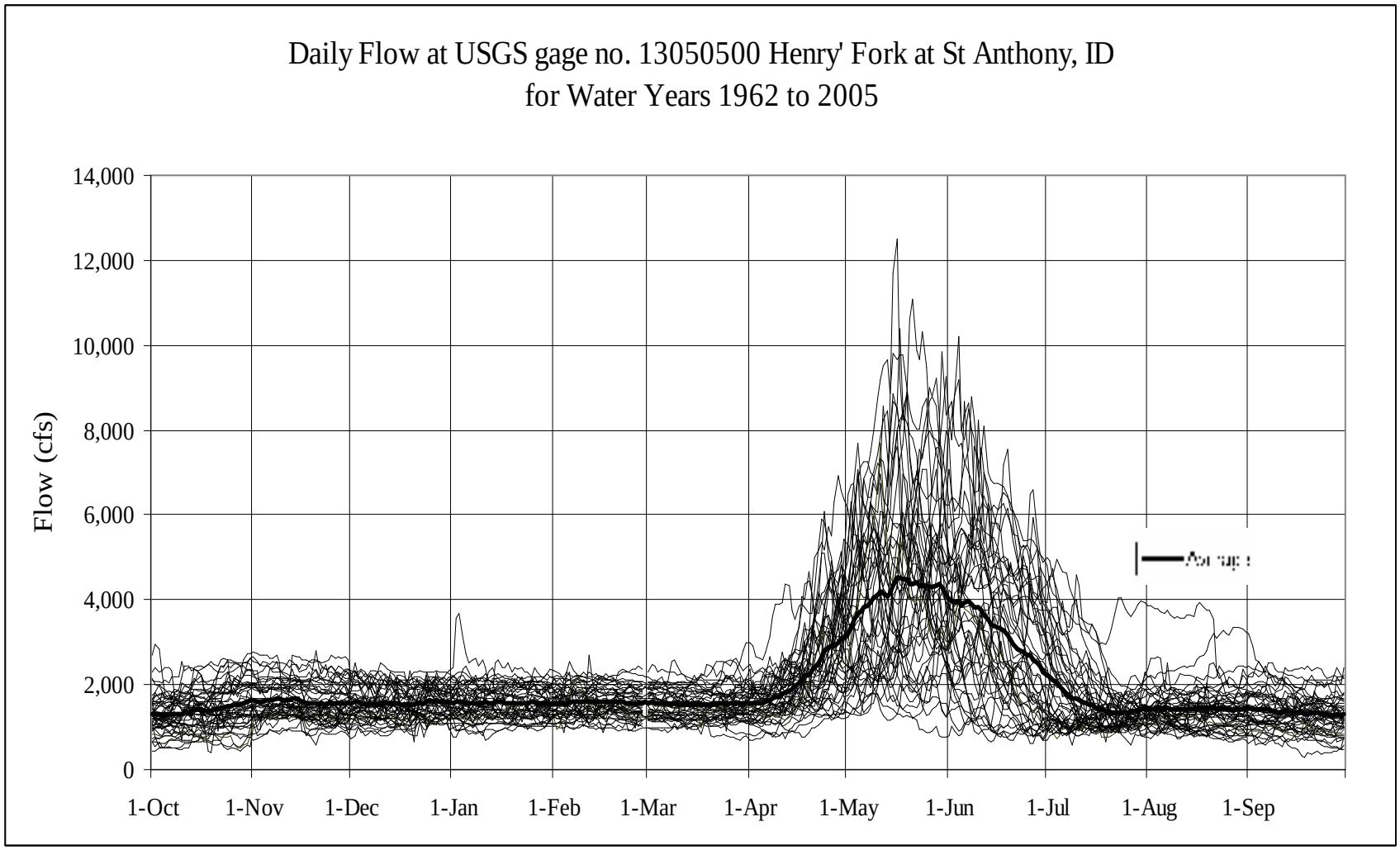


Figure 5. Daily and average flow at USGS gage no. 13050500 Henry's Fork at St Anthony for water years 1962 to 2005. (Source: USGS, 2006)

Water Quality

The existing Chester dam reservoir has a surface area of about 34 acres, a maximum depth of about 10 feet, a storage capacity of 42 acre-feet, and extends upstream from the dam about 3,200 feet. The proposed project would raise the water level by 3 feet, which would increase the storage capacity by 12.7 acre-feet and extend the reservoir up to an additional 1,200 feet upstream. Water quality in the project reach of the Henry's Fork is generally good, and it meets the state water quality criteria (table 3). According to the Upper Henry's Fork Sub Basin Assessment (Hill and Mebane, 1998), the Upper Henry's Fork subbasin (which ends at Ashton, about 7 miles upstream of Chester dam) fully supports the beneficial uses of coldwater biota and salmonid spawning, and there was no need to develop total maximum daily loads (TMDLs) for any water bodies in the sub basin. Where localized water quality problems were noted, they were generally related to riparian habitat quality, stream bank stability, and flow connectivity between water bodies.

Existing water temperatures in the Henry's Fork typically range from near 0°C up to about 21°C. The highest temperatures occur in July and August and are mostly in the range of 15 to 20°C, well within the criteria for coldwater biota. The applicant conducted water temperature monitoring in the Chester dam reservoir in 2002 and 2003, and compared those temperatures to historical data from the Henry's Fork at Ashton (upstream of Chester dam) and St. Anthony (downstream of Chester dam), and to data from the Falls River. During the months of July and August, the highest average monthly temperatures were observed in the Henry's Fork at Ashton, with slightly lower temperatures in the Chester dam reservoir, followed by the Henry's Fork at St. Anthony, with the coolest temperatures in Falls River. The maximum difference in temperatures observed among the sites was about 5°C, but typically was in the range of 1 to 3°C. The applicant also compared daily water temperatures between Ashton and Chester reservoir, and found that during the spring, summer, and fall months temperatures in the reservoir were often cooler than at Ashton, by up to 5°C. However, during the warmest summer period, temperatures were nearly the same, peaking at about 21 to 22°C.

b. Environmental Effects:

Water Quantity

The proposed project would divert river flow from the Henry's Fork, but would return all diverted water to the base of Chester dam, and not result in any dewatering of the river. There would be changes in the flow and velocity patterns below Chester dam and those effects are discussed in sections V.C.1, *Geology and Soils*, and V.C.3, *Aquatic Resources*.

Water Quality

The primary concerns related to water quality were the effects of potential sediment mobilization as a result of project construction and operation, and the potential effects on water temperature associated with a slightly larger impoundment above Chester dam. The sedimentation issue was discussed in detail in section V.C.1, *Geology and Soils*.

The concern related to water temperature is that water temperatures could increase as a result of the larger impoundment, by increasing the residence time of water in the impoundment, allowing for additional warming. Idaho Fish and Game and the NGOs did not make specific recommendations concerning water quality, except that the Greater Yellowstone Coalition recommended that the applicant's Stream Segment Temperature (SSTEMP) model be validated. The applicant conducted SSTEMP modeling to determine the effects on temperature of a larger impoundment, and has not proposed any additional measures related to water temperature.

Our Analysis

The proposed project would permanently raise the water level of the Chester dam impoundment by 3 feet, and extend the reservoir upstream by up to 1,300 feet. The applicant estimated that this larger reservoir would increase the residence time of water in the impoundment from 1 to 4 minutes during spring runoff, and from 3 to 13 minutes during the summer base flow period. The SSTEMP model was run using flow and temperature data from 2003, which was considered a low flow year (95 percent of the years between 1961 and 2003 experienced flows higher than 2003). The modeling indicated that there would be very minor temperature changes as a result of the larger impoundment (Symbiotics, 2004). The modeling results were as follows:

- January – February: 0 to 0.003°C cooler
- March – June: 0 to 0.005°C warmer
- July – September: no change
- October – December: 0 to 0.007°C cooler.

These results demonstrate that water temperatures would essentially remain unchanged. Because rising the existing impoundment by 3 feet would result in such a minor change in residence time, and we see no basis for questioning the results of the SSTEMP model. Therefore, we see no need to validate the modeling as recommended by the GYC. However, water temperature monitoring could detect any substantial changes in water temperatures resulting from project operations or other factors (such as adverse weather conditions like drought), and should temperatures approach levels unsuitable for

salmonids, the applicant and agencies could consult on measures that could be implemented (if any) to mitigate for higher water temperatures. In the scenario where higher water temperatures are resulting from basin-wide or regional weather patterns, there would likely be no measures that could be implemented by the project to mitigate for these higher temperatures.

c. Cumulative Effects:

We proposed to address the cumulative effects of the project on water quality in the Henry's Fork Snake River sub basin from the upstream Vernon (Fritz) Bridge (about 3 miles upstream) to the downstream Fun Farm Bridge (about 3 miles downstream). The primary issues related to water quality are effects of sedimentation and potential water temperature changes. As we discussed in section V.C.1, *Geology and Soils*, there is some potential for additional sediment releases during project construction and operation, but assuming erosion control measures and good construction practices are followed during construction, and water quality monitoring is implemented, this should not substantially add to the existing sediment load of the Henry's Fork, which we consider to be low to moderate.

The applicant's temperature modeling indicates there would be essentially no increase in water temperatures as a result of the project operation. Existing water temperature data for the Henry's Fork (in Symbiotics, 2004), comparing existing Chester dam impoundment temperatures to water temperatures at Ashton (upstream) and at St. Anthony (downstream), showed that Chester dam temperatures were within the range of temperatures observed upstream and downstream, and in fact were lower than upstream and downstream temperatures in many months. There is little likelihood that operation of the project would cumulatively affect water temperatures in the Henry's Fork.

Other foreseeable future actions in the Henry's Fork watershed that, when considered in conjunction with the potential effects of the proposed project could cumulatively affect water quality, include continued agricultural operations (including irrigation) and residential/urban development. The Henry's Fork watershed upstream and downstream of the project area is primarily an agricultural area that includes a number of irrigation canals, with two canals (Cross Cut and Last Chance) that originate at Chester dam. Agricultural operations have the potential to contribute sediment and increase nutrient levels in the river. The existing heavy algae growth observed in the river is an indication of high nutrient levels. Increased sedimentation or increased algal/aquatic plant growth in the river could adversely affect or reduce the amount of salmonid habitat in the river. Although this part of the Henry's Fork watershed is primarily a rural, agricultural area, there is some urban and residential development associated with the towns of Ashton and St. Anthony, and some development of seasonal and permanent homes along the river outside of the two towns. This development would increase the potential for "urban runoff" (sediment, chemicals) and for higher nutrient levels from

septic systems or sewage treatment plants, also adversely affecting or reducing the salmonid habitat in the river. The project, however, would not increase sedimentation or contribute additional nutrients or chemicals to the river, so would not cumulatively affect water quality in conjunction with other future actions in the watershed.

d. Unavoidable Adverse Effects:

None.

3. Aquatic Resources

a. Affected Environment:

The aquatic habitat in the project reach of the Henry's Fork consists of a shallow reservoir/pool upstream of Chester dam and a continuous run/riffle downstream of the dam. The primary species of management interest in this reach of the Henry's Fork is the rainbow trout, which is a self-sustaining population that supports a "blue-ribbon" fishery in the river. Brown trout also occur as a self-sustaining population, but in lower numbers. Both the brown and rainbow trout in the project reach of the Henry's Fork exhibit non-migratory life-history forms. Other species that occur in the river include mountain whitefish, Utah sucker, Utah chub, speckled dace, mottled sculpin, and redside shiner. Several fisheries investigations have been conducted on the rainbow trout population of the Henry's Fork since 1980, and the applicant conducted additional investigations associated with this license application. The applicant's investigations included electrofishing surveys to estimate age 0 (juvenile) and age 1+ (adult) rainbow trout population sizes and condition, spawning surveys to identify the location of spawning redds, and surveys of the Cross Cut irrigation canal to estimate the extent of fish entrainment into the canal. Table 4 summarizes the results of the applicant's population surveys.

Table 4. Results of applicant population estimates and other statistics for rainbow trout in the Henry's Fork in the vicinity of the Chester Diversion Project. (Source: Symbiotics, 2004)

	Upper Reach[a]		**Lower Reach[b]**	
	Age 1+	**Age 0**	**Age 1+**	**Age 0**
Population estimate	4,046	5 (spring) 166 (fall)	2,858	39 (spring) 13 (fall)
95% Conf. Interval	2,590-5,502	5-18 (spring) 166-190 (fall)	1,558-4,158	39-43 (spring) 13-31 (fall)
Avg. TL (in./mm)	16.1 (408)	-	15.2 (385)	-

Avg. weight (lb./g)	1.6 (737)	-	1.3 (577)	-
Avg. Cond. Factor	1.02	-	0.97	-
% PSD (>12 in.)	89	-	85	-
% QSD (>16 in.)	59	-	48	-

[a] Upper reach is the about 3-mile reach from Vernon bridge to Chester dam.
[b] Lower reach is the about 3-mile reach from Chester dam to Fun Farm bridge.

These results indicate a somewhat higher rainbow trout population upstream of Chester dam, with larger and more robust (heavier) fish, and a greater percentage of fish of "quality" size (more than 16 inches long).

The applicant conducted two spring spawning surveys in 2003 and 2006 to identify the location of rainbow trout redds in the vicinity of Chester dam. Both surveys examined the reach of the Henry's Fork from Ashton dam downstream to Chester dam (6.5 miles) and from Chester dam downstream to Fun Farm bridge (3.3 miles) (table 5). In both survey years, redds were concentrated upstream of Chester dam, primarily associated with islands where spawning gravels are most suitable, and mostly in the upper end of the upstream reach near Ashton. In 2006, about 85 percent of the redds were located within about 1 mile of Ashton dam. No redds were observed within the Chester dam impoundment or in the reach upstream of the dam that would be affected by the proposed higher water level of the Chester dam impoundment. No redds were observed immediately downstream of Chester dam, with the closest redd located about 2,000 feet downstream of the dam. The applicant reported that spawning gravels were generally less suitable downstream of Chester dam due to either unsuitable sized gravels or gravels that were too embedded for trout to successfully spawn.

Table 5. Number of rainbow trout spawning redds in the Henry's Fork in the vicinity of Chester dam. (Source: Symbiotics, 2004; 2006)

Ashton dam to Chester dam (upstream reach)		**Chester dam to Fun Farm bridge (downstream reach)**	
2003	**2006**	**2003**	**2006**
102	318	14	74

Chester dam currently diverts irrigation flows to the Cross Cut irrigation canal on the left bank (looking downstream) and to the Last Chance irrigation canal on the right bank. The Cross Cut irrigation canal is the larger of the two irrigation canals with a maximum diversion rate of 590 cfs, and is in the location of the proposed powerhouse. In response to agency concerns about current and future entrainment of fishes into the Cross

Cut irrigation canal, the applicant supported studies in the Cross Cut irrigation canal to estimate current entrainment. Studies included screw-trap sampling immediately below the canal headgate structure, and electrofishing at several locations within the canal. The applicant also collected fishes during an annual chemical treatment of the canal for aquatic weed control, which typically results in heavy mortality of fishes in the canal. Investigators recorded actual numbers of fishes collected and estimated the total population of each species collected by screw trap and electrofishing.

Table 6 provides the results of the Cross Cut irrigation canal fish collections, and indicates that thousands of fish currently enter the canal, including rainbow trout numbering in the several hundreds or even thousands. According to Ecosystems Research Institute (ERI) (2006), most of these fish probably die during chemical treatment for weed control; little downstream movement from the canal to the Teton River (the discharge point for the Cross Cut irrigation canal) was observed.

Table 6. Fishes collected (all size groups) in the Cross Cut irrigation canal by screw trap, electrofishing, and during chemical treatments, April through October 2005. (Source: ERI, 2006)

Species	Number Collected	Estimated Population
Screw trap (April – June):		
Rainbow trout	169	763
Brown trout	1	NA
Mountain whitefish	823	24,996
Speckled dace	1,522	18,228
Redside shiner	78	NA
Mottled sculpin	17	NA
Utah sucker	10	NA
Utah chub	1	NA
Electrofishing (April and October):		
Rainbow trout	40 (April); 186 (Oct.)	283 (April); 829 (Oct.)
Brown trout	1 (April); 0 (Oct.)	10 (April); 10 (Oct.)
Mountain whitefish	9 (April); 111 (Oct.)	90 (April); 462 (Oct.)
Speckled dace	Not counted	-
Redside shiner	Not counted	-
Mottled sculpin	Not counted	-
Utah sucker	5 (Oct.)	50 (Oct.)
Chemical treatment (July):		
Rainbow trout	264	NA
Brown trout	4	NA
Mountain whitefish	2,167	NA

Species	Number Collected	Estimated Population
Speckled dace	Not counted	-
Redside shiner	Not counted	-
Mottled sculpin	Not counted	-
Utah sucker	13	NA
Utah chub	1	NA

The applicant did not conduct any studies in the right bank Last Chance irrigation canal (maximum capacity of 225 cfs), but Idaho Fish and Game reported by letter to the Commission dated January 9, 2007, that it conducted electrofishing surveys with the Henrys Fork Foundation in the Last Chance irrigation canal in March 2003. The results of that sampling are included in table 7. Results of that sampling effort indicated that the Last Chance irrigation canal also entrains substantial numbers of fish, including salmonids, whose fate is unknown.

Table 7. Fishes collected (all size groups) in the Last Chance irrigation canal by Idaho Fish and Game electrofishing, March 2003. (Source: Letter from T. Trent, Chief, Natural Resources Policy Bureau, Idaho Fish and Game, to M.R. Salas, Secretary, FERC, January 9, 2007)

Species	Number Collected	Percent of Catch	Fish per 100 meters
Brook trout	1	0.3	0.8
Brown trout	8	2.6	6.4
Rainbow trout	223	73.4	178.4
Yellowstone cutthroat trout	1	0.3	0.8
Dace	29	9.5	23.2
Mountain whitefish	23	7.6	18.4
Sculpin	12	4.0	9.6
Suckers	7	2.3	5.6
Total	304		

The applicant did not conduct any sampling in the Falls River, which enters the Chester dam impoundment immediately upstream of the dam. The Henry's Fork Foundation, however, presented information on trout density in the Falls River. It reported that the density of rainbow trout in a 10-kilometer section of Falls River, based on Idaho Fish and Game surveys, was 474 fish per kilometer, but only 5 percent of the fish were greater than 400 millimeters (about 16 inches) long. It also reported that the length of Falls River accessible to trout from the Henry's Fork is about 28 miles, up to Sheep Falls. Two dams on the river have fishways, the Farmer's Own diversion dam at river mile 15 and the Marysville Hydroelectric Project (FERC No. 9885) at river mile 20

(letter from J. DeRito, Conservation Director, Henry's Fork Foundation, to M.R. Salas, Secretary, FERC, December 12, 2006).

b. Environmental Effects:

The proposed Chester Diversion Project is located on one of the premier trout rivers in the Northwest, and supports a "blue-ribbon" trout fishery, attracting anglers from outside of the project area. As a result, significant concerns were expressed by government agencies, NGOs, and individuals regarding the potential effects of the project on the fishery. Several commenters expressed opposition to the project, while others recommended a suite of mitigation and enhancement measures to protect the fishery. The major concerns or issues related to fishery resources are discussed below.

Fish Entrainment

Operation of the project would result in fish entrainment into the proposed powerhouse, as well as continued or increased entrainment into the Cross Cut irrigation canal. The proposed maximum hydraulic capacity of the powerhouse would be 3,500 cfs, while the maximum capacity of the canal during the irrigation season (May through September) is 590 cfs. The Last Chance irrigation canal on the west side of Chester dam has a maximum capacity of 225 cfs. Thus, at flows up to 4,315 cfs (which is higher than the 10 percent annual exceedance flow [3,440 cfs] at the downstream St. Anthony USGS gage), about 95 percent of the river flow would be diverted toward the east end of Chester dam, toward the proposed powerhouse and Cross Cut irrigation canal, if all facilities were withdrawing water at full capacity. Flows greater than 4,315 cfs would spill over the dam, but river flows that high typically occur only during the months of May and June. Although analysis of the flow distribution would not be a precise predictor of fish distribution at Chester dam, it is reasonable to assume that more of the fish that are moving downstream would be drawn to the area passing the greatest amount of flow – the east end of Chester dam. Based upon studies conducted by the applicant, fish entering the powerhouse would experience some mortality, generally in the range of 10 to 20 percent depending on species and fish size, while fish entering the Cross Cut irrigation canal would experience nearly 100 percent mortality, due to annual summer herbicide treatments and the dewatering of the canal at the end of the irrigation season.

In general, Idaho Fish and Game and all the NGOs recommended that both irrigation canals and the powerhouse be screened to prevent fish entrainment, although the recommendations varied as to the type or size of screen; however, the Settlement Parties now have altered specific recommendations slightly with the filing of the Settlement. Idaho Fish and Game originally recommended that fish screens be provided to result in zero percent mortality for fish greater than 200 mm (about 8 inches) in length and no greater than 10 percent mortality for fish less than 200 mm. The NGOs originally recommended various screens, ranging from ¾-inch-spaced screens on the powerhouse

and canals to perforated plate/woven wire screens with ¼ inch openings, capable of screening fingerling salmonids (60 mm and larger) on the canals. With the signing of the Settlement, however, the Settlement Parties now agree with the applicant's proposal to construct a 1.5-inch-spaced screen on the powerhouse intake and 0.25-inch-spaced screens across both the Last Chance and Cross Cut irrigation canals. The Snake River Cutthroats, however, continue to recommend that the turbine screen spacing should not exceed an inch, but they do agree that 0.25-inch screens on the irrigation canals are appropriate.

Our Analysis

Due to the changing flow distribution at the dam, as described above, and the elimination of spillage during most of the year, a high potential for fish entrainment into the powerhouse exists, as well as a high likelihood of entrainment above what currently occurs into the Cross Cut irrigation canal. Entrainment into the Last Chance irrigation canal, however, probably would not increase, and may in fact decrease, because a smaller portion of the total river flow would be diverted to the west side of Chester dam.

The applicant originally proposed to screen the turbine with a single 1.5-inch-spaced screen to protect the larger fish and to construct the project in such a way so as to provide a pathway for downstream fish migration. The screen design shown in the license application (see figure 2), however, appears as though it would divert more fish into the Cross Cut irrigation canal and away from the sluiceway for downstream passage. For these reasons, we conclude that the potential exits for higher fish entrainment into the canal due to the placement and operation of the proposed powerhouse. Although the applicant's studies in the Cross Cut irrigation canal, which many commenters criticized, could not quantify with certainty the current fish entrainment into the canal, these studies indicated that substantial numbers of fish, including rainbow trout, currently enter the canal. Most fish that enter the canal eventually do not survive because of poor habitat conditions, chemical treatment for weed control, and draining of the canal after the irrigation season. As we indicated in our September 2007 EA, because of the proximity of the proposed powerhouse to the relocated head of the Cross Cut irrigation canal, a single screen set at the proper angle could act to divert fish away from both facilities and toward the sluiceway, where fish could pass safely over the dam.

Through the Settlement, however, the applicant now proposes to install separate turbine and irrigation canal screens. The Settlement states that the applicant will install a 1.5-inch-spaced screen across the turbine and 0.25-inch-spaced screens across the irrigation canals. Screens with 1.5-inch spacing would physically prevent only the largest fish in the system from entrainment. Somewhat smaller fish also may be excluded by 1.5-inch-spaced screens due to behavioral effects, in that fish are more likely to avoid "squeezing" through spaces where they are unable to freely swim. Additionally, an appropriate screen angle and sweeping velocities along the screen may improve the performance of 1.5-inch-spaced turbine screens. Screens with 0.25-inch spacing across

the irrigation canals would physically prevent both fingerling (juvenile) and adult salmonids from being entrained in to irrigation canals and the proposed powerhouse.

Using screens with spacing less than 1-inch, however, as recommended by the Snake River Cutthroats, may be problematic. Although not noted in any of the comments, our site visit revealed that heavy algae growth occurs in the Henry's Fork during the summer months and this growth becomes suspended in the water column and floats downstream. During the October site visit, we observed a heavy coating of algae on structures and substrate within the Cross Cut irrigation canal. Any fish screen constructed at the project would be affected by a heavy coating of algae, requiring continual maintenance during algal runs[15] to keep the screens clean and functioning properly. Clogged screens would adversely affect the proper functioning of the screen by changing the hydraulics along the screen, which would include increased water velocities and potentially increased fish impingement on the screen. We agree, however, with comments on the September 2007 EA that suggest proper screen design and regular maintenance could minimize the likelihood of clogging. Although no definitive information exists in the record that would indicate the degree of additional fish protection provided by the narrower spaced screens, screens with spacing less than 1-inch would physically exclude a greater number of smaller fish.

Upstream and Downstream Fish Passage

The existing Chester dam blocks the upstream movement of fish in the Henry's Fork but allows for partial downstream passage. Currently, fish that move downstream pass over the spillway or enter the irrigation canals. Fish that survive the spillway passage may contribute to the fishery in the Henry's Fork below the dam, but fish entering the canals do not return to the Henry's Fork, and thus are essentially lost. The percentage of fish that successfully pass downstream over the dam versus the number lost in the irrigation canals is not known, but studies indicate that substantial numbers of fish do enter the Last Chance and Cross Cut irrigation canals.

The applicant originally proposed to construct a fish ladder for upstream passage, and as signatories to the Settlement, Idaho Fish and Game and most of the NGOs agree that upstream passage should be provided at the project. Most of the NGOs recommend that any upstream passage facility be able to pass fish 100 mm (about 4 inches) and larger. To enable downstream passage, the applicant proposes to provide fish screens on the powerhouse and both irrigation canals, and to provide a sluiceway (logway) that would pass 25 cfs and allow fish to pass downstream over the dam. The Settlement includes conditions requiring the screening of the powerhouse and both irrigation canals, as well as provisions for the applicant to provide continuous and sufficient bypass flows for downstream migration. In addition, while the applicant no longer proposes to

[15] Periods when the algae is floating downstream.

construct an upstream fish passage facility, the Settlement contains a measure stipulating that the NGOs would fund an upstream fish passage facility (fish ladder) that the applicant would design and construct at the time of initial development of the project. After initial construction, the fish ladder would be operated and maintained by Idaho Fish and Game. According to the Settlement, this measure, agreed to by the Settlement Parties, would occur outside of any license issued for the project.

Our Analysis

Agreement exists among the Settlement Parties who believe that upstream fish passage should be provided at the project and it should occur outside of any license issued. In addition, some commenters point out that other dams on the Henry's Fork and Falls River have upstream fish passage facilities that are used by resident rainbow trout and other resident species. Idaho Fish and Game supports the construction of a fish ladder, but originally stated in its December 12, 2006, letter that the ladder should not be operated until the protocols for its operation are decided. The existing dam has blocked the upstream passage of fish since its initial construction by Reclamation in 1938. Additionally, the applicant's proposal for installing an inflatable rubber dam will not affect the current condition of upstream fish passage at the existing Chester dam.

Despite the presence of the existing dam, the Henry's Fork still has maintained a blue-ribbon trout fishery, which many of the commenters state is worth millions of dollars to the local economy. The baseline studies conducted by the applicant show the river has a good self-sustaining population of rainbow trout, although the reach upstream of the dam has a higher number of spawning redds and a larger population of rainbow trout than the reach below the dam (tables 4 and 5). As confirmed by Idaho Fish and Game in their comments on the September 2007 EA, it is unclear what the benefits of upstream fish passage would be. Fish passage would allow fish from the lower reach to access the presumably more suitable habitat upstream of the dam; however, that could result in adverse impacts if the upstream habitat were to become overcrowded by fish passing upstream over Chester dam. Overcrowding could result in redd superimposition or increased competition for food resources, which could ultimately reduce the size or health of the rainbow trout population. Even without upstream passage, the upstream reach still could contribute to the population of trout in the downstream reach, via the downstream movement of fish over Chester dam. This downstream movement would be enhanced if both the project intake and the irrigation canals are screened, preventing the entrainment of fish into the irrigation canals (see below).

For downstream passage, the applicant proposes to operate the proposed project to provide continuous and sufficient bypass flows for downstream fish migration. In addition, as we previously stated, screening both the proposed powerhouse and the Cross Cut irrigation canal is essential to prevent fish entrainment. Direction of fish by the screen toward a fish bypass, the applicant's originally proposed 25-cfs sluiceway/logway, would provide downstream-moving fish an option for safe passage over the dam.

Idaho Fish and Game and many of the NGOs originally recommended that the Last Chance irrigation canal should be screened, in addition to the Cross Cut irrigation canal. In the September 2007 EA, however, we concluded that the Last Chance irrigation canal did not need screening because the proposed operation of the project directed flows away from the canal. In its comments on the September 2007 EA, however, Idaho Fish and Game points out that no analyses can predict, with acceptable confidence, the project affect upon entrainment in to the Last Chance irrigation canal. Although most of the flow (up to 95 percent) would be directed away from that canal, we agree that no definitive conclusion can be made regarding whether fewer fish would be entrained. After reviewing the comments filed on the Settlement Agreement and the September 2007 EA, we conclude that screening the Last Chance irrigation canal could provide fish additional protection against any potential project effects and would enhance fisheries resources to levels above current conditions.

Loss of Upstream Riverine Habitat

The applicant originally proposed to install a 36-inch-high rubber inflatable dam on the crest of Chester dam in order to maintain a higher permanent pool at the project. According to the applicant, this would result in an increase in the size of the Chester dam pool, extending the pool approximately 800 feet upstream in the Henry's Fork and an unknown distance in the Falls River. Now, however, the applicant proposes to increase the height ofAfter further analysis using the applicant's forebay inundation maps, however, we determined that the extent the higher pool could extend upstream in the Henry's Fork would be closer to 1,300 feet.

In the Henry's Fork, the affected reach is currently run habitat and would be transformed to more pool-like habitat, although the actual habitat characteristics would vary depending on river flow. At higher flows, the habitat would maintain more run-like characteristics, while at low river flows it would have more pool-like conditions. The modification of riverine habitat to more pool-like habitat would likely result in some shifting of fish distribution as species that prefer riffle/run habitat (such as rainbow trout), would move to other nearby preferred habitat. The pool-like habitat could continue to be used to some extent by these species, but this usage would likely shift (adult trout may use the deeper pool habitat while juveniles would use the pool margins) and be less than under riverine conditions.

Comments on our September 2007 EA suggested that the EA lacked an adequate analysis of the possible backwater effects on the Fall River. As a result, we examined aerial photos and flood insurance data in this final EA. Based on a review of aerial photographs, there appears to be a riffle area in the Falls River beginning about 1,000 feet upstream of the confluence with the Henry's Fork, with two islands in the next 600 feet upstream. The gradient of Falls River in this reach is not known, although most of the lower 1,000-1,300 feet of the river appears to be backwatered from Chester dam. It is likely that some portion of the riffle area beginning about 1,000 feet upstream of the

confluence would be inundated by the proposed 38-inch-high rubber dam. Based upon preliminary analyses using flood insurance data (FEMA, 1991), we estimate that the proposed impoundment could extend up to 2,000 feet from the confluence with the Henry's Fork, inundating approximately an additional 700 feet of the Falls River.

Initially, Idaho Fish and Game and the NGOs recommended mitigation for the loss of the riverine habitat. Idaho Fish and Game, Greater Yellowstone Coalition, Henry's Fork Foundation, and Trout Unlimited originally recommended restoration of a similar amount of habitat elsewhere in the basin, and Idaho Fish and Game called for an enhancement plan within 1 year of license issuance. The Snake River Cutthroats recommended the establishment of a $990,000 mitigation fund and The Henry's Fork Foundation recommended additional monitoring for erosion and water quality effects, including validation of the applicant's SSTEMP model, and continuation of trout spawning surveys. The applicant originally agreed with the recommendations to restore a similar amount of habitat elsewhere in the basin and to prepare an enhancement plan. With the filing of the Settlement, however, the applicant now states that mitigation for the loss of free-flowing riverine habitat and a fish habitat enhancement plan is no longer necessary because the other measures the applicant agreed to implement under the Settlement negate the need for such mitigation. By signing the Settlement and through their comments in support of the Settlement, the Settlement Parties agree that mitigation for the loss of free-flowing riverine habitat is no longer necessary, as well, although they provide no biological reasons to support their argument.

The Snake River Cutthroats, however, did not sign the Settlement and continue to recommend that the applicant provide funds to Idaho Fish and Game to allow the agency to remove and/or circumvent 1,200 feet of river and habitat obstructions between Fun Farm Bridge and a public access point near the City of St. Anthony. The Snake River Cutthroats disagree with the Commission's assessment in the September 2007 EA of the costs associated with mitigating for the loss of free-flowing river and the NGO feels the Commission did not take into account the adverse economic impacts of the loss on the local economy. In comments on both the September 2007 EA and the Settlement, the NGO, citing the 2004 Loomis study (Loomis et al, 2005), states that the loss of free-flowing river in the Henry's Fork and the Falls River will have an annual negative benefit to the local economy of $120,455 and $175,578, respectively.

Our Analysis

Rainbow trout can occupy and thrive in both pool and riverine habitats; consequently, difficulties arise when attempting to quantify population-level positive or negative impacts on this important species that would result from the conversion of riverine habitat to pool habitat in the Henry's Fork and in the Falls River. Movement of some fish into habitat already used by other fish could result in some intra-species competition, which could affect food availability and the condition of some fish if food organisms are reduced. The conversion of typical riverine riffle-run-pool habitat units to

homogenous pool habitat may reduce the habitat diversity in this reach of the Henry's Fork. A reduction of habitat diversity could negatively affect the abundance of individuals of a given species and also could cause a reduction in the overall species diversity of the reach. Mitigation for the habitat to be modified in the Henry's Fork, as originally agreed to by the applicant, would be appropriate because of the importance of the trout fishery in the river. Mitigation techniques, such as the restoration or improvement of habitat in the vicinity of the project, would improve the diversity of the habitat of the selected reach, thereby increasing the capacity for biological productivity and offsetting the loss of habitat diversity due to inundation. It also would be appropriate to mitigate for the modification of riverine habitat in the Falls River, although a scientifically reliable estimation of the extent of modification has not yet been performed. Idaho Fish and Game originally recommended, and the applicant originally agreed to, the preparation of an enhancement plan for mitigation of habitat to be modified by the project. The plan would be a mechanism for determining a location and detailed plan for habitat improvement in another area. This plan also would allow further quantification of the habitat modified in the Henry's Fork and in the Falls River, with a similar amount of that habitat included in the enhancement plan.

Funds provided by the applicant to Idaho Fish and Game to remove or circumvent 1,200 feet of river and habitat obstructions downstream of the project, as recommended by the Snake River Cutthroats, also would provide an opportunity to mitigate for the loss of some of the free-flowing river as a result of the proposed project. The habitat enhancement plan, as originally proposed the Idaho Fish and Game would require consultation with the agency and would enable to the applicant and the agency to discuss the best alternatives for developing the appropriate mitigation measures. In regards to the impact to the local economy, as discussed by the Snake River Cutthroats, we note that the Chester dam already inundates portions of the Henry's Fork and the Falls River, but these areas continue to be classified as blue-ribbon trout fisheries. While, as stated above, additional inundation could negatively affect the abundance of individuals of a given species and cause a reduction in the overall species diversity of the reach, mitigation for the loss of this habitat would reduce this project effect and also reduce the impacts to the local economy.

Flow Patterns Downstream of Chester Dam

The proposed powerhouse would be located on the east bank of the river, immediately adjacent to the entrance to the Cross Cut irrigation canal. As currently proposed, flows released from the powerhouse would be diverted by a concrete wingwall and enter the river at approximately a 90-degree angle to the flow passing over Chester dam. During periods of no spillage over the dam, which would be most of the year, assuming a maximum powerhouse flow of 3,500 cfs, powerhouse flows would be the only releases from the dam. This would result in a changing flow pattern downstream of the dam. Currently, flows pass over the dam generally parallel to the river banks, but

with the proposed powerhouse, flows would be directed generally across the downstream toe of the dam toward the west bank. The applicant modeled the potential flow patterns downstream of the dam and found that increasing flows from the powerhouse would result in stronger currents toward the west bank, turning of flows downstream, and some areas of eddy and very low velocity in the northwest corner of the area immediately below the dam (Lamarra, 2005). As indicated earlier, because the substrate immediately below the dam is comprised primarily of large boulders, it is unlikely that these changes in velocity patterns would result in bedload movement or changes in river morphology.

Idaho Fish and Game and some of the NGOs originally expressed concerns regarding the potential effects of the change in the downstream flow patterns and they recommended further studies conducted to document river morphology and redd distribution pre- and post-project (for up to 3 to 5 years), and also that any flow effects be dissipated within 100 meters of the dam. While the applicant did not believe any further studies of flow distribution or spawning surveys were required to address this issue, the applicant originally proposed to conduct periodic monitoring of the resident trout population in the project area in order to determine any long-term project effects. With the filing of the Settlement, however, the Idaho Fish and Game and the NGOs now agree that the applicant does not need to conduct studies and periodic monitoring to determine the effects of the change to the downstream flow patterns. The applicant, therefore, no longer proposes to conduct such studies.

Our Analysis

Based on the modeling presented in Lamarra (2005), substantial changes in the flow pattern downstream of Chester dam would occur when only the powerhouse is operating and no spillage flows over the dam. However, because the existing substrate below the dam is mostly large boulder, there appears to be little potential for changes in bottom morphology or effects on spawning redds as a result of the flow pattern changes. Large boulder substrate, because of the size and weight, would not likely be moved by the force or velocity of a 3,500 cfs flow. During the 2006 spawning surveys, the closest spawning redd was found about 2,000 feet below Chester dam, well below the area with flow pattern changes, indicating that trout spawning would not be affected by the pattern changes. Because the modeling by Lamarra (2005) extended only about 60 meters (200 feet) below the dam, the distance required to dissipate the flow pattern changes can not be predicted, but may likely extend farther than the 100 meters (325 feet) as suggested by several commenters. None of the commenters recommended specific means to dissipate the effects, but potential measures could include instream structures that would direct the flow into a pattern that would distribute the flow across the full width of the river, or changes in the tailrace alignment that would result in flows entering the river at less of an angle. Construction of instream structures, however, would result in impacts to the current river bed immediately below the dam, which could offset any benefits that could result. Tailrace re-alignment could be a reasonable measure for implementation, but

limited space exists below the dam to re-align the tailrace, and this could impact the proposed boat launch below the dam. Other than some possible fish distribution changes below the dam, few other impacts are likely. Although the applicant no longer proposes to conduct long-term monitoring of the resident trout population, such monitoring would provide valuable information on the long-term effects of the project.

Technical Team and Fisheries Management Plans

Henry's Fork Foundation, Trout Unlimited, and Snake River Cutthroats originally recommended the development of a technical team, comprised of professional biologists and engineers representing the applicant, agencies, and NGOs. The team would oversee all monitoring studies and would develop a fisheries management plan for all game species. The Settlement, however, did not include this recommendation as a condition to be included in any license issued for the proposed project.

Our Analysis

A technical team, as originally recommended by the NGOs, could coordinate all monitoring studies, including fisheries, water quality, and wildlife. Development of a project-specific fisheries management plan could address fisheries issues and management in the project area.

c. Cumulative Effects:

For fisheries, we consider the cumulative effects in the Henry's Fork Snake River sub basin from the upstream Ashton dam (about 7 miles upstream) to the downstream influence of project releases at Fun Farm Bridge (3 miles downstream). As we previously described, this reach of the Henry's Fork supports a "blue-ribbon" fishery for rainbow trout, although the applicant's studies indicate that the rainbow trout population upstream of Chester dam is in better condition than that downstream. The reason for the difference is not known, but probably is related to better habitat upstream of Chester dam. Construction of the Chester Diversion Project would result in some enhancements that could benefit the rainbow trout population and other fish species in this reach of the Henry's Fork. If the project is licensed as recommended by staff, fish screens would be provided that would screen both the powerhouse intake and the entrance to the Cross Cut and Last Chance irrigation canals. Most adult and juvenile fish would be prevented from entering the irrigation canals, which currently are a source of mortality for fishes in the Henry's Fork. A fish bypass structure (sluiceway) would allow fish from the upstream reach to successfully pass the dam into the downstream reach, and may enhance the population in that reach.

Other foreseeable future actions in the Henry's Fork watershed that when considered in conjunction with the potential effects of the proposed project could cumulatively affect fisheries resources, include continued agricultural operations

(including irrigation) and residential/urban development. The Henry's Fork watershed upstream and downstream of the project area is primarily an agricultural area that includes a number of irrigation canals, with two canals (Cross Cut and Last Chance) that originate at Chester dam. Agricultural operations have the potential to contribute sediment and increase nutrient levels in the river. The existing heavy algae growth observed in the river is an indication of high nutrient levels. Increased sedimentation or increased algal/aquatic plant growth in the river could adversely affect or reduce the amount of salmonid habitat in the river. Although this part of the Henry's Fork watershed is primarily a rural, agricultural area, there is some urban and residential development associated with the towns of Ashton and St. Anthony, and some development of seasonal and permanent homes along the river outside of the two towns. This development would increase the potential for "urban runoff" (sediment, chemicals) and for higher nutrient levels from septic systems or sewage treatment plants, also adversely affecting or reducing the salmonid habitat in the river. The project, however, would not increase sedimentation or contribute additional nutrients or chemicals to the river; therefore, we find that the operation of the Chester Diversion Project, in conjunction with the recommended measures, as discussed in section VII, *Comprehensive Development*, would result in a positive cumulative effect on the fisheries of the Henry's Fork.

d. Unavoidable Adverse Effects:

None.

4. Terrestrial Resources

a. Affected Environment:

Botanical Resources

The Chester Diversion dam is located in the extreme northeast corner of the Intermountain Sagebrush Province in the sagebrush-wheatgrass section. The project area exists primarily within a matrix of agricultural land, and the immediate vicinity is characterized by a narrow, interrupted riparian strip with interspersed upland vegetation. Common species include big sagebrush, willow, and bunch grasses. The proximity of the site to roads and pasture facilitates an abundance of weedy species including Canada thistle, common mullein, and pasture grasses. The Chester Wetlands segment of the Sand Creek Wildlife Management Area, managed by Idaho Fish and Game, abuts the northwest bank of the Henry's Fork adjacent to the project area.

In the project area, forbs and grasses form consistent ground cover with exotic and weedy species the most frequently occurring plants high on both banks of the Henry's Fork and in areas of high vehicle/foot traffic. The most common of these species are

Canada thistle, Kentucky bluegrass, timothy, nightshade, and sow thistle. Portions of both banks are also covered by shrubs. Thickets on the southeast bank are patchy in their distribution compared to more evenly distributed shrubs found along the northwest bank. The dominant shrubs are native; the most frequently occurring include willow, mountain alder, nutka rose, silverberry, big sagebrush, and red-osier dogwood. Cottonwoods grow along the southeast side of the access road that runs along the south side of the impoundment and Cross Cut irrigation canal and are also found downstream of the dam along the southeast banks. No cottonwoods occur within the proposed powerhouse site or canal expansion area.

The proposed powerhouse would be placed between the access road and Cross Cut irrigation canal, in a disturbed area. The disturbed area that abuts the canal has relatively low cover and extends approximately 10 feet south (toward the access road). Common species in the area are cheat grass, leafy spurge, common toadflax, Kentucky bluegrass, curly cup gumweed, and curled dock. Beyond this area, native upland shrubs and grasses such as big sage, Parry's rabbitbrush, viscid rabbitbrush, and needle and thread grass, become prominent and extend nearly to the road. Weedy species occur within this area, but the principal species are native.

The proposed transmission line route would extend approximately 1 mile from the powerhouse site along the access road right-of-way to connect with existing power lines. The vegetation along the right-of-way is comprised primarily of weedy species and pasture grasses.

The applicant conducted studies in 2005 to characterize vegetation within the project boundary, paying particular attention to those areas that would be potentially affected by changes in the forebay elevation or disturbed by project construction (ERI, 2005). Areas within 164 feet of the Henry's Fork and Falls rivers were mapped using fine-scale mapping. Detailed mapping of the forebay area identified 13 plant community groupings (see table 8).

Table 8. Area of each fine-scaled mapped community type that would be affected by construction and operation of the Chester Diversion Project. (Source: ERI, 2005, as modified by staff)

Description	Location	Area within 164 feet of river (acres)
Wetland; Reed canarygrass community type	Located along the southeast shoreline of the Henry's Fork River above its confluence with the Falls River.	0.6
Wetland; Nebraska sedge community type	Located along the southeastern banks of the Henry's Fork and Falls Rivers.	1.15

Description	Location	Area within 164 feet of river (acres)
Wetland; Mesic meadow mosaic of Nebraska sedge and baltic rush community type, and unclassified human induced graminoid community types	Located within subirrigated grazing pasture on the peninsula created by the confluence of the Falls and Henry's Fork Rivers.	5.1
Wetland; Beaked sedge community type	Located within seasonally to semi-permanently inundated areas along the low-lying margins of the peninsula created by the confluence of the Henry's Fork and Falls Rivers.	2.52
Wetland; Hardstem bulrush community type	Located in shallow waters along the margins of the peninsula created by the confluence of the Falls and Henry's Fork rivers.	1.01
Wetland; Nebraska sedge and baltic rush community type	Located in depressions and topography breaks toward either river on the peninsula created by the confluence of the Falls and Henry's Fork Rivers.	4.73
Wetland; Narrowleaf cottonwood/red osier dogwood community type	Located in limited stands along the southeast banks of the Henry's Fork River downstream of Chester dam.	1.35
Wetland; Shining willow/wet forb and Geyer willow/beaked sedge community type	Located immediately upstream of the dam along the southeast banks of the Henry's Fork River and upstream of the confluence of the Falls and Henry's Fork Rivers.	6.46
Wetland; Black hawthorn/wood’s rose community type	Located on a rocky outcrop on the southeast banks of the Henry's Fork River.	0.06
Wetland; Mesic meadow mosaic of Nebraska sedge, baltic rush, beaked sedge and unclassified graminoid community types	Located along the northwest banks of the Henry's Fork River above and below Chester dam.	3.77

Description	Location	Area within 164 feet of river (acres)
Wetland; Baltic rush community type	Located along both banks of the Henry's Fork River, upstream of Chester dam.	0.36
Riparian; Mountain alder/horsetail, chokecherry/sagebrush and unclassified shrub community types	Located along the banks of the Henry's Fork River adjacent to and immediately downstream of Chester dam on both banks.	0.06
Upland; Basin big sagebrush, needle and thread grass, and bitterbrush community type	Located along the northwest banks of the Henry's Fork River upstream of Chester dam.	5.59
Total		32.76

Special-status Plant Species

ERI conducted surveys for sensitive plants on July 24 and 25, 2002, following FWS guidelines (1996). Surveys covered the proposed powerhouse site and both banks of the forebay and tailrace. Twenty-six species from the Idaho state list of plants with conservation priority occur in Fremont County. Based on habitat requirements, five could potentially occur in the project area (table 9). These include one monitored plant, two sensitive plants, one conservation priority two plant, and one plant federally listed as threatened. Ute ladies'-tresses (*Spiranthes diluvialis*) is the only sensitive species known within a mile of the project area and is discussed in section V.C.5, *Threatened and Endangered Species*. No plant species of concern were found during surveys within the project boundary.

Table 9. Special status plant species potentially occurring in the project area. (Source: Symbiotics, 2004)

Common Name	Scientific Name	Status[a]	Habitat requirements
Swamp willow-weed	*Epilobium palustreI*	State monitored	peat bogs, wet places
Buxbaum's sedge	*Carex buxbaumii*	State sensitive	wet places, standing water
Bulb-bearing waterhemlock	*Cicuta bulbifera*	State sensitive	wet places

Common Name	Scientific Name	Status[a]	Habitat requirements
Slender spike-rush	*Eleocharis tenuis*	State Rank 2	wet soil
Ute ladies'-tresses	*Spiranthes diluvialis*	State/federal threatened	bogs, open seepage areas

[a] Conservation status:
Monitored - limited range or uncommon occurrence, but without identifiable threats.
Sensitive - small populations or localized distributions such that the species might be jeopardized without active management or removal of threats.
Rank 1 - in danger of becoming extinct in the foreseeable future, populations at critically low levels, habitats degraded/depleted to a significant degree.
Rank 2 - if factors contributing to declines continue, species likely to be listed as Rank 1 in the foreseeable future.
Threatened – protected as threatened under the federal Endangered Species Act.

Wildlife Resources

Habitat in the area near the Chester dam consists of open water and riparian shrub thickets. Open water in the forebay serves as feeding, breeding, and resting habitat for waterfowl. Both osprey and bald eagle occasionally forage in the forebay and tailrace areas.

Riparian shorelines along the forebay and tailrace are used for feeding and shelter by small mammals such as mountain cottontail, jackrabbit, and small rodents. This habitat also provides nesting and feeding areas for songbirds and breeding habitat for small mammals, reptiles, and amphibians. Hiding and thermal cover are available for some wildlife; however, the deciduous nature of most of the shrubs limits the effectiveness of this cover during winter months.

Large cottonwood trees that border the river may serve as perches for hunting osprey and bald eagles. One stand is found along the southeast banks of the Henry's Fork River immediately downstream of Chester dam. Several additional cottonwoods grow along the fence adjacent to the access road that runs parallel with the south bank of the impoundment.

Mule deer, elk, and moose are found in uplands away from the project area. Although these species may incidentally occur within the project boundary, preferred habitat does not occur. Other game species that may be found in the project vicinity include upland game birds such as sharp-tailed grouse, ring-necked pheasant, and gray partridge.

The Henry's Fork is considered an important waterfowl area because birds from both the Pacific and Central flyways use the area during migration. A total of 216 waterfowl were observed during 13.5 hours of census survey conducted during the

breeding season in May, June, and July (ERI, 2002a). Abundant fish attract diving waterfowl such as the common merganser and double-crested cormorants. Submerged macrophytes and gently sloping banks with cover provide habitat for dabbling ducks such as mallard, teal species, gadwall, and American wigeon. In addition, adjacent grain fields attract Canada geese. Other species observed during surveys included sandhill crane, belted kingfisher, black-crowned night heron, great blue heron, and American white pelican. Sections of the river remain ice-free year-round and provide wintering habitat for many waterfowl species, including the trumpeter swan (*Cygnus buccinator*), a state and federal species of concern.

Special Status Wildlife Species

Idaho Fish and Game records indicate that 12 animal species with state conservation status occur in Fremont County. Of these, the project area provides potential habitat for the five species discussed below. One species, the whooping crane (*Grus americana*) is federally listed as endangered and is discussed in section V.C.5, *Threatened and Endangered Species*.

Bald Eagle—The bald eagle (*Haliaeetus leucocephalus*) is state-listed as endangered and also is protected from take under the federal Bald and Golden Eagle Protection Act. Bald eagles are found primarily near rivers, reservoirs, and lakes where they prey upon fish and waterfowl. They also feed on small mammals, carrion, and small birds. Bald eagles require large trees for nesting, perching, and roosting. Both wintering and nesting eagles can be found in Idaho. Two breeding areas occur in the project vicinity (Whitfield, 2003). The Singleton Pond nest site is found approximately one mile west of the dam, and the Fun Farm Bridge breeding area is located two river miles downstream of Chester dam and ¼ mile from the riverbank.

The Singleton Pond nesting eagles occasionally forage near the dam (Whitfield, 2003). Eleven foraging perches were identified during 2002. Nine were located near Singleton Pond and in the Chester Wetlands Complex (managed by Idaho Fish and Game). Two were along the Henry's Fork, including one near Chester dam. The Fun Farm Bridge breeding pair forage on the Henry's Fork near the nest; prey includes waterfowl and fish. During winter, resident and migratory eagles forage more extensively near Chester dam.

Western Toad—The western toad (*Bufo boreas)* is listed as an Idaho state species of concern and an FWS species of concern in the project region. Nearly all of Fremont County is identified as potential range for the western toad. Western toads are largely terrestrial, although usually found in the proximity of water. They are found from lowlands to montane elevations and from moist coastal areas to northern deserts. Toads use small mammal burrows or dig in loose soil, and hibernate through the winter months. Western toads breeding in the project area during early summer require shallow, still or slow-moving water. The project site is not likely to contain habitat significant to western

toad populations due to unsuitable breeding habitat. During 107 hours of trapping with twelve funnel traps and 200 feet of drift fence, no toads were caught or observed (ERI 2002b). Although sightings have been recorded north and immediately south of the project area, no record of toads from the immediate project vicinity exists.

Trumpeter Swan—The trumpeter swan is listed as an Idaho sensitive species and a federal species of concern in the region. Their range extends from Alaska to southeastern Oregon, Idaho, and Wyoming. Trumpeter swans both breed and winter in areas of eastern Idaho, including Island Park reservoir. Nesting swans require emergent and submerged aquatic vegetation and prefer fertile marshes or lakes. During winter, swans in Idaho use shallow rivers with open water and level terrain nearby. In Idaho, they feed primarily on pondweed and water-milfoil.

Wintering habitat for trumpeter swans is plentiful in the Chester dam region. The closest wintering and breeding site to the project is at Singleton Pond, 1.4 miles southeast of the project boundary. There are six other known trumpeter swan locations within 10 miles of the project, none of which are on Henry's Fork or associated rivers. Four of these are breeding sites, one is a breeding and wintering site, and one is a wintering site. Several of these sites were single observations. The Henry's Fork contains wintering habitat several miles from the proposed project (Symbiotics, 2005).

The number of wintering swans at regularly surveyed sites shows wide annual variability. Numbers appear to be increasing in the Lower Henry's Fork and Lower Teton River survey areas, counts appear to be declining in the Upper Teton River survey area, and the number of wintering swans shows no apparent trend for the Upper Henry's Fork and Singleton Pond survey areas (Symbiotics, 2005).

Long-billed Curlew—The long-billed curlew (*Numenius americanus)* is a protected species in the State of Idaho and a federal species of concern in this region. Nesting ranges from south-central British Columbia to southern Manitoba, south to northeastern California, central Utah, central New Mexico, and northern Texas, and east to southwestern Kansas. They winter from central California, southern Texas, Louisiana and South Carolina to Mexico. In Idaho, long-billed curlews inhabit the Snake River Plain and range extends south to Utah in the eastern part of the state, and populations also occur along the Clearwater River Basin and north near the Canadian border (Link et al., 2001). The long-billed curlew is found in meadows and grassy areas usually near water. They prefer open shrub steppe with short vegetation for ground nesting and often feed in agricultural areas. Because the project site is within their range and includes shrub steppe with agricultural lands nearby, long-billed curlews may occur. None, however, were observed during site visits and wildlife surveys (ERI, 2002a).

Black Tern—The black tern (*Childonias niger)* is an Idaho protected non-game species. In the United States, the black tern breeds from south-central California, northern Nevada, northern Utah, Colorado, Nebraska, northern Iowa, northeastern

Illinois, northern Indiana, north-central Ohio, northwestern Pennsylvania, northern New York, northwestern Vermont, and Maine. The species' population generally is patchily distributed on the fringes of its range, particularly in the Northeast and in arid portions of the West. In Idaho, the breeding population of terns is approximately 200 individuals. The black tern winters mainly in marine and marine-coastal areas in the Americas along the Pacific Coast from southern Mexico east and south to Peru. Black terns nest in shallow, highly productive wetlands with emergent vegetation in freshwater (sometimes brackish or alkaline) marshes, along prairie sloughs, lake margins, edges of islands or slow-moving rivers, wet meadows, bogs, shrub-swamps, and, in California, cultivated rice fields or flooded fallow fields. Although potential nesting habitat exists in the project boundary, no black terns were observed during site visits and wildlife surveys (ERI, 2002a).

Yuma Myotis—The yuma myotis (*Myotis yumanensis)* is an Idaho protected non-game species. This species is found from western British Columbia, south into western Montana, Idaho, eastern Washington, Colorado, New Mexico, and Arizona to central Mexico. Populations also extend along the Pacific Coastal areas of Baja California, California, Oregon, and Washington. They range throughout Idaho, although little is known about maternity colonies and winter roosts. Yuma myotis are closely associated with water and riparian habitats. Maternity colonies may form in mines and caves with high humidity and low human disturbance. During the summer they roost in crevices in cliffs, old buildings, mines, caves, bridges, and abandoned cliff swallow nests. No large winter concentrations of this species have been studied in Idaho. The Chester dam area likely provides feeding habitat for yuma myotis, however, no roosting areas are known from the project vicinity.

b. Environmental Effects:

Effects of Project Construction

Project construction would result in the permanent loss of 0.33 acre of habitat, with 0.16 acre of vegetation temporarily disturbed during construction (see table 10). Although much of this habitat is low, weedy herbaceous species or upland shrubs with limited value to wildlife, project construction would permanently remove 0.04 acre and temporarily remove 0.06 acre of riparian vegetation. As a result, construction activities and loss of habitat could displace wildlife. Additionally, noxious invasive species could proliferate because of soil disturbance.

Symbiotics proposes, as modified by the Settlement, several measures to minimize the effects of project construction on vegetation and wildlife habitat. These include: (1) developing a landscape plan prior to ground disturbance, which includes establishing foot and vehicle access routes to protect vegetation from trampling, planting native shrubs totaling 500 square feet to improve the aesthetics of the powerhouse and associated

structures, and planting native bunchgrasses totaling 500 square feet to improve the aesthetics of developed areas; (2) re-seeding all disturbed areas with a native grass mix; (3) controlling noxious weeds and introduced grasses in the project area to allow establishment of native plantings, including funding the maintenance of all plantings and control of noxious weeds in the project's O&M budget; (4) retaining all mature cottonwoods if at all possible; (5) planting three cottonwoods at least 6 feet high for every one cottonwood that is harmed, when avoidance is not possible; (7) minimizing the duration of construction to curtail disturbance to all wildlife; and (8) constructing the project facilities between May 15 and early March, with all efforts made to conclude construction activities by late February.

The applicant originally proposed to construct the project between May 16 and November 1 in order to reduce potential disturbances to nesting and wintering bald eagles. In the Settlement, however, Symbiotics notes that this schedule is now too restrictive given its new proposal to screen both the Cross Cut and Last Chance irrigation canals, which would require construction to occur outside the irrigation season (typically April through October). In response to the new proposal, the applicant now proposes to construct the project between May 16 and the end of February to accommodate installation of the fish screens. If construction has not been completed by the end of February, the applicant states some construction may occur during March as well, but efforts would be made to avoid this situation.

In Idaho Fish and Game's original recommendations for the proposed project, the agency recommended that the applicant avoid disturbing vegetation during construction to the greatest extent possible, particularly large cottonwood trees. The agency further commented that Symbiotics should revegetate with native species, monitor, and replant as needed, all disturbed areas, to attain 80 percent survival over 5 years. The agency also asked that the applicant monitor plantings of cottonwood trees and replant them to assure 100 percent replacement of trees lost to construction.

Several NGOs had similar recommendations. Snake River Cutthroats, Trout Unlimited, and Greater Yellowstone Coalition all suggested that Symbiotics minimize the loss of vegetation from construction, revegetate all areas with native vegetation, and monitor all plantings for success and to control noxious weeds. Greater Yellowstone Coalition suggested there be no net loss in riparian habitat or associated upland habitat due to project construction and that project construction occur during periods when sensitive species are either not present or less susceptible to activity associated with heavy construction work.

Additionally, Symbiotics originally proposed to plant and monitor 4,200 square feet of upland steppe habitat to mitigate for the habitat permanently lost from the powerhouse placement. The Settlement, however, does not include this measure as a suggested license condition. Symbiotics, as well as the Settlement Parties, conclude that

other measures the applicant agreed to implement through the Settlement negate the need for this type of mitigation.

Symbiotics, in its response to Idaho Fish and Game's original terms and conditions, agreed to monitor all plantings according to Idaho Fish and Game's recommendations.

Table 10. Area of each community type that would be affected by project construction and operation. (Source: AIR No. 11 response, as modified by staff)

					Percentile of Flow (cfs) at Elevation (feet)					
					0%	**1.41%**	**25th**	**50th**	**75th**	**100th**
Area Within:			**Acres:**		*12,404*	*7,301*	*2,383*	*1,890*	*1,513*	*551*
	1 mile (ac)	**50 m of River**	**Removed for project structures**	**Temporarily disturbed during construction**	*5,044.77*	*5,043.5*	*5,041.92*	*5,041.72*	*5,041.55*	*5,041.04*
Wetlands	1,718	27.2	0.008	0.03	5.340	1.959	0.177	0.022	0	0
Riparian	14	0.06	0.04	0.06	0.04	0.03	0.01	0.01	0.01	0
Upland	1,539	6.43	0.3	0.11	0.08	0.03	0	0	0	
Total	3,270	27.1	0.33	0.16	5.62	2.99	1.2	1.04	1.02	1.01

Our Analysis

Construction of the proposed project, including the proposed powerhouse and re-alignment of the Cross Cut irrigation canal, would permanently remove less than an acre of vegetation. The proposed project facilities are all located within areas that are dominated by invasive noxious forbs or grasses; however, about 0.1 acre of riparian vegetation would be permanently or temporarily disturbed. It is not anticipated that Symbiotics would need to remove any mature cottonwood trees. Project construction would temporarily disturb or remove additional vegetation adjacent to the proposed facilities and along the proposed transmission line corridor. During construction, large, mobile wildlife species, including waterfowl, would likely temporarily avoid the areas because of construction noise and habitat disturbance. Because the construction sites do not provide unique habitat in the area, these wildlife species are likely to use other habitats nearby. Some small and less-mobile species, such as small rodents that use these habitats could be affected more because of vegetation removal and construction traffic.

The project is located 1 mile and 2 miles from the nearest bald eagle nests (Whitfield, 2003). Construction activities would be located sufficiently distant from the nest sites to avoid potential disturbance from noise and human activity (U.S. Fish and Wildlife Service, 2007). Construction activities occurring between mid-May through early March, however, could have a minor, short-term effect on the foraging of breeding and wintering eagles, temporarily forcing eagles to move to areas upstream or downstream of the project area.

Limiting the duration of construction and limiting the timing to avoid prime bald eagle project-area use times would minimize the effect of construction disturbance on wildlife species. Overall, project construction would have short-term adverse effects on individual wildlife species; however, these effects would not affect their overall population health.

Symbiotics proposes and Idaho Fish and Game recommended measures to reduce the potential for long-term effects on vegetation and wildlife habitat and to reseed, replant, and monitor all disturbed areas to ensure the re-establishment of native species. Reseeding and replanting disturbed areas with native species, combined with noxious species control, would help native species start to become re-established in construction areas. Additionally, monitoring these areas for 80 percent survival over 5 years would ensure that native species are strongly established to enable them to survive competition from noxious weeds. Protecting the existing cottonwood trees and, in the event a mature cottonwood is harmed during construction, re-planting and monitoring cottonwoods to ensure 100 percent survival 5 years after construction, would maintain perch trees for a variety of birds, including bald eagles.

Originally, Symbiotics proposed to plant and monitor 4,200 square feet of upland steppe habitat to mitigate for the habitat permanently lost from the powerhouse placement. Noxious invasive species thrive in areas of disturbed soils, especially when they are plentiful in nearby areas. The proposed planting and monitoring an additional 4,200 square feet of habitat would mitigate for the small amount of habitat permanently lost by improving habitat conditions.

Effects of Proposed Forebay Level

As a result of project operation, the forebay (the Chester dam headpond) elevation would be permanently maintained at 5,043.7 feet msl. Currently, the forebay is at or above this elevation about 5 percent of the year (see section V.C.2, *Water Resources*). Maintaining the forebay elevation at 5,043.7 feet msl year-round would affect wetlands and riparian vegetation along the perimeter of the forebay and could affect associated wildlife such as nesting waterfowl.

Symbiotics proposes several measures to protect, minimize, or mitigate for the effects of a permanently elevated forebay level, including: (1) limiting vehicle parking and traffic to established areas to minimize disturbance of remaining and re-established riparian vegetation; (2) excluding grazing from the riparian zone to minimize trampling and allow establishment of new shoots; (3) planting and protecting native riparian shrubs along both banks where vehicle traffic and trampling have prevented establishment of vegetation; and (4) not raising the forebay level following construction prior to the accustomed high water period of mid-May to protect early nesting waterfowl.

Trout Unlimited suggests Symbiotics revegetate using local or native riparian species if there is any loss in riparian vegetation.

Our Analysis

Of the 27.2 acres of wetlands within 164 feet of the project shoreline, project operations would permanently inundate about 2 acres (see table 10). Additionally, the permanently elevated forebay level would inundate about 0.03 acre of the 0.06 acre of existing riparian habitat in this same area. Permanently inundating these wetlands and riparian vegetation would cause much of this vegetation to die because many of the species found in this zone are not able to withstand permanent inundation or submergence. With the forebay elevation stabilized at 5,043.7 feet msl, however, wetlands and riparian vegetation would “shift up” and be reestablished along the banks at this higher elevation, where upland vegetation occurs currently. The southeast bank of the forebay has a more gradual slope, therefore the zone of inundation and area of reestablishing vegetation would be larger than the steep northwest bank.

The measures proposed by Symbiotics would aid in the natural reestablishment of wetlands and riparian habitat. Although it is likely this shift would occur naturally,

protecting these areas to minimize disturbance to vulnerable new vegetation would allow this succession to happen faster. Additionally, in those areas where construction disturbs the vegetation, Symbiotics proposes to replant native riparian vegetation, further ensuring that native riparian species are reestablished along the shoreline as soon as possible. Overall, the proposed project would have a temporary effect on wetlands and riparian vegetation; however, a long-term effect is unlikely.

In the short-term period during project construction and until riparian and wetland vegetation is reestablished at the proposed forebay level, raised water levels and lack of habitat may affect nesting and feeding waterfowl. High water marks at the forebay historically occur during May and June, which is the peak waterfowl nesting season (ERI, 2002a). As such, waterfowl build their nests above this high-water mark in habitat that may not be affected by the permanently increased forebay elevation. Because the 5,043.7 feet msl elevation level only occurs 5 percent of the time, however, it is likely that the proposed forebay elevation level would inundate some of the nesting habitat. Overall, however, any loss of habitat would be short-term and minor. Waterfowl nesting habitat would still be available around the forebay and in other water systems nearby. Any inundated habitat would be replaced as the vegetation is reestablished higher on the shorelines. Additionally, the stable water elevation could cause emergent vegetation and aquatic macrophytes to grow around the forebay, increasing cover and food for a variety of waterfowl species.

Transmission Line Avian Protection

The proposed transmission line would run parallel and in proximity to the river; therefore, it is likely to be in the flight path of birds traveling to and from the river to upland habitats. Factors that influence the potential for power line collisions include body size and flight behavior, time of day, age and sex, weather, land use, disturbance factors, and line placement, orientation, and configuration (APLIC, 1995). As part of the Settlement, Symbiotics proposes to construct the above-ground power lines fitted with reflective devices that protect trumpeter swans from strike mortality. Idaho Fish and Game agrees that marking the line with some type of passive diverters and making the line more visible can sufficiently reduce the likelihood of collisions. Although Idaho Fish and Game and the NGOs originally recommended that Symbiotics bury the proposed transmission line to preclude avian collision or electrocution, they support the Settlement.

Bald eagles, which are found in the project vicinity, are occasional victims of collisions with power lines. Their keen eyesight, relatively slow flapping flight, and maneuverability in flight serve to minimize problems (Olendorff and Lehman, 1986). Eagles can be susceptible when preoccupied or distracted during inclement weather or periods of high winds, and before sunrise or after dusk.

Large, less maneuverable birds such as herons, cranes, and swans, are more vulnerable to collisions (Huckabee, 1993). Idaho Fish and Game provided data in its initial terms and conditions letter, indicating that transmission line strikes are a significant source of mortality for trumpeter swans throughout their range, with 22 of 59 detected trumpeter swan mortalities in east Idaho from 2001 to 2006 being from transmission line collisions.

Mortality is particularly a problem when a line either bisects or borders a major use area or in an area of high density for vulnerable species. The project is used by limited numbers of eagles and swans, but lacks concentration areas or defined migration paths. Swans use the project area for resting and loafing and feed in nearby fields, while eagles perch in cottonwood trees downstream of Chester dam. The nearest breeding site for bald eagles and trumpeter swans is Singleton Pond, located about 1 mile west of the project. Another eagle nest site is located at the Fun Farm Bridge, which is located approximately 2 river miles downstream of Chester Dam and ¼ mile from the river bank.

Burying the proposed transmission line, as originally recommended by Idaho Fish and Game and suggested by various NGOs, would eliminate the potential for avian mortality or injury from transmission line collision. If built underground, the proposed transmission line would be buried adjacent to the Cross Cut irrigation canal and an existing access road. Although the extent of the rockiness of the substrate in this location is not known, excavation in the same substrate has occurred for the canal, which indicates that burying the transmission line would be possible.

Marking the line, as proposed in the Settlement, would provide an alternative to burying the line. The use of devices, such as passive diverters (e.g., bird flight diverters, swan flight diverters, spiral vibration dampeners) or swinging markers (e.g., bird flappers), can be effective in reducing avian collisions by increasing the visibility of the line. Numerous studies have documented the success of these types of measures in reducing mortality (Moorkill and Anderson, 1991; Brown and Drewien, 1995). Birds would be particularly vulnerable, however, during times of poor visibility. Although marking the line would not be as successful in eliminating the potential for collision as burying the line would, marking would substantially reduce the risk.

Above-ground power poles may be attractive perch sites to raptors such as bald eagles, making them susceptible to electrocution. The risk of electrocution, however, could be minimized or eliminated by designing the above-ground transmission line in accordance with raptor protection guidelines (APLIC, 2006). Burying the line, on the other hand, would eliminate any risk of electrocution.

c. Unavoidable Adverse Effects:

Project construction would permanently remove 0.33 acre of vegetation and temporarily disturb an additional 0.16 acre of vegetation. Increased water levels also would affect about 2 acres of wetlands and 0.03 acre of riparian vegetation until this

habitat is reestablished along the new shoreline elevation. Construction activities from November through early March, however, could have a minor, short-term effect on foraging of breeding and wintering eagles. Marking the power line to increase visibility would minimize the risk of avian collision mortality, while burying the line would eliminate the risk.

5. Threatened and Endangered Species

a. Affected Environment:

Ute ladies'-tresses

Ute ladies'-tresses (*Spiranthes diluvialis),* a federally listed threatened species, is an attractive, perennial, white-flowered member of the orchid family. It is known to occur in Utah, Colorado, Wyoming, Nebraska, Montana, and Idaho, as well as Washington. The preferred habitat of Ute ladies'-tresses is low-elevation wetland and riparian areas, including spring habitats, mesic to wet meadows, river meanders, and floodplains. Ute ladies'-tresses occur primarily in areas where the vegetation is relatively open and not overly dense or overgrown. Populations tend to decline if trees and shrubs invade the habitat where they reside. Ute ladies'-tresses require "permanent sub-irrigation," indicating a close affinity with floodplain areas where the water table is near the surface throughout the growing season and into the late summer or early autumn (FWS, 1995).

A large population of Ute ladies'-tresses was documented by Idaho Fish and Game northwest of the project area within a complex of vernal ponds and wet swales. The population consists of over 400 individuals in nine subpopulations. The subpopulation nearest to the project area is located between the Last Chance irrigation canal and the Henry's Fork, within 66 feet of the river, outside the project area; other subpopulations are located more than 3/4 mile from the Chester Diversion within a wetland complex. No Ute ladies'-tresses were documented during sensitive plant surveys in the project boundary. Although potential habitat may occur along the wetted perimeter of the forebay, much of the shoreline has dense riparian vegetation that is not preferred Ute's ladies'-tresses habitat.

Whooping Crane

The whooping crane (*Grus americana*) is listed as a protected non-game species by the State of Idaho and is considered an experimental population by FWS. However, whooping cranes in Idaho, introduced to the Grays Lake National Wildlife Refuge, are classified as an experimental, nonessential population. Only 163 wild whooping cranes remain, 13 of these in the Gray's Lake flock. Whooping cranes breed in south central Mackenzie and northern Alberta and winter on the Gulf Coast of Texas. The Gray's Lake birds winter in central New Mexico. Whooping cranes nest in open marshes on mounds

of emergent vegetation and inhabit aspen parkland, northern forests, short grass plains, river deltas, and tundra during the summer. They winter on tall grass prairies, salt flats, coastal marshes and lagoons. Whooping cranes have been documented in eastern Idaho, including Island Park reservoir, and may migrate through or incidentally occur near the project site. No cranes, however, were observed during site visits or wildlife surveys (ERI, 2002a).

Utah Valvata Snail

The Utah valvata snail (*Valvata utahensis*), a federally listed endangered species, occurs in the Henry's Fork. Surveys conducted by the Idaho Conservation Data Center (2005) in 2004 did not detect any valvata snails in the project area. The closest known occurrence to the Chester diversion is about 30 miles downstream.

b. Environmental Effects:

Although the proposed project would temporarily alter the wetted perimeter of the shoreline, because there is very little potential habitat and the Ute ladies'-tresses is not known to occur within the forebay, the proposed project would have no effect on this species.

Although whooping cranes may incidentally occur within the project area, suitable nesting and feeding habitat does not occur in the project area, and the project would have no effect on this species.

The project would have no effect on the Utah valvata snail because the project occurs outside the range of this species.

c. Unavoidable Adverse Effects:

None.

6. Recreational Resources

a. Affected Environment:

The Henry's Fork is one of the most heavily fished streams in Idaho and considered one of the top fly fishing destinations in the lower 48 states. The Henry's Fork is open to year- round fishing from the Vernon Bridge, which is located several miles upstream of the Chester dam, to the downstream confluence with the Snake River (Henry's Fork Anglers, 2006). In addition to fishing opportunities within the vicinity of the project, the Chester Wetlands segment of the Sand Creek Wildlife Management Area, managed by Idaho Fish and Game, abuts the northwest bank of the Henry's Fork near the

project area. The 1,500 acre Chester Wetlands area is open year-round and provides opportunities for wildlife observation, hiking, fishing, and hunting (including waterfowl, big game, and upland bird) during established hunting and fishing seasons (Idaho Fish and Game, 2006a).

According to the 2006 Fishing and Boating Access Guide (Idaho Fish and Game, 2006b), there are three main access locations to the river along the Henry's Fork between the towns of Ashton and St. Anthony. These include: (1) Vernon Bridge, a 1-acre area located about 5 miles southwest of Ashton, which provides a boat ramp, restroom and parking facilities, and fishing opportunities; (2) Chester dam, about 3 acres in size, located at the diversion dam, which provides an unimproved gravel boat ramp above the diversion dam and an unimproved gravel boat ramp below the diversion dam, parking and restroom facilities, and fishing and waterfowl hunting opportunities; and 3) Fun Farm Bridge, about 1 acre in size, located about 3 miles north of St. Anthony, which provides a boat ramp, parking and restroom facilities, and fishing opportunities. Vernon Bridge is located about 3 miles upstream of Chester dam, and Fun Farm Bridge is located about 3 miles downstream of the dam.

Symbiotics states that both of the current boat ramps at Chester dam are susceptible to erosion with unimproved bed surfaces of gravel, cobble, and mud, and that boat launching is quite difficult without the use of a four-wheel drive vehicle. Gravel surfaced vehicle parking and turnarounds are available above and below Chester dam near the boat ramps. Symbiotics states that space for the parking and turnarounds is limited as the area is confined to a narrow area between the river and private agricultural land. Idaho Parks and Recreation comments that access to Chester dam is over a very narrow, precipitous bridge that crosses the Cross Cut irrigation canal and restricts public access to the dam.

In terms of use, a creel census study was conducted of boat and shore anglers along a 6-mile section of the Henry's Fork, primarily at three access locations: Vernon Bridge, Chester dam, and Fun Farm Bridge (figure 6). The study was conducted during July through September 2002, on a total of 20 weekdays and 9 weekend days. A total of 136 anglers were observed or interviewed and of these surveyed anglers, 59 (43 percent) provided information. The study results indicated that 41 percent of the anglers fished above Chester dam and 59 percent fished below, of which a total of 24 fishing boats were observed with 71 percent above and 29 percent below Chester dam. Table 11 summarizes the angler hours and catch rates estimated from this study.

Loomis et al (2005) conducted a study to estimate the contribution to local income and employment to Southeast Idaho and Southwest Wyoming of river segments of the Snake River from Jackson Hole to the confluence of the Henry's Fork, including the Henry's Fork. The Chester dam area is within the lower Henry's Fork section of the study area, which includes the area extending from Ashton dam to the confluence with the South Fork of the Snake River. Over the entire study area, 1,272 surveys were

handed out during 99 sampling days from May through September 2004 (study period), with an overall response rate of 64 percent. Within the lower Henry's Fork section, a total of 76 surveys were distributed.

The total estimated visitor use for the lower Henry's Fork section was 31,517 visitor days, with angling accounting for about 90 percent (27,120 visitor days) of this use. The average group size was 2.9 people. For the Henry's Fork segment, about 86 percent of the anglers fished from shore or waded and about 60 percent of the anglers fished from a boat. Other activities that respondents participated in included: wildlife viewing (33 percent), sightseeing (26 percent), picnicking (19 percent), camping (14 percent), hiking (10 percent), rafting (5 percent), and ATV use (2 percent).[16] The average distance respondents traveled to the area was 503 miles with about 88 percent of the respondents traveling by car and the remainder traveling by plane or RV.

Table 11. Estimated angler hours, catch and catch rates at Chester dam on Henry's Fork, 2002 and 1981.

Census Interval (2002)	Angler Hours [a]	Total Trout [b]	Total trout/hr.
July 1-July 31	1,700	712	0.42
August 1-September 2	683	120	0.18
Total 2002	2,382	832	0.29
Census Interval (1981) [c]			
July 1-July 31	2,341	2,000	0.87
August 1-August 31	1,628	1,172	0.72
Total 1981	3,969	3,172	0. 8

[a] Angler use was calculated by multiplying half of the mean daylight hours in the interval (month) by the mean of the angler count totals, and the number of days in the interval.

[b] Total numbers of trout caught or released were estimated by multiplying angler use by catch rates.

[c] Estimates used to calculate fishing pressure near Chester dam in 2002 vary slightly from Idaho Fish and Game surveys conducted in 1981. Sampling duration was increased to two hours and sampling frequency was doubled on the weekdays. When calculating fishing pressure, the mean daylight hours were reduced by half to compensate for sampling duration.

In the lower Henry's Fork section, the primary species targeted by anglers was rainbow trout (95 percent), followed by brown trout (49 percent), whitefish (27 percent), and cutthroat trout (19 percent). Anglers also indicated that they spent an average of 5.4 hours fly fishing, 0.7 hours bait fishing, and 0.4 hours lure fishing. About 24 percent of the respondents indicated that they used a fishing guide.

[16] Respondents may have participated in more than one type of activity. Accordingly, this is a percentage of all the people that participated in these activities, not a summary distribution of the type of use.

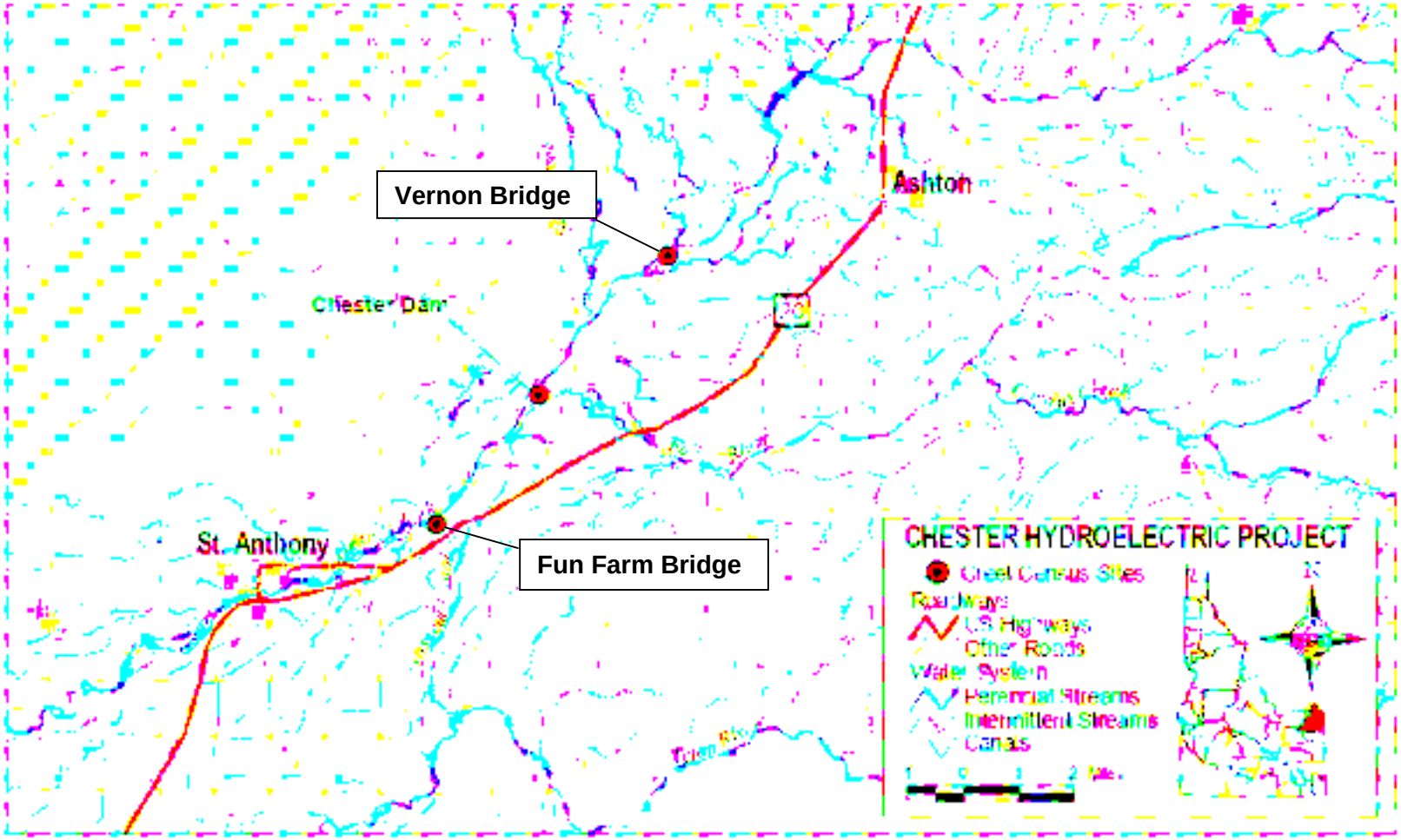


Figure 6. 2002 Henry's Fork creel surveys. (Source: Symbiotics, LLC, 2006, as modified by staff)

Loomis et al (2005) asked anglers and visitors to rate the importance of attributes/reasons for their trip on a four point scale where 1 was not important, 2 was somewhat important, 3 was important, and 4 was very important. The top rated categories included: nature (3.7), solitude (3.7), relaxing (3.5), wildlife viewing (3.4), catching large numbers of trout (3.3), and catching trophy trout (3.0). The respondents also were asked to rate the degree of crowding they experienced on their most recent trip (rated on a 9-point scale of 1 being the least crowded and 9 being the most crowded). The lower Henry's Fork section was rated the most crowded (5.1) of all the other Henry's Fork segments (which ranged from 3.7 to 4.9).

Based on the travel cost method (TCM), Loomis et al (2005) estimated both the net willingness to pay and the average willingness to pay for angling on the lower Henry's Fork segment to be $55.30 per day, and $1,499,668 for the season. Based on the contingent valuation method (CVM), Loomis et al estimated the net willingness to pay for angling on the lower Henry's Fork to be $65.50 per day and $1,776,360 for the season. For the entire Henry's Fork River, Loomis et al estimated fishing to have a net economic value to anglers of between $8 million annually (TCM) and $15 million (CVM) to maintain the current level of fishing quality.

b. Environmental Effects:

The proposed project and associated construction would have potential short-term and long-term effects on the recreational use of the area, in particular angling use, as a result of short-term limited access restrictions and proposed enhancements to boating access. The proposed project would result in the creation of an enlarged forebay area that would extend approximately up to 1,300 feet above the existing Chester dam impoundment.

As addressed in the Settlement, the applicant's new proposal includes the implementation of several recreation measures originally recommended by all the Settlement Parties, as well as the Snake River Cutthroats. As outlined in section 6.2.4 of the Settlement, Symbiotics now proposes to improve the boat launch areas upstream and downstream of the dam by reconstructing the boat ramps with concrete logs and providing gravel parking areas. Symbiotics also proposes to provide improved access to the project area by building an ADA compliant fishing platform with a hardened surface that connects to ADA parking and ADA-accessible restrooms. In addition, the applicant proposes to improve access for passenger vehicles and trailers at the upper bridge across from the Cross Cut irrigation canal and maintain public access during all phases of construction by developing a temporary recreation access management plan. Finally, Symbiotics proposes to develop an information and education plan that identifies locations for maps, signs, information boards, brochures, and other materials to inform the public about recreational opportunities in and adjacent to the project.

In their original comments on the proposed project, Idaho Parks and Recreation, Idaho Fish and Game, Henry's Fork Foundation, the Greater Yellowstone Coalition, Trout Unlimited, Idaho Rivers United, and the Snake River Cutthroats recommended or suggested the several additional recreation-related measures. In response to the original recommendations, the applicant agreed to work with the agencies and NGOs to fulfill the proposed conditions to the satisfaction of all parties. The additional measures originally recommended or suggested include:

- Explore providing additional access facilities, including a ramp, parking, and a vault toilet upstream of Chester dam at a location previously used by anglers;
- Install an improved parking area to serve approximately 20 vehicles between the upstream and downstream boat ramps located at Chester dam;
- Provide accessible picnic, fishing, and wildlife viewing facilities, including an ADA-compliant bird watching/fishing pier and kiosk;
- Provide boat access and ADA-compliant vaulted toilets at Fun Farm Bridge to meet Idaho Fish and Game criteria, also provide vaulted toilets at Vernon Bridge access;
- Provide new access at a point approximately 1,000 feet upstream of the dam site,[17] with a boat ramp, parking for 20 cars and trailers; and
- Provide an informational and educational kiosk on site at the Chester dam.

Our Analysis

As indicated by the applicant, boating and recreational facilities on Henry's Fork in the vicinity of Chester dam are in poor condition and access is difficult due to unimproved roads and boat ramps. Access consists mostly of narrow, dirt roads and limited parking exists once you reach the dam. The existing gravel boat ramps are prone to erosion and washout and therefore, are degrading. The Henry's Fork, including the proposed project area, is known as a premier dry fly fishing area and provides unique recreational opportunities. Based on the study conducted in 2004 (Loomis et al, 2005) there were over 30,000 visitor days in the vicinity of Chester dam during May through September with about 90 percent of this use being angling. In addition, about 60 percent of the anglers indicated that they fished from boats, demonstrating the need for adequate recreational boating access at the project.

[17] The Snake River Cutthroats specifically recommended the construction of a concrete-block boat ramp at Seeley's.

There would be short-term adverse effects on the recreation access and angling opportunities in the vicinity of the proposed project facilities and recreation enhancements during the construction period. Provisions for alternative public recreation access, with the appropriate safety provisions and restrictions in the areas of construction, would help to mitigate potential adverse effects of restricted recreation access during the construction period. A temporary recreation access plan that includes restricting public access in construction areas, identifying recreation access locations and facilities to be provided during the construction period, providing adequate public safety provisions, and alerting the public regarding these measures would help to ensure that adequate access and public safety are provided during the construction of the project.

The recreational enhancements as proposed by the applicant in section 6.4 of the Settlement would provide enhanced recreational opportunities by improving boating and vehicular access in the vicinity of Chester dam. Our recommendation in the September 2007 EA to provide parking for 20 passenger vehicles and trailers also would ensure adequate public access to the boat launch areas. The proposed ADA enhancements, including the ADA fishing pier near the river, would provide barrier-free access to the river between the boat launch and the powerhouse tailrace and would improve angling opportunities in the vicinity of Chester dam. In addition, with the implementation of the proposed fishery measures (see section V.C.3, *Aquatic Resources*), no adverse effects on the fishery resources and associated angling opportunities in the project area would occur.

Several of the Settlement Parties originally recommended additional recreation measures; however, with implementation of the Settlement, these measures are no longer considered official recommendations. The Snake River Cutthroats, who did not sign the Settlement, continue to recommend access areas at the Vernon and Fun Farm Bridge, located several miles above and below, respectively, the proposed project; therefore, these recreational facilities and associated access would not be affected by the proposed project. Exploring additional access facilities upstream of Chester dam in a location previously used by anglers, while beneficial, would not be necessary due to the close proximity of the existing recreation site and the proposed enhancements outlined in the Settlement. The existing recreation access immediately upstream and downstream of Chester dam, along with the proposed enhancements, including boat ramp modifications, parking, vault toilet facilities, and accessible fishing pier, would provide adequate public access to project waters and recreational facilities to meet recreation demand within the vicinity of the Chester dam.

The proposed project would result in the forebay area being maintained at the surface elevation of the existing high water elevation, resulting in an extension of the existing reservoir further upstream of its current limit by 1,300 feet. This change would result in the area changing from a free-flowing stretch of river suited to wade angling, to a more constant, inundated stretch of river better suited to reservoir-based activities such as boat angling. This change, however, would occur in a limited area and would continue

to be within easy reach of the upgraded boat ramp/access point immediately upstream of Chester dam. The proposed new boat ramp and parking area upstream of the enlarged forebay would be located less than one mile from the existing boat access immediately upstream of Chester dam. The short distance between the upgraded boat ramp and the end of the larger forebay negates the need for an additional boat ramp in the vicinity of the forebay expansion.

Snake River Cutthroats also recommended an ADA-compliant bird watching and fishing pier be provided on the Idaho Fish and Game side of the river along the shoreline of the expanded forebay. While a beneficial enhancement to recreational opportunities in the area, the close proximity of the existing fishing facilities in the project area, in addition to the applicant's proposed enhancement of the fishing pier/hardened access at the location of Chester dam, would provide sufficient public access to the project area.

Currently, no signage or information exists regarding the recreational opportunities and access at Chester dam. The development of an information and education plan, as included in the Settlement, would provide the means to identify and implement appropriate signage and distribution of information related to the project and recreational opportunities within the project area. Signage could be provided in the form of an informational kiosk, as well as in other forms, such as signs, information boards, and/or brochures.

Some of the proposed recreation enhancements, such as a portion of the upstream boat launch, the downstream boat launch, parking and restroom facilities, and the proposed barrier-free trail and hardened accessible surface near the river would occur outside of the proposed project boundary. Modification of the proposed project boundary to include all of the proposed recreation enhancements and associated access areas would provide public access to project recreation facilities and would ensure these facilities are maintained over the term of the license. We discuss the modification of the project boundary under section V.C.7, *Land Use and Aesthetic Resources*.

c. Unavoidable Adverse Effects:

None.

7. Land Use and Aesthetic Resources

a. Affected Environment:

The Henry's Fork watershed covers 1.7 million acres in eastern Idaho and western Wyoming, including part of Yellowstone National Park and the western slope of the Teton Mountains. Three counties, Fremont, Teton, and Madison, lie within the basin. Agriculture is an important industry within the basin, with the primary crops of potatoes and grains. More than 235,000 acres of farmland are irrigated using surface or ground

water sources in the basin. Canals divert water from the Henry's Fork, the Falls River, the Teton River, and smaller tributaries, and water is stored for irrigation in dams built on Henry's Lake, Henry's Fork, and the Falls River (Partnership Resource Center, 2006).

The Chester Diversion dam and associated canals are located in Fremont County which provides a variety of scenic mountain vistas, natural rivers, and other scenic view corridors. The project area is located within the South Fremont Planning Area, which comprises about 275,000 acres (430 square miles) with 60 percent of that area in private ownership, and the remainder in public ownership, administered by the State of Idaho (12.6 percent) and Bureau of Land Management (28.4 percent) (Freemont County, 2002).

The project region includes productive farmland, scenic open space, and an ecologically rich habitat. The land north of Ashton is publicly owned while the lower river is predominantly private land. Within a 1-mile buffer of Chester dam and canal, about 50 percent of the area is agricultural in nature and about 50 percent is associated with deciduous riparian vegetation and sagebrush dominated acreage. Land ownership in the project vicinity is made up of agency (Idaho Fish and Game) and private land holdings.

The area near the diversion dam is relatively flat with open flat water and predominantly low-growing vegetation and interspersed cottonwood trees. Land adjacent to the forebay area includes cultivated and fallow pasture. Foreground views of the diversion dam area include the forebay area upstream of the diversion dam, the dam, the irrigation canals and associated structures, and the gravel roadway and parking areas at the site. Middleground views from the diversion dam area include the flat open terrain along with views of dispersed residences, and the Teton Mountain range can be seen in the background, distant views.

Project Boundary

As proposed by the applicant, the project boundary would enclose Chester Diversion dam (except for the downstream toe), Cross Cut irrigation canal headworks, the proposed powerhouse, the proposed improved boat launches located immediately upstream and downstream of Chester dam, the existing reservoir, and the proposed transmission line.

b. Environmental Effects:

The proposed project would not change existing land use in the area. Although the project would occupy the current location of the headgate structure for the Cross Cut irrigation canal, new headworks would be constructed immediately adjacent to the dam, and there would be no effect on irrigation operations and existing land use. The project would alter the aesthetics of the immediate area by construction of the proposed

powerhouse, transmission line right-of-way, and associated facilities, although they would replace the existing aging headgate structure.

Idaho Parks and Recreation, the Greater Yellowstone Coalition, Trout Unlimited, and Idaho Rivers United recommend that Symbiotics construct the powerhouse and buildings using a consistent building style, coloration, and materials, such as tinting the concrete at the powerhouse to match the native rocks and soils, and screening with native or local vegetation. Trout Unlimited also suggests that Symbiotics use non-reflective roofing materials for the facilities and provide enhancements, including signs, vault toilets, and ramp construction in a style that would provide a consistent and natural look. In section 6.2.4.3 of the Settlement, Symbiotics proposes to design any buildings for the proposed project to be aesthetically pleasing and construct any facilities out of a material and in a design to blend with the natural environment, including vegetative screening.

Idaho Parks and Recreation states that the existing narrow, precipitous bridge that crosses the Cross Cut irrigation canal restricts public access to Chester dam. Idaho Parks and Recreation accordingly recommends that Symbiotics grade and widen the access road and widen the bridge to ensure safe use by passenger vehicles and vehicles with trailers. The applicant now proposes to provide improved access to the project area to ensure safe use by passenger vehicles and vehicles with trailers at the upper bridge across the Cross Cut irrigation canal.

Our Analysis

The proposed project facilities would alter the landscape and aesthetics of the Chester dam site. Specifically, construction of the proposed facilities and associated recreation enhancements would result in short-term aesthetic and land use effects including closure of certain areas, land disturbance, noise, and dust. Long term adverse effects on aesthetic resources would include permanent placement of the project powerhouse, transmission line right-of-way, and associated facilities; however, these effects would be largely mitigated through the applicant's proposal to use proper design and building materials, such as coloration of the facility to match the surrounding environment or through the use of vegetative screening with native vegetation.

The proposed increase in elevation of the reservoir would result in a change from a free-flowing river to one that is inundated and maintained at a higher elevation within a 1,200-foot-long reach upstream of the current impoundment. This would result in a few short-term adverse aesthetic effects as the vegetation along the shoreline is permanently inundated. The riparian area would quickly acclimate to the new environment, however, resulting in few long-term adverse effects because the proposed elevation would be the same as the existing high-water elevation and would be only a relatively small extension of the existing reservoir.

Grading and widening of the access road and bridge to the site of the dam, including the recreation access areas, would help to ensure that safe vehicular access is provided to the public to access project recreation resources.

Project Boundary

Symbiotics proposes a project boundary of about 39 acres, with about 29 acres under water (the reservoir). The remaining 10 acres includes about 5 acres of undeveloped riparian shrubland, and the remaining uses include pasture land (fallow and disturbed), cultivated fields, undeveloped non-riparian land, and riparian woodland. The Greater Yellowstone Coalition and Idaho Rivers United ask that the current project boundary be expanded to include the entire scope of the project, including the additional length of reservoir to be impounded upstream of the existing reservoir. They also recommend that the project map be drawn to the appropriate scale and clearly show the details needed to properly assess what is and is not within the project boundary.

Our Analysis

As stated in section V.C.6, *Recreational Resources*, some of the proposed recreation enhancements would be located outside of the proposed project boundary depending on the final location and design developed under the recreation plan. Modification of the project boundary to include all of the proposed recreation enhancements and associated access areas, the entire reservoir, including the newly inundated portions, and entire Chester dam and project facilities (including the downstream toe of the dam) would provide public access to project recreation facilities and ensure all project facilities are maintained over the term of the license.

c. Unavoidable Adverse Effects:

None.

8. Cultural Resources

a. Affected Environment:

Cultural Resources, Historic Properties, and Area of Potential Effects

Historic properties are cultural resources listed or eligible for listing in the National Register. Historic properties can be buildings, structures, objects, districts (a term that includes historical and cultural landscapes), or sites (archaeological sites or locations of important events). Historic properties also may be resources of traditional religious and cultural importance to any living community, such as an Indian tribe or a local ethnic group, that meet the National Register criteria; these properties are known as

traditional cultural properties. In most cases, cultural resources less than 50 years old are not considered eligible for the National Register. Cultural resources also have to have enough internal contextual integrity to be considered historic properties. For example, dilapidated structures or heavily disturbed archeological sites may not have enough contextual integrity to be considered eligible.

Section 106 of the National Historic Preservation Act requires federal agencies including the Commission to consider the effects of their undertakings on historic properties. An undertaking means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including, among other things, processes requiring a federal permit, license, or approval. Advisory Council on Historic Preservation (Advisory Council) regulations implementing section 106 define effects on historic properties as those that change characteristics that qualify those properties for inclusion in the National Register. In this case, the undertaking is the proposed issuance of an original license for a new hydroelectric project; potential effects of licensing may result from construction of the project, day-to-day O&M of the project, or from other actions required by the license, such as those associated with land or natural resource management or recreation.

Determination of effects on historic properties first requires identification of historic properties in the APE of an undertaking. The Advisory Council's regulations define the APE as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. APEs for licensing of new hydroelectric projects normally include lands within the proposed project boundary, plus any locations outside the proposed project boundary where project construction or operation may affect the character or use of historic properties. As proposed by Symbiotics, the Chester Diversion Project would include installing a 38-inch-high inflatable rubber dam on the crest of the existing concrete Chester dam spillway (thereby raising the reservoir level by 38 inches and extending the reservoir up to an additional to 1,300 feet upstream), adding concrete buttresses at each end of the existing spillway, relocating the Cross Cut irrigation canal headworks about 20 feet upstream of the present control gate structure, constructing a new 50-foot-wide concrete intake structure adjoining the existing spillway structure on the south side, and constructing a hydroelectric powerhouse. The APE therefore encompasses the reservoir shoreline 100 feet inland from the proposed high water mark of all backwatered areas upstream of Chester dam on Henry's Fork and on the Falls River; existing and proposed locations of project access roads and recreation facilities; plus the Cross Cut and Last Chance irrigation canals, Chester dam, and the locations proposed for the hydropower facilities.

Advisory Council regulations also require the Commission to seek concurrence from the Idaho SHPO on any finding involving effects or no effects on historic properties, and allow the Advisory Council an opportunity to comment on any finding of adverse effects. In addition, regulations require the Commission to consult with

interested Native American tribes that might attach religious or cultural significance to historic properties within the APE.

Cultural History Overview

The project is located in a region of overlapping cultural traits from the Great Basin and Great Plains. The earliest human occupation of the area occurred in the Paleo-Indian period (ca. 14,500 to 7,200 years before present [B.P.]). People were hunter-gatherers with a broad-spectrum subsistence economy geared toward large game animals and supplemented by smaller animals and plants.

During the Mountain Archaic period (7,200 to 1,400 B.P.) large game animals became extinct and modern species of bison and mountain sheep began to appear. These smaller and faster animals necessitated a technological change from large, hand-wielded spears to atlatls which were used to throw stone-tipped darts. During the Late Archaic Period (ca. 1,400 to 145 B.P.), significant cultural changes occurred as the Fremont and the Shoshone settled in the region. Archaeological evidence shows the Fremont (Great Salt Lake Variant) cultural group lived in the area from around 1,300 B.P. to approximately 300 B.P. The Numic or Shoshonean culture has been demonstrated archaeologically from around 300 B.P., but the largest population immigration occurred between 170 to 145 B.P. (late A.D. 1700s to early 1800s) when they were removed from the High Plains by the newly horse-mounted Blackfoot.

The project is located in the traditional territories of the modern-day Northern Shoshone-Bannock Tribes. Other tribes who began to use the area during the Late Archaic period include the Western Shoshone, Crow, Nez Perce, Sheepeaters, Flathead, Blackfoot, Arapaho, and Cheyenne. These other tribes, however, did not have any sustained settlements in the area, and their presence was limited to hunting parties, exploratory trips, and raiding parties. The Shoshone-Bannock are Numic speakers from two language groups: the Northern Shoshone and the Bannock. The Bannock, who speak a Northern Paiute dialect, shared the same geographic territory as the Northern Shoshone. At the time of first contact with Euroamericans, the two groups were so culturally mixed they were/are referred to by a single name, the Shoshone-Bannock. The Shoshone-Bannock Tribes are composed of dozens of smaller groups or bands. The Bannock/Goose Creek and the Fort Hill bands occupied the Upper Snake River Valley area, which contains the project area.

While Euroamericans explored and fur trapped the project area during the 1800s-1840s, they did not appear in large numbers until the Oregon Trail was well established in the early 1840s. From 1845 to 1865, thousands of pioneers passed through southern Idaho, but relatively few stayed in the region. Mormons were the first to settle the area in meaningful numbers, establishing the town of Franklin (in the southeastern corner of Idaho) in 1860. Additional Mormon communities were established in the region; by

1879 these communities included the towns of Rexburg, Salem, and Teton, located near the project area.

Late 19th century agricultural development, however, was limited by lack of adequate irrigation in this relatively dry region – a problem the Reclamation Act of 1902 was intended to resolve. To that end, Congress authorized the Minidoka Project in 1904. Consisting of Minidoka dam on the Snake River, Jackson Lake dam, and a third dam at American Falls, the irrigation system provided water for approximately 100,000 acres of farmland that formerly had been sagebrush desert.

Unfortunately, the Minidoka Project provided no relief for farmers in the Upper Snake River Valley. As a result, in 1935 the federal government authorized the Upper Snake River Storage Project. This project eventually merged with the Minidoka Project and collectively became the Upper Snake River Division. The Upper Snake River Storage Project provided irrigation water to more than 1.2 million acres of farmland. Its facilities include Island Park dam and reservoir (upstream of Chester dam), Grassy Lake dam and reservoir (in Wyoming), Cascade Creek diversion dam and canal, Cross Cut (Chester[18]) Diversion dam, and Cross Cut irrigation canal.

Construction of the Cross Cut irrigation canal unit (including the Chester Diversion dam and canal, as well as associated structures) began August 6, 1936. The Cross Cut irrigation canal was designed to divert water from Henry's Fork and carry it to the Teton River. The purpose of the canal was to increase water allotments to various canals in the area that are fed by the Teton River. The diversion dam was finished in December 1937 and the canal on January 13, 1938. Operation of the facility, however, did not begin for another year because gaging stations and flumes (which carried water from one existing agricultural field, across the canal, to another field) had to be constructed. Also, during 1938 various tests were conducted to determine the integrity of the canal's concrete. Additional minor improvements and repairs were completed during 1938 and into 1939. The first diversion of water for irrigation occurred in the summer of 1939.

Prehistoric and Historic Archaeological Resources

The only cultural resources survey conducted in the APE of the Chester Diversion project occurred in 2002, in association with Reclamation's title transfer of the irrigation facilities operated by the Freemont-Madison Irrigation District to the District (Garrison et al., 2003). The survey was largely a literature search, although a field survey focused on

[18] While the Chester Diversion dam also is referred to as the "Cross Cut Diversion dam," and all Reclamation materials associated with the Minadoka Project refer to the project by this name, for consistency and clarity in this EA we use the name Chester Diversion moniker.

the irrigation facilities was conducted. It did not discuss or investigate the shorelines of the reservoir above Chester dam. The survey resulted in the documentation of one historic archaeological site. Site TS-1 consists of a small trash scatter dating from about 1920-1940 and probably predates the construction of Cross Cut irrigation canal. The study recommended Site TS-1 as ineligible for the National Register because it had shallow depth potential, poor site integrity, lack of context, and may in fact have been a secondary deposit moved from its original location. The site contained no significant artifacts, concentrations, or features. Finally, the integrity of the site had been compromised by erosion, probable displacement, and deterioration.

Historic Buildings and Structures

The APE contains no buildings or structures listed in the National Register. The 2002 cultural resources survey identified 51 historic-period resources (referred to as 51 "sites" in the cultural resource survey report). All of these sites seem to be related to the construction and operation of Chester dam and the Cross Cut irrigation canal.

The Cross Cut irrigation canal alignment (AS-1) is 6.6 miles long with a variable width between 25 and 40 feet and a depth of 5 to 7 feet. Seven sites consist of features that are a part of or closely associated with the canal's function. Cross Cut (Chester) Diversion dam (CC-1) is composed of headworks of the Cross Cut and Last Chance irrigation canals, the dam, a concrete transition/lining, concrete piers, a hoist house, and a gaging station. Other sites directly related to the canal include concrete checks (CC-3 and CC-5), a concrete drop and canal inlet (CC-5), a concrete drop (CC-13), a concrete turnout (CC-6), and a concrete lining/transition (CC-7).

Forty-four sites represent features associated with the Cross Cut irrigation canal, but are not a part of it and not integral to its function. These resources are related to separate irrigation, drainage, or transportation systems (e.g., bridges, flumes, and siphons). Seventeen flumes (S-7, S-8, S-10, S-13, S-16, S-18, S-19, S-28, S-30, S-32, S-34, S-37, S-39, S-41, S-43, S-45, and S-47), all of the typical farm lateral flume variety, were recorded. Ten farm bridges (S-3, S-9, S-17, S-20, S-22, S-29, S-33, S-35, S-42, and S-48) were identified; these bridges were constructed to allow farmers access to agricultural fields otherwise isolated by construction of the Cross Cut irrigation canal. Five other bridges or bridge remnants were documented, and include footings for a historic highway bridge (S-40), rock footings of a stock bridge (S-3), a concrete highway bridge (S-24), a concrete railroad bridge (S-25), and a wood bridge located at the Chester dam headworks (S-51). Eight drainage inlets (S-1, S-2, S-4, S-5, S-12, S-14, S-26, and S-27), four siphons (S-15, S-21, S-36, and S-46), and one corrugated metal pipe turnout (S-23) constitute the remaining structures.

The cultural resources survey report (Garrison et al., 2003) recommends 22 of these 51 resources as eligible for the National Register. In a September 24, 2005, letter to Symbiotics (filed with the Commission on April 4, 2008), the Idaho SHPO informed the

applicant that it had consulted with Reclamation pursuant to section 106 of the NHPA during the title transfer process and had reviewed the surveys and documentation Reclamation conducted in 2002. The Idaho SHPO informed Symbiotics that it concurred with the findings of eligibility in the 2003 cultural resources report, confirming that the Chester dam is eligible for the National Register of Historic Places. The Idaho SHPO also informed the applicant that the proposed project would adversely effect a historic property; however, the documentation completed by Reclamation in 2002 sufficiently mitigated the adverse effect. The Idaho SHPO concluded, therefore, that no additional documentation of the facilities was necessary.

Traditional Cultural Properties

Reclamation consulted Native American tribes in association with its proposed title transfer of the Chester dam and related facilities. Expressing concern about downstream flows, the Shoshone-Bannock Tribes, in a letter to Reclamation dated January 28, 2002, noted that the Tribes considered the water to be a sacred resource and thus a traditional cultural property.

b. Environmental Effects:

In this section, we consider the effects of project construction and operation on cultural resources listed in or eligible for inclusion in the National Register.

Symbiotics proposes to modify the Cross Cut Diversion (Chester) dam (Site CC-1) by installing a 38-inch inflatable rubber dam on the crest of the existing concrete spillway, adding concrete buttresses at each end of the existing spillway, relocating the Cross Cut irrigation canal headworks about 20 feet upstream of the present control gate structure, constructing a new 50-foot wide concrete intake structure adjoining the existing spillway structure on the south side, and constructing a hydroelectric powerhouse at the diversion dam. Such alterations and new construction would require removal or alteration of existing historic materials, and as such would adversely affect the National Register-eligible Chester dam. Neither construction nor operation of the new hydroelectric project, however, would involve or affect any of the other 21 historic-period resources eligible for the National Register. All of the 21 historic-period resources eligible for the National Register, which are associated with the irrigation development, would continue to be operated by the Freemont-Madison Irrigation District for irrigation purposes.

Construction and operation of the Chester Diversion Project, however, could adversely affect archaeological resources along the reservoir shoreline, should any such resources be found to exist. As noted in our analysis in section V.C.1, *Geology and Soils*, raising the reservoir elevation creates the potential for increased shoreline erosion. Recreational enhancements (see section V.C.6, *Recreational Resources*) would not only involve ground disturbance during construction, but also would increase public use and

thus the potential for vandalism or accidental destruction of any archaeological resources located on or near the ground surface. In addition, placement of the 15-kV transmission line underground, as proposed by several agencies, would involve ground disturbance in areas that could contain archaeological resources.

In its application for the project, Symbiotics proposes to mitigate adverse effects of project construction on Site CC-1 by completing Historic American Engineering Record (HAER) documentation of the facility prior to any alterations or additions. On September 2, 2005, Symbiotics submitted to the Idaho SHPO a request for comments regarding any possible effects of the proposed project on cultural resources and a draft HPMP. The plan calls for documentation of the Chester dam to HAER standards prior to any alteration of the facility. In its September 24, 2005, response, filed with the Commission on April 4, 2008, the Idaho SHPO indicated that while the proposed Chester Hydroelectric Project would result in an adverse effect to a historic property, Reclamation already sufficiently documented the facility and no additional documentation was necessary.

Our Analysis

The proposed Chester Diversion Project would involve ground disturbance, both through an increase in the reservoir elevation (potential erosional effects) and through construction of project facilities and recreational amenities. Given the current lack of information regarding the presence or absence of archaeological resources (particularly prehistoric archaeological resources) along Henry's Fork and the Falls River in the area of the impoundment, the Chester Diversion Project could adversely affect significant cultural resources, should any exist within the APE. Completion of an archaeological field investigation of those portions of the APE not covered in the 2002 survey, developed and conducted in consultation with the Idaho SHPO and the Shoshone-Bannock Tribes, would ensure that any significant archaeological sites would be identified prior to ground-disturbing activities.

Revision and finalization of the draft HPMP in consultation with the Idaho SHPO and the Shoshone-Bannock Tribes would ensure that adverse effects on historic properties arising from project operations or project-related activities over the term of a new license would be mitigated, lessened, or avoided. To resolve any potential adverse effects arising from license requirements, the HPMP would be revised to include principles and procedures to address the continued use and maintenance of properties that are listed or may be eligible for listing on the National Register; principles and procedures for ensuring that significant archaeological resources are identified, and any adverse effects arising from project operations resolved; as well as principles and procedures to respond to accidental discovery of cultural resources during project operations. The revised and finalized HPMP would contain procedures for biennial review, and as necessary, revision of the document, including delineation of the APE.

Such principles and procedures would ensure that cultural resources would be afforded proper treatment and, as appropriate, protection, over the term of the license.

HAER recordation is a standard measure to preserve information about a structure when it must be altered or removed. HAER documentation of Chester dam, as proposed by Symbiotics and already completed by Reclamation, would adequately mitigate the adverse effects of the proposed changes to this historic property.

Prior to license issuance, the Commission would execute a PA with the Idaho SHPO. The PA would require the licensee to revise, finalize, and implement its HPMP in consultation with the Idaho SHPO and the Shoshone-Bannock Tribes. The PA then would be incorporated into the new license by reference. Execution of the PA and implementation the measures in its associated HPMP, in consultation with the Idaho SHPO, would ensure that adverse effects of the project would be appropriately mitigated.

c. Unavoidable Adverse Effects:

None.

D. NO-ACTION ALTERNATIVE

Under no action, the project would not be constructed, and the existing environmental resources would remain unchanged. Under this alternative, however, none of the environmental protection or enhancement measures proposed by the applicant or recommended by the staff or others would be implemented.

VI. DEVELOPMENTAL ANALYSIS

In this section, we analyze the use of water resources of the Henry's Fork of the Snake River by the Chester Diversion Project to generate power; estimate the economic benefits of the project; and estimate the cost of various environmental protection and enhancement measures and the effects of these measures on project operations.

Under its approach to evaluating the economics of hydropower projects, as articulated in *Mead Corporation, Publishing Paper Division* (72 FERC ¶ 61,027, July 13, 1995), the Commission employs an analysis that uses current costs to compare the costs of the projects and likely alternative power with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. The Commission's economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project-generated power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

The main purpose of the project is to provide power to PacifiCorp. If constructed, the Project would have an installed capacity of 3.3 MW and generate about 16,800 MWh of electrical energy annually.

Power from the project would be sold to PacifiCorp. In a February 13, 2008 order, the Idaho Public Utilities Commission (IPUC) established a levelized avoided cost rate for PacifiCorp of $71.10/MWh for a project smaller than 10 megawatts coming on-line in 2010, with a 20-year contract.[19]

For our economic analysis of alternatives for the Chester Diversion Project, we used the assumptions, values, and sources shown in table 12.

Table 12. Staff assumptions for the economic analysis of the Chester Diversion Project. (Source: Staff)

Assumption	Value	Source
Energy rate (2010)	$71.10/MWh	Idaho Public Utilities Commission, 2010 on-line rate
Period of analysis	30 years	Staff
Interest rate	8.0 percent	NPS letter August 30, 2005
Discount rate	8.0 percent	Staff
Federal tax rate	35.0 percent	Staff
Local tax rate	3.0 percent	Staff
Insurance rate	0.25 percent	Staff
Term of financing	20 years	Staff
Escalation rate after 2008	0 percent	Staff
O&M costs excluding taxes (2008$)	$105,370	NPS letter dated August 30, 2005 escalated at 4% per year
Base construction and license application cost without environmental costs and fish screening (2008$)	$7,275,780[a]	NPS letter dated August 30, 2005 escalated at 4% per year

[a] If a license is issued to Symbiotics for the project, it must acquire title in fee or the right to use in perpetuity all lands, necessary or appropriate for the construction, maintenance, and operation of the project within 5 years of issuance of the license.

[19] Retrieved Order No. 30480 from http://www.puc.state.id.us/ELECTRIC/30480.pdf on February 25, 2008.

The construction cost does not include a cost for acquiring these rights. *See* (1) the Commission staff letter to the licensee, issued October 19, 2007, noting that additional property, including the entire Cross Cut Diversion dam, relevant portions of the Cross Cut Canal and headworks, and related lands must be included within the proposed project boundary, and requiring the licensee to file information regarding the costs of acquiring adequate property rights for the additional property; and (2) the licensee's response, filed November 19, 2007, attaching a Memorandum of Understanding (MOU) between the applicant and Fremont-Madison Irrigation District, and stating that the MOU provides that the licensee will pay for all of the District's relevant expenses, but that there will be no payment for the use of the District's facilities.

A. POWER AND ECONOMIC BENEFITS OF THE PROPOSED PROJECT

Symbiotics proposes to install a 3.3-MW powerhouse at the Chester Diversion dam. As proposed by Symbiotics, the annualized cost of operating the Chester Diversion Dam Project would be about $1,158,100, or $69.35/MWh. This includes the $7,275,800 initial cost for modifications to the dam, relocation of the entrance to the Cross Cut irrigation canal, and installation of the powerhouse plus $639,500 for environmental enhancements at the site, for a total capital investment of $7,915,330. Based on an estimated average annual generation of 16,700 MWh, the project would produce power valued at $1,187,370 when multiplied by the $71.10/MWh value of the project's power. Therefore, at current power values, the project power would cost $29,270, or $2.25/MWh, less than the likely cost of alternative sources of power.

B. POWER AND ECONOMIC BENEFITS OF THE STAFF-RECOMMENDED ALTERNATIVE

Resource agencies and nongovernmental organizations recommended the implementation of a variety of measures at the project. We reviewed each recommendation and determined the measures that were most appropriate for implementation. In section VII, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the Staff Alternative and why we believe the environmental benefits are worth these costs.

As recommended by staff, the annualized cost of operating the Chester Diversion Dam Project would be about $1,166,570 or $69.85/MWh. Based on an estimated average annual generation of 16,700 MWh, the project would produce power valued at $1,187,370 when multiplied by the $71.10/MWh value of the project's power. Therefore, the power would cost $20,800, or $1.25/MWh, less than the likely cost of alternative power. Our recommended environmental measures increase the capital investment in the project by $73,470, bringing the total capital invested to $7,988,800.

C. COMPARISON OF ALTERNATIVES

Table 13 compares the power value and annual costs for Symbiotics' proposed measures and Symbiotics' proposed measures with additional or alternative staff-adopted measures for the project. We recommend most of Symbiotics' proposed measures, except for the fish ladder, the fish screen at the turbine intakes (for which we offer an alternative), and multi-year studies to determine levels of fish entrainment in the Cross Cut irrigation canal accompanied by fish salvage operations, if required (instead we recommend a fish screen that would provide fish screening of the Cross Cut irrigation canal entrance). We also recommend that the licensee bury the transmission line for the project instead of installing it overhead. Our reasons for rejecting these measures or recommending alternative measures are discussed in detail in section VII, *Comprehensive Development and Recommended Alternative*. Table 14 shows the effect on costs and power values of individual measures proposed by Symbiotics and recommended by us and others, including the additional or alternative measures that we recommend for inclusion in any license. We note that some of the measures listed in table 14 are no longer recommended as a result of the settlement. These measures remain in table 14, however, for purposes of continuity.

The Commission would require the licensee to file with the Commission, for approval, three copies of a project financing plan showing that the licensee has acquired the funds, or commitment for funds, necessary to construct the project in accordance with the license. This requirement would help to ensure the economic feasibility of the project, since the licensee would not be permitted to start any project construction or ground-disturbing activities that are inseparably associated with the project, before the project financing plan is approved.

The Commission uses current costs to compare the cost of the project and likely alternative power with no forecasts concerning potential future inflation, escalation, or deflation beyond the license issuance date. The basic purpose of the Commission's economic analysis is to provide a general estimate of the potential power benefits and costs of a project, and of reasonable alternatives to project power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

Our analysis shows that the project with additional staff recommendations would cost less to operate than our estimated cost of alternative power. Nevertheless, it is the applicant who must decide whether to accept any license issued and any financial risks that decision entails. Even though staff does not explicitly account for the effects inflation may have on the future cost of electricity, the fact that hydroelectric generation is relatively insensitive to inflation, compared to fossil-fueled generators, is an important economic consideration for the power producers and the consumers that they serve. This is one reason project economics is only one of the many public interest factors the

Commission considers in determining whether, and under what conditions, to issue a license.[20]

Table 13. Summary of costs for Symbiotics' proposed action and Symbiotics' proposed action with additional or alternative staff-recommended measures for the Chester Diversion Dam Hydroelectric Project. (Source: Staff)

	Symbiotics' Proposed Action	**Symbiotics' Proposed Action with Additional or Alternative Staff-recommended Measures**
Installed capacity (MW)	3.3	3.3
Annual generation (MWh)	16,700	16,700
Annual power value	$1,187,370 $71.10/MWh	$1,187,370 $71.10/MWh
Annual cost	$1,158,100 $69.35/MWh	$1,166,570 $69.85/MWh
Net annual benefit[a]	$29,270 $1.75/MWh	$20,800 $1.25/MWh

[a] Difference between annual power benefit and annual costs.

[20] Since, as noted, project costs do not include the cost of Symbiotics obtaining rights in project property, project power cost (for each project alternative), including project power cost in comparison to the cost of alternative power sources, may be understated.

Table 14. Summary of capital and one-time costs, annual costs, and total annualized costs for environmental measures proposed by Symbiotics and recommended by staff and others for the Chester Diversion Dam Project. (Source: Staff)

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
Geology and Soils						
1. Develop and implement an erosion control plan.	Symbiotics	$52,500	$0	$4,260	Yes	a
2. Minimize sediment mobilization before and during construction.	Trout Unlimited, Snake River Cutthroats	$0	$0	$0	Yes, covered by erosion control plan	b
3. Stabilize sediment in the forebay prior to construction.	Trout Unlimited	$0	$0	$0	Yes, covered by erosion control plan	b
4. Implement measures to dissipate the effects of flows downstream of the powerhouse.	Henry's Fork Foundation, Trout Unlimited, Snake River Cutthroats	$0	$0	$0	No	c

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
5. Complete pre- and post-construction surveys of geomorphology in the tailrace area.	Idaho, Trout Unlimited	$0	$0	$0	No	c
Water Resources						
6. Monitor water quality before, during, and after construction.	Symbiotics, Upper Snake River Flyfishers	$0	$10,500	$10,500	Yes	a
7. Provide evidence that water temperatures are not affected by the operation of the project.	Trout Unlimited	$0	$0	$0	Yes	d
8. If water quality standards are not met, mitigate for losses.	Trout Unlimited	$0	$0	$0	Yes, but covered by 401 certification	c

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
Aquatic Resources						
9. Install screen with 1.5-inch openings across the turbine and screens with 0.25-inch openings across the Cross Cut and Last Chance irrigation canal intakes to prevent entrainment of all downstream migrating adult trout also provide a bypass to the tailrace with a 25-cfs transport flow.	Settlement Agreement	$437,900	$29,160 (includes 100 MWh of lost energy)	$54,400	Yes	a
10. Conduct effectiveness testing of the turbine intake screens.	Henry's Fork Foundation, Trout Unlimited, Snake River Cutthroats, Upper Snake River Flyfishers	$0	$5,380 ($30,000 per year in years 3, 6, 9)	$5,380	Yes, would also provide effectiveness results for the Cross Cut irrigation canal	a

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
11. Conduct effectiveness testing of the canal intake screens.	Henry's Fork Foundation, Trout Unlimited, Snake River Cutthroats, Upper Snake River Flyfishers	$0	$5,380 ($30,000 per year in years 3, 6, 9)	$5,380	No	a
12. Conduct multi-year studies to determine levels of fish entrainment to the Cross Cut irrigation canal and conduct fish salvage operations, if required.	Symbiotics, Henry's Fork Foundation, Greater Yellowstone Coalition, Idaho Rivers United	$0	$5,380 ($30,000 per year in years 3, 6, 9)	$5,380	No	a
13. Design and conduct an entrainment study for the Last Chance irrigation canal.	Greater Yellowstone Coalition, Idaho Rivers United	$0	$3,590 ($20,000 per year in years 3, 6, 9)	$3,590	No	a
14. Install an upstream fish ladder.	Settlement Agreement (outside of license order)	$525,000	$31,830 (includes 300 MWh of lost energy)	$63,250	No	a

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
15. Conduct effectiveness testing of the upstream fish ladder	Henry's Fork Foundation, Trout Unlimited, Snake River Cutthroats, Upper Snake River Flyfishers	$0	$3,590 ($20,000 per year in years 3, 6, 9)	$3,590	No	a
16. Mitigate for the loss of free-flowing river that results from the three-foot increase in reservoir elevation and prepare a fish habitat enhancement plan	Staff, Snake River Cutthroats	$36,800	$0	$2,980	Yes, but not a mitigation fund or enhancements outside of the project area	a
17. Conduct additional multi-year electrofishing surveys periodically in the project vicinity both prior to and during project operation to document population size and size structure of resident trout.	Staff	$0	$3,860 ($20,000 per year in years 1, 5, 10)	$3,860	Yes	a

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
18. Establish an independent technical team to provide independent, third-party review and evaluation of all studies and surveys related to the project	Symbiotics, Henry's Fork Foundation, Trout Unlimited, Snake River Flyfishers	$5,250	$0	$430	No	a
19. Provide a detailed plan for Yellowstone Cutthroat Trout protection	Henry's Fork Foundation	$5,250	$0	$430	No	a
20. Develop fisheries management plans for all game species of fish that utilize project waters	Henry's Fork Foundation	$5,250	$0	$430	No	a

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
Terrestrial Resources						
21. Reseed all disturbed areas with a native grass mix	Symbiotics, Idaho, Henry's Fork Foundation, Trout Unlimited, Snake River Flyfishers, Greater Yellowstone Coalition, Idaho Rivers United	$5,680	$2,180	$1,880	Yes	e
22. Complete construction in a timely manner to avoid prolonged disruption of wildlife in the area.	Symbiotics	$0	$0	$0	Yes	b
23. Construct the project between May 16 and the end of February to minimize disturbance to nesting bald eagles.	Settlement Agreement	$0	$0	$0	Yes	b

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
24. Maintain water surface elevations in the forebay until the accustomed high water period of mid-May occurs to protect early nesting waterfowl.	Symbiotics	$0	$0	$0	Yes	b
25. Provide onsite rehabilitation and plantings of native riparian shrubs to allow for expansion of the riparian zone in conjunction with elevated water levels.	Symbiotics	$0	$0	$0	Yes	h
26. Limit vehicle traffic and parking to established areas	Symbiotics	$0	$0	$0	Yes	b
27. Exclude grazing in the riparian zone to minimize trampling and allow for establishment of new shoots.	Symbiotics	$0	$0	$0	Yes	b

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
28. Develop a landscape plan prior to ground distributing activities that would include appropriate landscaping and plantings of native upland vegetation to mitigate for the loss of upland vegetation at the powerhouse site.	Symbiotics	$5,250	$0	$430	Yes	a
29. Control noxious weeds to allow establishment of native grasses including consultation with local agencies to determine best management practices when controlling weeds and reed canary grass in proximity to moving water, and funds for maintaining all plantings and associated control of noxious weeds in the O&M budget.	Symbiotics, Henry's Fork Foundation, Trout Unlimited, Greater Yellowstone Coalition, Idaho Rivers United, Snake River Flyfishers	$10,500	$5,250	$4,260	Yes	a
30. Retain all mature cottonwoods, when possible, or replace any lost cottonwoods at a 3:1 ratio	Symbiotics	$0	$0	$0	Yes	i

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
31. Monitor re-vegetated areas to attain 80 percent survival over 5 years and 100 percent survival for cottonwoods	Symbiotics, Idaho Fish and Game	$5,250	$1,720 ($5,000 per year in years 2-6)	$1,550	Yes	a
32. Mark the 15-kV primary transmission line to minimize avian collision hazard	Settlement Agreement	$10,50	$0	$850	Yes	a
Recreational Resources						
33. Provide public access during construction and a temporary recreation access management plan	Settlement Agreement	$5,250	$0	$430	Yes	a

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
34. Upgrade the existing boat launches located immediately upstream and downstream of the dam by re-surfacing the boat launches with concrete, expand and improve the parking area between the two launches to accommodate 20 cars and trailers, install vault toilets at each launch site	Settlement Agreement (with Staff modifications)	$90,860	$2,180	$8,790	Yes	e
35. Construct a bird watching/fishing pier and kiosk upstream of the dam	Trout Unlimited, Greater Yellowstone Coalition, Idaho Rivers United, Snake River Cutthroats	$5,250	$0	$430	No	a
36. Ensure barrier-free access to the upstream and downstream boat launches by including a barrier- free trail and hardened accessible surface near the river below the dam.	Settlement Agreement	$5,410	$550	$790	Yes	a, m

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
37. Provide a new boat ramp and parking area with vault toilets to be located upstream of the enlarged forebay that can be used during and after construction and with all ADA-compliant facilities	Idaho, Henry's Fork Foundation, Trout Unlimited, Greater Yellowstone Coalition, Idaho Rivers United	$40,000	$2,000	$4,540	No	a
38. Improve the Fun Farm Bridge boat access area located about three miles downstream of the dam and outside of the project boundary to include permanent toilets, pavement, improved turnaround areas and parking and to make all facilities ADA compliant.	Henry's Fork Foundation, Trout Unlimited, Snake River Flyfishers	$31,500	$0	$2,550	No	a, k

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
39. Improve the Vernon Bridge boat access area located three miles upstream of the dam and outside of the project boundary to include permanent toilets, pavement, improved turnaround areas and parking and to make all facilities ADA compliant.	Henry's Fork Foundation, Trout Unlimited, Snake River Flyfishers	$31,500	$0	$2,550	No	a, k
40. Improve the Seeley's boat access area located about one mile upstream of the dam and outside of the project boundary by obtaining property/easement, installing a pre-fabricated concrete block boat ramp, parking for 20 boats and trailers, vaulted toilets, picnic areas and make all facilities ADA compliant.	Snake River Flyfishers	$42,000	$0	$3,410	No	a, k
41. Develop an information and education plan that includes the development of an information and education kiosk.	Settlement Agreement (with Staff modification)	$5,250	$0	$430	Yes	a

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
Land Use and Aesthetic Resources						
42. Construct the proposed powerhouse of concrete and textured concrete block to minimize visual impacts and seek resource agency comments on the color and texture of the blocks.	Settlement Agreement	$0	$0	$0	Yes	b
43. Improve and maintain the bridge over the Cross Cut irrigation canal and grade and widen the access road (Note: the existing bridge will be replaced when the upper portion of the canal is relocated).	Symbiotics, Idaho, Trout Unlimited	$0	$0	$0	Yes	l
44. Screen all buildings with vegetation.	Settlement Agreement	$5,250	$0	$430	Yes	a

Environmental Measures	Recommending Entities	Capital and One-time Costs (2008$)	Annual Costs, including O&M (2008$)	Total Annualized Cost (2008$)	Adopted by Staff?	Notes
45. Expand the project boundary to include the additional backwatered areas upstream of the dam resulting from increased reservoir elevations and all project recreational facilities.	Greater Yellowstone Coalition, Idaho Rivers United	$0	$0	$0	Yes	b
46. Complete an economic analysis of project effects on recreational boating and fishing.	Henry's Fork Foundation	$78,750	$0	$6,380	No	a
Cultural Resources						
47. In consultation with the Idaho SHPO, complete an archaeological survey on unsurveyed portions of the APE prior to any ground disturbance.	Staff	$26,250	$0	$2,130	Yes	a
48. In consultation with the Idaho SHPO and Shoshone-Bannock Tribes, revise, finalize and implement the HPMP.	Staff	$5,250	$0	$430	Yes	a

[a] Cost estimated by staff.

[b] Assume the measure could be implemented at no additional cost.

[c] Insufficient information is available on what is encompassed under this measure to estimate a cost.

[d] The cost would be included in monitoring cost.

[e] Cost provided by Symbiotics.

[f] Some level of screening would be provided under the staff alternative.

[g] Cost is dependent on how the mitigation is provided.

[h] Cost is included in the reseeding cost.

[i] No cost would be incurred if cottonwoods are not removed.

[j] This represents the incremental cost to bury the transmission line instead of running it overhead.

[k] This measure is considered to be non-project because the site is located outside of the project boundary and the project's reasonable geographic scope in relation to the issue involved.

[l] Assume no additional cost because the bridge and approach roads would need to be reconstructed when the Cross Cut irrigation canal is relocated.

[m] The cost of obtaining the easements is not known. Symbiotics would obtain the necessary easements when it acquires the title in fee or the right to use in perpetuity all lands, necessary or appropriate for the construction, maintenance, and operation of the project.

VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a) of the FPA require that the Commission give equal consideration to all uses of the waterway on which the project is located. When we review a proposed project, we consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values. Accordingly, any license issued shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses.

Based on our independent review of agency and public comments filed on this project and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the proposed project, with staff-recommended modifications, as the recommended alternative. This alternative includes elements of Idaho Fish and Game and NGO recommendations, the applicant's proposed measures, and some staff-recommended additional measures. We recommend this alternative because: (1) issuance of a new hydropower license by the Commission would allow Symbiotics to construct and operate the project as a dependable source of electric energy; (2) the 3.3-MW project would eliminate the need for an equivalent amount of fossil-fuel derived energy and capacity, which helps conserve these non-renewable resources and limits atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative; and (4) the recommended environmental measures would protect fish and terrestrial resources, improve public use of recreational facilities and resources, and protect and maintain historic and archaeological resources within the area affected by project operation.

We describe the rationale for our recommendations and for not recommending certain recommendations in the following section.

1. Symbiotics' Proposed Measures[21]

We recommend including the following measures proposed by Symbiotics in any license issued for the Chester Diversion Hydroelectric Project:

- Operate the project in run-of-river mode.
- Develop and implement an erosion control plan.
- Monitor water quality before, during, and after construction.

[21] In some cases (italicized), we incorporated minor modifications to the applicants' proposal in order to include a more specific recommendation.

- Provide a 25-cfs bypass flow through the sluiceway (logway) to allow downstream fish passage.

- Install a 1.5-inch mesh screen at the turbine intake to prevent entrainment of downstream migrating adult trout.

- Install 0.25-inch mesh screens at the Last Chance and Cross Cut Canals to prevent entrainment of downstream migrating adult trout.

- Develop a landscape plan prior to ground disturbance which includes establishing foot and vehicle access routes to protect vegetation from trampling, planting native shrubs totaling 500 square feet to improve the aesthetics of the powerhouse and associated structures, and planting native bunchgrasses totaling 500 square feet to improve the aesthetics of developed areas; re-seed all disturbed areas with a native grass mix; control noxious weeds and introduced grasses in the project area to allow establishment of native plantings, including funding the maintenance of all plantings and control of noxious weeds in the project's O&M budget; retain all mature cottonwoods when possible. If avoidance is not possible, plant three cottonwoods at least 6 feet high for every one cottonwood that is harmed; minimize the duration of construction to curtail disturbance to all wildlife. *Complete these restoration measures within one year after project construction is complete and file a report within three years of license issuance indicating that these landscape measures have been completed. If any of the measures were not successful, the report should include recommendations to further mitigate the effected resources. In any license issued, the Commission would reserve the authority to require additional measures if the results contained within the report are deemed inadequate.*

- Construct the project between May 16 and the end of February to minimize disturbance to nesting bald eagles.

- Mark the 15-kV primary transmission line to minimize avian collision hazards.

- To protect riparian vegetation, limit vehicle parking and traffic to established areas to minimize disturbance of remaining and re-established riparian vegetation; exclude grazing from the riparian zone to minimize trampling and allow establishment of new shoots; plant and protect native riparian shrubs along both banks where vehicle traffic and trampling have prevented establishment of vegetation; do not raise the forebay level following construction prior to the accustomed high water period of mid-May to protect early nesting waterfowl; provide onsite

rehabilitation and plantings to protect riparian vegetation and allow for expansion of the riparian zone in conjunction with elevated water levels; consult with local agencies to determine best management practices when controlling weeds and reed canary grass in proximity to moving water. *Within three years of license issuance, the applicant should file a report detailing the results of all the recommended measures for the protection of botanical and wildlife resources and provide specific details for each of the proposed measures, including the results of any revegetation and restoration efforts. If any of the measures were not successful, the report should include recommendations to further mitigate the effected resources. In any license issued, the Commission would reserve the authority to require additional measures if the results contained within the report are deemed inadequate.*

- Develop an information and education plan that identifies locations for maps, signs, information boards, brochures, and other materials informing the public about opportunities for recreation and aesthetic use in and adjacent to the project area. *Develop and construct an information and education kiosk at Chester Diversion dam and file a report within three years of license issuance indicating that these measures have been implemented. In any license issued, the Commission would reserve the authority to require additional measures if the results contained within the report are deemed inadequate.*

- Provide enhancements to the boat launches upstream and downstream of Chester dam to reduce erosion and improve stability (e.g., re-surface boat launches with concrete); upgrade angler access below Chester Diversion dam through the development of an improved trail to the river, between the boat launch and the powerhouse tailrace; grade and widen the roads and bridges, as necessary, to ensure safe use by passenger vehicles and vehicles with trailers; provide public access during construction via the development of a temporary recreation access management plan. *Expand and improve the parking area between the two upgraded boat launches to accommodate 20 cars and trailers, include trash receptacles, and install vault toilets at each launch site. File a report within three years of license issuance indicating that these recreation measures have been completed. In any license issued, the Commission would reserve the authority to require additional measures if the results contained within the report are deemed inadequate.*

- Design any buildings for the proposed project to be aesthetically pleasing and construct any facilities out of a material and in a design to blend with the natural environment, including vegetative screening.

2. Staff's Recommended Measures

For reasons outlined in sections V and VII of this final EA, we altered our list of additional recommended measures since the issuance of the September 2007 EA, including the addition of one measure (turbidity and water temperature monitoring). Other measures we recommended (recreation enhancements, marking the transmission line, providing access during construction, screening of the irrigation canals) are now included in the applicant's proposal as a result of the Settlement. In addition, several measures originally included in the September 2007 EA (mitigation for loss of upland steppe habitat) are no longer recommended.

In addition to the applicant's proposed measures, we recommend including the following measures in any license issued for the Chester Diversion Hydroelectric Project:

- Include turbidity and water temperature as parameters in the proposed water quality monitoring program.

- Prepare a plan that includes testing to address the effectiveness of the screens and ensure the screens are meeting design objectives.

- Conduct additional multi-year electrofishing surveys periodically in the project vicinity both prior to and during project operation to document population size and size structure of resident trout. Additional information on presence, abundance, and spatial distribution of cutthroat trout in the project vicinity would be gathered during these surveys.

- Consult with Idaho Fish and Game on the preparation of a habitat enhancement plan for mitigation of the impacts of modification of up to 1,300 feet of riverine habitat in the Henry's Fork and in the Falls River as a result of raising the water surface level of the Chester dam pool by 38 inches. The plan should focus on habitat enhancement that could be completed in the immediate project area, and should include quantification of the habitat that would be modified in the Henry's Fork and in the Falls River.

- Expand the project boundary to include the entire Chester Diversion dam, all project recreational facilities and parking areas, as well as all of the additional backwatered areas upstream of the dam resulting from increased reservoir elevations.

- Within six months of license issuance, and in consultation with the Idaho SHPO, complete an archaeological survey on unsurveyed portions of the APE prior to any ground disturbance.

- Within one year of license issuance, revise, finalize, and implement the HPMP in consultation with the Idaho SHPO and Shoshone-Bannock Tribes.

3. Rationale for Staff Recommendations

Sediment Control Measures and Water Quality

Several commenting agencies and entities were concerned about the potential for sediment to be mobilized during project construction and operation and passed downstream into the Henry's Fork, adversely affecting aquatic habitat. We agree that the potential exists for some erosion and sedimentation to occur during project construction. The applicant proposes to prepare and implement an erosion control plan during project construction. The applicant also proposes to isolate the main area of powerhouse construction immediately above Chester dam (which is also the area with the highest amount of sediment deposition) by constructing a coffer dam around that area, and removing the fine sediment prior to construction. These measures should control or minimize any sediment releases during construction, eliminating the need to implement sediment stabilization and to study potential sediment mobilization.

The applicant also proposes to monitor water quality before, during, and after project construction. We recommend that, at a minimum, the parameters of turbidity and water temperature are included in any water quality monitoring program. Turbidity monitoring would allow for the detection of unsuitable sediment concentrations caused by any project activities. Including temperature as a parameter in a water quality monitoring program would be an inexpensive means to ensure the recognition of any unforeseen project effects on water temperature.

We estimate that implementing the erosion control plan would have a capital cost of $52,500 and an annualized cost of $4,260, while water quality monitoring would an annualized cost of $10,500. These costs are reasonable to ensure that sediment is not released to the Henry's Fork during and after construction and we conclude that the expected benefits justify the cost.

During project operation, naturally occurring sediment would continue to enter the Chester dam impoundment and be potentially deposited in the turbine intake/fish screen area, requiring removal to maintain the proper functioning of the intake and fish screens.

Sedimentation in the area of the powerhouse intakes and fish screens may or may not occur during project operation, and it is possible that the intakes may be designed to reduce such sedimentation. The extent of this potential problem would be unknown until after commencement of operations and if the problem

does occur, Symbiotics would be required to perform actions that would minimize sediment releases to the river.

Fish Screens and Downstream Passage

The Henry's Fork maintains a blue-ribbon trout fishery that many commenters state is worth millions of dollars to the local economy. The results of studies performed by the applicant, however, indicated that entrainment into the Cross Cut irrigation canal results in the loss of thousands of fish every season, due to fatal summertime herbicide treatments and the dewatering of the canal at the end of the irrigation season. Studies also indicate significant entrainment in to the Last Chance irrigation canal. Nearly all of the commenters (agencies, NGOs, and individuals) recommend that fish screens be installed on the powerhouse intakes, the Cross Cut irrigation canal, and the Last Chance irrigation canal. The applicant proposes to install 1.5-inch-spaced screens on the powerhouse intakes and two 0.25-inch-spaced screens on the Cross Cut and Last Chance irrigation canals. Our analysis found that there would be high potential for fish entrainment into the powerhouse and likely higher entrainment than currently occurs into the Cross Cut irrigation canal due to the elimination of spillage during most of the year and the changing flow distribution at the dam, where up to 95 percent of the flow would be directed toward the powerhouse and the Cross Cut irrigation canal. In our September 2007 EA, we did not recommend screening the Last Chance irrigation canal. We reasoned that entrainment would be minimal because most of the flow would be directed away from that canal during project operation. We now agree, however, with Idaho Fish and Game that given the available information, it is not possible to predict, with confidence, the potential project effect upon entrainment into the Last Chance irrigation canal; therefore, we now recommend that fish screens be installed on the powerhouse intakes and on the intake to the Cross Cut irrigation canal, as well as the Last Chance irrigation canal, to reduce potential entrainment and project-related fish mortality.

Initially, several different screen designs were recommended or proposed, ranging from 1-inch-spaced screens originally proposed by the applicant, to ¾-inch spaced screens, to wire-woven and perforated plate screens with 0.25-inch openings. We recommended 1-inch-spaced screens in our September 2007 EA at both the powerhouse intake and the Cross Cut irrigation canal. The Settlement, however, now includes a proposal to use screens with 1.5-inch-spaced screens at the powerhouse intake and screens with 0.25-inch openings on both of the irrigation canals. As noted in our September 2007 EA, using screens on the irrigation canals with spacing less than 1-inch, however, may be problematic. During our site visit we observed a heavy coating of algae on structures and substrate within the Cross Cut irrigation canal. Any fish screen constructed at the project may be affected by a heavy coating of algae, requiring continual

maintenance to keep the screens clean and functioning properly during periods when algae is present in the river. Design considerations incorporating an appropriate screen angle and sweeping velocities along the screen, along with proper maintenance, however, may improve the performance of the 0.25-inch-spaced irrigation canal screens. This size screen would comply with the National Oceanic and Atmospheric Administration's fingerling criteria, ensuring the protection of juvenile and adult fish.

Initially, the applicant had proposed screening the powerhouse intakes with 1-inch-spaced screens. The intent of this proposal was to physically prevent the entrainment of adult salmonids, specifically, those longer than approximately 300mm (12 inches). As provided by the Settlement, the applicant now proposes to install powerhouse intake screens with 1.5-inch-spacing. Our analysis suggests that 1.5-inch-spaced screens will physically prevent entrainment of only the very largest salmonids in the system – a very small proportion of population. Despite larger spacing, however, the screen should continue to maintain its function as a structure eliciting avoidance behavior amongst fish, given proper design considerations incorporating an appropriate screen angle and sweeping velocities along the screen. Additionally, the mortality of entrained fish is generally low and studies indicate that approximately 80-90% of fish that would become entrained in to the powerhouse would survive. When considered with the proposed canal screens that will protect the resident salmonid populations, we agree with the applicant and the Settlement Parties that a 1.5-inch-spaced powerhouse intake screen will be sufficient to ensure the protection of fisheries resources. We also note that algae coating would not cause as many maintenance issues with the larger 1.5-inch-spaced screens; however, appropriate design consideration for the larger screens and proper maintenance also would ensure the larger screens continued to work as designed.

We now recommend, therefore, the installation of 0.25-inch-spaced screens for the Last Chance and Cross Cut irrigation canals, as well as a 1.5-inch-spaced turbine screen at the powerhouse. The screens should be designed to promote fish passage towards the logway/sluiceway that is proposed by the applicant (25-cfs discharge capacity), which would provide a bypass for safe downstream passage. We estimate that the recommended screen and bypass would have a capital cost of $437,850 and an annualized cost of $54,450. Although the recommended screens would be a relatively high cost item for the project, they would provide significant protection to the unique and valuable blue-ribbon trout fishery in the Henry's Fork, and also would mitigate the current impact of fish entrainment into the Cross Cut and Last Chance irrigation canals, which studies indicate is substantial. By excluding fish from entering the canals, these screens would increase the likelihood of downstream fish passage, thereby increasing recruitment to the reach downstream of Chester dam, which has been shown to have a lesser trout

population than upstream of the dam. We conclude that the expected benefits received from screening the turbine intake, as well as both the Cross Cut and Last Chance irrigation canals justify the cost.

We also recommend that the applicant develop a plan that includes monitoring effectiveness of the fish screens to ensure they are meeting the objectives for which they were designed. This monitoring would have an estimated annualized cost of $5,380 and we conclude the expected benefits gained from the plan justify the cost.

The applicant has agreed to provide a sluiceway/logway with a capacity of 25-cfs, as recommended by many of the commenters, as a downstream fish passage structure. The final configurations of the sluiceway and the screen across the turbine intake and Cross Cut irrigation canal have not yet been determined. The applicant has agreed to consult with Idaho Fish and Game, and other agencies and stakeholders, on the final design which would require Commission approval. The 25 cfs bypass flow would provide downstream-moving fish an option for safe passage over the dam; therefore, we recommend this measure be included in any license issued for the project. The cost of this measure is included in the cost to screen the canal and we conclude the environmental benefits gained from the bypass flow justify the cost.

Upstream Fish Passage

In the Settlement, the applicant proposes to construct an upstream fish passage facility (fish ladder) at Chester dam during the initial project construction. As set forth in section 7 of the Settlement ("Non-License Terms and Obligations"), this facility would be funded by the NGOs and operated by Idaho Fish and Game. Idaho Fish and Game stated that the ladder should not be operated until the protocols for its operation are decided. In comments on the September 2007 EA, Idaho Fish and Game noted an agreement with our analysis that the benefits of upstream fish passage are uncertain; however, despite this apparent uncertainty, the agency continues to recommend this measure as a party to the Settlement. The existing dam has blocked the upstream passage of fish since its initial construction in 1938, but the Henry's Fork still maintains a blue-ribbon trout fishery and the proposed project would not change the status of upstream fish passage at Chester dam. The baseline studies conducted by the applicant showed that the river has a good self-sustaining population of rainbow trout upstream and downstream of the dam, even though the reach upstream of the dam had a higher number of spawning redds and a slightly larger population of rainbow trout than the reach downstream of the dam. Assuming non-anadromous salmonids of the Henry's Fork in the vicinity of Chester dam would utilize the upstream fish passage structure, fish passage would allow fish from the lower reach to access the presumably more suitable habitat upstream of the dam.

Upstream passage, however, could result in adverse impacts if the upstream habitat were to become over utilized by fish passing upstream over Chester dam. Overcrowding could result in redd superimposition and increased competition for other resources, which could ultimately reduce the size or health of the rainbow trout population upstream of Chester dam. Without upstream passage, the upstream trout fishery can still contribute to the downstream trout fishery, via the downstream movement of fish over Chester dam. This downstream movement would be enhanced if both the project intake and the Cross Cut irrigation canal are screened, preventing the entrainment of fish into the Cross Cut irrigation canal.

We estimate that the capital cost of a fish ladder at Chester dam would be high at $525,000 (annualized cost of $63,250, including the lost energy associated with providing additional flow to operate the ladder), and the annualized cost of associated effectiveness studies would be $3,560. Despite its inclusion in the Settlement, due to an insufficient biological basis and no "project nexus," we continue to not recommend the construction of a fish ladder for upstream fish passage as the costs outweigh the expected benefits. [22]

Loss of Upstream Riverine Habitat

The project would include the addition of a 38-inch-high rubber inflatable dam on the crest of Chester dam, designed to maintain a higher permanent pool. This would result in an increase in the size of the existing Chester dam pool, extending the pool approximately 1,300 feet upstream in the Henry's Fork and an additional 700 feet upstream in the Falls River. Idaho Fish and Game and the NGOs originally recommended mitigation for the loss of the riverine habitat by a variety of means; however, by signing the Settlement, the Settlement Parties agreed that these mitigation measures were no longer necessary. Snake River Cutthroats, who did not sign the Settlement, however, continue to recommend the establishment of a mitigation fund to be used by Idaho Fish and Game to remove river and habitat obstructions downstream of the Chester Diversion Project.

[22] While section 7 of the Settlement labels the upstream fish passage facility as "Non-license" and it would be owned (at least for five years) and operated by a non-licensee, it still would be integrated into the project's impounding features and affect project operations, including dam safety. The applicant, as the licensee, therefore, would be required to hold sufficient rights in the facility to fulfill license obligations affected by the facility's construction and operation (including dam safety). The Settlement's "non-license" fish passage facility must, accordingly, be included within the project boundary, as any license issued in this proceeding would provide, as Commission licenses uniformly provide, that "the project consists of: all lands, to the extent of Licensee's interests in those lands, enclosed by the project boundary…."

Originally, Symbiotics agreed with the recommendations to restore 800 feet of habitat elsewhere in the basin and to prepare an enhancement plan; however, in the Settlement, the applicant states that habitat restoration is no longer necessary because the mitigation measures contained in the Settlement negate any need for this mitigation.

We conclude that even with measures implemented through the Settlement, the effects resulting from the modification of the mainstem Henry's Fork riverine habitat, as well as any effects caused by modification of the riverine habitat in the Falls River tributary, need to be mitigated. The signatories did not provide any biological information within the Settlement indicating how the Settlement measures provided this needed mitigation. Rainbow trout are known to prefer riverine habitat, and although they may also occur in pool habitat, studies have shown that riverine areas are most productive for rainbow trout, the most important sport species in the Henry's Fork. As we discuss in section V.C.3, *Aquatic Resources*, any riverine habitat affected in Falls River should also be mitigated, although the quantity of habitat has not yet been verified. We also recommend that mitigation be provided in or near the project area, instead of elsewhere in the Henry's Fork basin. This is consistent with Commission policy supporting provision of mitigation for project impacts in reasonably close proximity to the project, so that affected resources may benefit from the mitigation.

We do not recommend that a mitigation fund be established, as originally recommended by some of the NGOs and still recommended by the Snake River Cutthroats. Such a fund, which could be used for other measures not related to the modification of the riverine habitat, would be inconsistent with recent Commission policy that discourages including such funds as license requirements. Preparation of a habitat enhancement plan would be the appropriate mechanism for determining a location and detailed plan for habitat improvement, ideally in proximity to the project. This plan also would allow further quantification of the habitat modified in the Falls River, with a similar amount of that habitat to be included in the enhancement plan. We recommend that the applicant consult with Idaho Fish and Game, FWS, and the NGOs in developing the plan, with the objective to provide measures as close to the project as possible, to minimize the cost of the measures, and to provide benefits to the affected resources. We estimate that preparation of a habitat enhancement plan and implementing the habitat enhancements would have a capital cost of $36,750 and an annualized cost of $2,980. These costs would be reasonable for mitigating the loss of riverine habitat in the project area and we conclude the expected benefits justify the costs associated with this measure.

Flow Patterns Downstream of Chester Dam

Proposed powerhouse operations would result in a changing flow pattern downstream of Chester dam. Currently, flows pass over the dam generally parallel to the river banks; however, with the proposed powerhouse, flows would be directed by concrete wingwalls out of the powerhouse and across the downstream toe of the dam toward the west bank. Idaho Fish and Game and the NGOs initially were concerned about the potential effects of changing flow patterns downstream of the dam and recommended that the applicant conduct further studies to document river morphology and redd distribution pre- and post-project (for up to 3 to 5 years), and that any flow effects be dissipated within 100 meters of the dam. The applicant did not propose any further studies of flow distribution or spawning surveys to address this issue, but had proposed to conduct periodic monitoring of the resident trout population in the project area in order to determine any long-term project effects. We do not recommend any further study because our analysis shows that, although major changes in the flow pattern would occur, the existing substrate below the dam (mostly large boulders) would prevent any major changes in morphology from occurring below the dam. Large boulders act to armor the streambed, preventing scouring, and becoming mobile only under the most extreme flow events. Some changes may occur in river morphology below the reach with boulder substrate, but we conclude that adverse effects on existing fish populations would be unlikely.

We agree, however, with the applicant's original proposal for long-term monitoring of the trout populations. In comments on the Settlement, the Settlement Parties, including Idaho Fish and Game, state that they no longer require long-term monitoring of trout populations. Idaho Fish and Game state that they will conduct studies to evaluate fish use of the proposed upstream fish ladder, thereby negating the need for the initially requested population monitoring. The Settlement further states that the included mitigation measures invalidate the need for monitoring. Because we are not recommending upstream fish passage, and we recognize the economic and ecological importance of the game fishery in the vicinity of the proposed project, however, we continue to recommend long-term monitoring of trout populations to identify any long-term project effects, as originally proposed by the applicant. We estimate that this monitoring would have an annualized cost of $3,860, a relatively small cost to ensure that trout populations are not adversely affected by the project; therefore, we conclude the environmental benefits justify the costs.

Vegetation and Wildlife Protection

The applicant proposes a suite of measures for the protection of botanical and wildlife resources during the construction period and after the completion of construction. These measures involve reseeding disturbed areas; controlling

noxious weeds, including reed canary grass; protecting and restoring riparian vegetation, including cottonwoods; and timing of construction and raising the reservoir levels to protect waterfowl and bald eagle use of the project area. We agree that these measures should be implemented; most of these measures have minor costs and provide important protection for terrestrial resources in the project area; therefore, Symbiotics should implement the proposed restoration measures in consultation with the resource agencies and NGOs. Within three years of license issuance, the applicant should file a report detailing the results of all the recommended measures for the protection of botanical and wildlife resources and provides specific details for each of the proposed measures, including the results of any revegetation and restoration efforts. We estimate capital cost of all the vegetation and wildlife protection measures to be $37,360, for an annualized cost of $8,970. We conclude that the expected benefits from the measures justify the cost.

Symbiotics originally proposed to develop 4,200 square feet of upland steppe habitat as mitigation for habitat losses associated with project operation. The applicant no longer proposes this measure because it believes that the Settlement would negate any need for this mitigation. We agree that Symbiotics' proposal to develop a landscaping plan, re-seed all disturbed areas, plant and protect native riparian shrubs, replace any lost cottonwood trees, exclude grazing from the riparian zone, and control noxious weeds and introduced grasses would adequately mitigate the minor loss of wildlife habitat.

The applicant proposes to install an above-ground, 1.4-mile-long, 15-kV primary transmission line running parallel to the river, downstream of the dam. Above-ground transmission lines could cause collision or electrocution injury or mortality to avian species, including trumpeter swans, an Idaho sensitive species, and bald eagles, protected under the Bald and Golden Eagle Protection Act, that use the river for winter and foraging habitat. Symbiotics, as part of the Settlement, proposes to construct the above-ground power lines fitted with reflective devices that protect trumpeter swans from strike mortality. Idaho Fish and Game and the NGOs that signed the Settlement, support the proposed measure to construct an above-ground transmission line fitted with reflective devices.

Our analysis shows potential for bird strikes because the proposed transmission line would run parallel and in proximity to the river, likely in the flight path of any birds traveling to and from the river to upland habitats.

As indicated in section V.C.4, *Terrestrial Resources*, information provided by Idaho Fish and Game indicates that transmission line strikes are a significant source of mortality for trumpeter swans throughout their range, and other large birds may also be more vulnerable to collisions. Burying the proposed

transmission line would eliminate the potential for avian mortality or injury from transmission line collision or electrocution. Under this alternative, the transmission line could be buried adjacent to the Cross Cut irrigation canal and an existing access road. Although the extent of the rockiness of the substrate in this location is unknown, excavation has occurred in the same substrate for the canal, which indicates that burying the transmission line would appear to be feasible.

Marking the line to increase its visibility would also minimize potential collision hazards but not to the extent of burying the line. Marking the line every 20 to 50 feet would cost less than $11,000. Given that no large concentrations of swans and eagles regularly use the reservoir or river immediately downstream of the dam or defined migration corridors across the path of the transmission line location, the minor benefit of burying the line does not justify the cost. Since swans, eagles, and other species would be expected to be found in the project area in limited numbers, less intensive measures are warranted. Instead, we agree with the Settlement and recommend that Symbiotics mark the line, after consultation with the resource agencies. We conclude that the expected benefits—the protection of the diverse avian community from potential collision mortality, including the bald eagle, other raptors, the trumpeter swan, and other large birds—would justify the $10,500 cost. Symbiotics should develop a plan, after consultation with the resource agencies, to determine the most effective means of marking the line for this particular location (type of device, spacing, maintenance, etc.)

Additionally, above-ground power poles may be attractive perch sites to raptors such as bald eagles, making them susceptible to electrocution. Consequently, Symbiotics should design the line to be consistent with accepted raptor-protection designs (APLIC et al, 2006). We do not believe that there would be any cost associated with this measure.

Recreational Enhancements

The applicants' proposal in the Settlement includes numerous recreational enhancements to the project area and many of these enhancements come directly from recommendations in the September 2007 EA. As stated previously, improved recreational access is needed in the vicinity of Chester dam because of the importance of the Henry's Fork as a premier trout fishery and the poor condition of existing access points near the proposed project, especially during the construction period of the proposed project. We agree that the recreation measures proposed in the Settlement should be provided in order to improve recreational access to both the upstream and downstream boat launches and to increase recreation opportunities within the project area; however, a few measures originally recommended in the September 2007 EA are not specifically listed in

the Settlement. We therefore recommend the measures outlined in the Settlement be included in any license issued for the project, along with the following additional recreation measures, originally included as part of the staff recommendation in the September 2007 EA:

- The improved parking area, to be located between the newly constructed concrete boat ramps, needs to be constructed to serve approximately 20 vehicles with trailers and to include trash receptacles; and

- An informational kiosk should be developed and constructed at Chester dam.

In addition, Symbiotics should file a report within three years of license issuance indicating that the recreation enhancements have been completed. We estimate the capital cost of these measures to be $96,270, for an annualized cost of $9,580. We conclude that the expected benefits from providing improved recreation access to the project justify this cost.

In addition to Symbiotics proposal to develop an information and education plan, we are recommending the applicant install an informational and educational kiosk at the site of Chester dam that provides the public information regarding access points, fishing, roads, restrooms, trash receptacles, trails, and related materials. This recommendation is consistent with the Greater Yellowstone Coalition, Idaho Rivers United, and the Snake River Cutthroats original recommendations. Currently, no signage or information exists regarding the recreational opportunities and access at Chester dam. The development of an informational kiosk would provide appropriate signage and information of recreational opportunities at the project. We estimate the capital cost of the kiosk to be $5,000, for an annualized cost of $430. We conclude that the expected benefits from providing an interpretive sign at the project justify this cost. In addition, Symbiotics should fine a report within three years of license issuance indicating that the information and education measures have been implemented.

Some of the recreational facilities originally recommended by Idaho Parks and Recreation, Idaho Fish and Game, and most of the NGOs fall outside of the project area. We agree that improved recreational access is needed in the vicinity of Chester dam because of the importance of the Henry's Fork and the poor condition of existing access. We do not, however, recommend that the applicant be responsible for additional facilities outside the project area; specifically at the Vernon and Fun Farm Bridges, access areas located several miles upstream and downstream of Chester dam, and the Seeley's boat access area located about one mile upstream of the dam. The additional facilities at Vernon and Fun Farm Bridges and at Seeley's boat access are located several miles from the proposed

project and are not directly affected by the proposed project operations. The existing boat access areas upstream and downstream of the dam, which we recommend be improved as proposed by the applicant, along with an improved bank access site below the dam, would provide adequate recreational access to the project. Furthermore, the Snake River Cutthroats recommended a bird watching/fishing pier upstream of the dam in the extended forebay area. While a beneficial enhancement, this facility would be located far from the more easily public-accessible area of Chester dam and does not provide recreational enhancements related to the Chester Project; therefore, we are not recommending the bird watching/fishing pier.

Several NGOs initially recommended an additional boat launch area to be located in the vicinity of the newly inundated area at the Chester dam impoundment; however, because the applicant already proposes to upgrade two boat launches and this proposed new launch would be located less than a mile from one of the applicant's improved launch's immediately upstream of Chester dam, we are not recommending this measure.

Project Boundary

The project boundary, as currently proposed by the applicant, does not fully incorporate all of the areas necessary for project purposes, such as the entire Chester dam and portions of the reservoir that would be inundated by use of the rubber dam. In addition, some of our recommended recreation enhancements, including portions of the upstream and downstream boat launch areas, the parking area and restrooms, and the barrier-free, hardened accessible surface near the edge of the river, may occur outside of the proposed project boundary. The Greater Yellowstone Coalition and Idaho Rivers United recommend that the applicant provide permanent angler access and new maps that clearly indicate the project boundary.

Modification of the project boundary to include all of the recommended recreation enhancements and associated access areas, as well as the entire reservoir (including the newly inundated portions), and the entire Chester dam and project facilities (including the downstream toe of the dam) would provide public access to project recreation facilities and ensure all facilities are maintained over the term of the license. In addition, any license issued for the project also would require the applicant to file revised drawings, to be approved by the Commission, that indicate the exact locations of project facilities and the project boundary. We recommend, therefore, that the project boundary be revised to include these facilities.

Cultural Resources

The proposed Chester Diversion Project would involve ground disturbance, both through an increase in the reservoir elevation (potential erosional effects) and through construction of project facilities and recreational amenities. Given the current lack of information regarding the presence or absence of archaeological resources (particularly prehistoric archaeological resources) along Henry's Fork and the Falls River in the area of the impoundment, we conclude that the Chester Diversion Project could adversely affect significant cultural resources, should any exist in the APE. We recommend completion of an archaeological field investigation of those portions of the APE not covered in the 2002 survey, developed and conducted in consultation with the Idaho SHPO and the Shoshone-Bannock Tribes within six months of license issuance. This would ensure that any significant archaeological sites would be identified prior to ground-disturbing activities and the results of this survey would inform the applicant of any cultural resources within the APE that might need to be protected through measures included in the HPMP. We estimate that this survey would have a one-time cost of $26,250 and an annualized cost of $2,130, which would be a reasonable cost to ensure protection of any archeological resources that may occur in the APE. We conclude that the expected benefits justify the cost.

We also recommend revision and finalization of the HPMP in consultation with the Idaho SHPO and the Shoshone-Bannock Tribes, within one year of license issuance. This would ensure that adverse effects on historic properties arising from project operations or project-related activities over the term of a new license would be mitigated, lessened, or avoided. To resolve any potential adverse effects arising from license requirements, the HPMP should be revised to include principles and procedures to address the continued use and maintenance of properties that are listed or may be eligible for listing on the National Register; principles and procedures for ensuring that significant archaeological resources are identified, and any adverse effects arising from project operations resolved; as well as principles and procedures to respond to accidental discovery of cultural resources during project operations. The revised and finalized HPMP should contain procedures for biennial review, and as necessary, revision of the document, including delineation of the APE. Such principles and procedures would ensure that cultural resources would be afforded proper treatment and, as appropriate, protection over the term of the license. We estimate that revision and finalization of the HPMP would have a one-time cost of $5,500 and an annualized cost of only $430. We conclude that the expected benefits justify the cost.

VIII. RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

Section 10(j) of the FPA[23] requires the Commission to include license conditions, in each hydroelectric license issued, that are based on recommendations provided by the state and federal fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the project. Moreover, section 10(j) states that, whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. If the Commission still does not adopt a recommendation, it must explain how the recommendation is inconsistent with Part I of the FPA or other applicable law and how the conditions imposed by the Commission adequately and equitably protect, mitigate damages to, and enhance fish and wildlife resources.

In response to the Commission's REA notice dated October 13, 2006, Idaho Fish and Game provided comments, as well as recommendations, for the proposed Chester Diversion Project, pursuant to section 10(j). On October 26, 2007, the applicant filed a Settlement, to which Idaho Fish and Game and the FWS were signatories. In subsequent comments on the September 2007 EA and the Settlement, Idaho Fish and Game indicated full support for the measures included in the Settlement and requested the Commission accept the measures contained in the Settlement, as proposed. In a January 11, 2008, letter requesting clarification on Idaho Fish and Game's section 10(j) measures, the agency again reiterated its belief that the measures proposed in the Settlement fully address its concerns regarding fish and wildlife as a result of the proposed Chester Diversion Project. As such, we now consider all fish and wildlife measures addressed by the Settlement to be Idaho Fish and Game's revised 10(j) measures. If an original 10(j) measure was not addressed by any measures within the Settlement, we considered this measure to no longer be a section 10(j) recommendation by Idaho Fish and Game. Table 15 lists Idaho Fish and Game's 10(j) recommendations, as proposed in the Settlement, and summarizes whether the recommendations are adopted under the staff alternative.

[23] 16 U.S.C. §803(j)(1).

Table 15. Analysis of Idaho Fish and Game's recommendations for the Chester Diversion Project.[24] (Source: Staff)

Recommendation	Agency	Within the Scope of 10(j)?	Annualized Cost	Staff Recommending?
1. Screen the powerhouse intake with 1.5-inch mesh screens; screen the entrance of the Cross Cut and Last Chance irrigation canals with 0.25-inch mesh screen; provide a pathway for downstream fish migration; and operate the project to provide sufficient flows for downstream fish migration	Idaho Fish and Game (Settlement)	Yes	$43,550	Yes
2. Mark the 15-kV transmission line to reduce avian hazards	Idaho Fish and Game (Settlement)	Yes	$3,730	Yes

Under the provisions of section 10(j) of the FPA, we make the preliminary determination that all of the recommendations filed by Idaho Fish and Game fall within the scope of section 10(j) and we recommend adopting all of those measures.

IX. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, and conserving waterways affected by a project. Under section 10(a)(2), federal and state agencies filed plans that address various resources in Idaho. Eleven plans address resources relevant to the Chester Diversion Hydroelectric Project:

[24] The FWS did not file any specific 10(j) recommendations for the project; therefore, we only consider the recommendations filed by Idaho Fish and Game.

Idaho

Idaho Department of Fish and Game. 2001. Idaho fisheries management plan, 2001- 2006. Boise, Idaho.

Idaho Department of Fish and Game. 2003. Draft white sturgeon management plan: Status and objectives of Idaho's white sturgeon resources in the Snake River. Boise, Idaho. August 2003.

Idaho Department of Fish and Game and Bonneville Power Administration. 1986. Pacific Northwest rivers study. Final report: Idaho. Boise, Idaho. 12 pp. and appendices.

Idaho Department of Health and Welfare, Division of Environment. 1985. Idaho water quality standards and wastewater treatment requirements. Boise, Idaho. January 1985. 72 pp. and appendices.

Idaho Department of Parks and Recreation. 1983. Idaho outdoor recreation plan. Boise, Idaho. December 1983. 140 pp. and appendices.

Idaho Department of Parks and Recreation. Idaho Statewide Comprehensive Outdoor Recreation Plan (SCORP) 2003-2007. Boise, Idaho.

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United States

Bureau of Land Management and U.S. Forest Service. 1991. Snake River final activity/operations plan. Department of the Interior, Idaho Falls, Idaho. Department of Agriculture, Idaho Falls, Idaho. February 1991. 101 pp. and appendices.

National Park Service. 1982. The nationwide rivers inventory. Department of the Interior, Washington, D.C. January 1982.

U.S. Fish and Wildlife Service. 1986. North American waterfowl management plan. Department of the Interior. Environmental Canada. May 1986.

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No conflicts were found with these plans.

X. FINDING OF NO SIGNIFICANT IMPACT

If the Chester Diversion Project is licensed as recommended by staff, the project would provide enhancements to fish and wildlife resources and improvements to recreational facilities in the project area.

Based on our independent analysis, issuance of the license as recommended by staff would not constitute a major federal action significantly affecting the quality of the human environment.

IX. LITERATURE CITED

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ERI. 2005. Forebay Community Type Mapping and Vegetation Cover in the Project Vicinity Chester Diversion Hydroelectric Project FERC No. 11879. Prepared for Symbiotics LLC, Rigby, ID. Prepared by Ecosystems Research Institute, Logan, UT. June.

ERI. 2002a. Chester Diversion Hydroelectric Project (FERC #11879): Surveys for nesting waterfowl. Unpubl. Report. Ecosystems Research Institute, Logan, UT. November.

ERI. 2002b. Chester Diversion Hydroelectric Project (FERC #11879): Surveys for western toad. Unpubl. Report. Ecosystems Research Institute, Logan, Utah.

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APPENDIX A

Response to Comments on September 28, 2007 Environmental Assessment
and
Response to Comments on November 11, 2007 Notice of Settlement Agreement

General Comments

Comment: The Idaho Department of Fish and Game, the Greater Yellowstone Coalition, Trout Unlimited, Idaho Rivers United, Idaho Parks and Recreation, The Henry's Fork Foundation, FWS, Forest Service, and James Pruett all filed comments stating that they agree with the terms, conditions, and obligations of set forth in the October 26, 2007, Settlement, and requesting that the Commission address all the proposed license requirements from the Settlement within the final EA and include the requirements in any license order issued for the proposed Chester Diversion Project.

Response: We have included an analysis of all the measures proposed in the Settlement in this final EA. While we understand the hard work and collaborative effort put forth to reach agreement in the settlement negotiations, we note that not all of the measures proposed in the Settlement meet Commission policy standards. We have revised the proposed measures to include the measures proposed through the Settlement and revised our analysis, as appropriate. In regards to some measures, such as screening the Last Chance irrigation canal, the information filed in support of the Settlement allowed us to revise our recommendation. Some measures, however, including the lack of mitigation for the loss of free-flowing riverine habitat, lacked sufficient scientific evidence that would allow us to revise our recommendations in favor the proposed Settlement measures; therefore, we do not recommend some measures contained in the Settlement and continue to recommend some other measures no longer proposed by the Settlement Parties.

Geology and Soils

Comment: The EPA recommends additional analyses, in order to justify the conclusion reached in the September 2007 EA, that a right angle discharge from the powerhouse into the historic riverbed of the Henry's Fork will not cause stream bank erosion. Specifically, the EPA recommends that an engineering study be conducted to analyze the stability of the boulders and bank and the forces of the discharge.

Response: We continue to believe that analyses performed in the September 2007 EA are sufficient to conclude that erosion, due to proposed powerhouse discharges, will not be a substantial issue. Additionally, the applicant has agreed to long-term water quality monitoring during project operation. This monitoring, along with a requirement to mitigate for any violations of turbidity standards, should ensure that any erosion-related sediment releases are minimized.

Comment: The EPA states that an analysis should be performed to assess the impacts of the diversion of the Henry's Fork from its historic water bed, dewatering of a section of the river, and return to the Henry's Fork riverbed.

Response: We believe the EPA is incorrect in characterizing the proposed project operations. Under the proposed project operations, water will be diverted through a powerhouse, to be located at the currently constructed dam, and delivered to the channel immediately downstream of the dam. The applicant is not proposing to dewater any sections of the river.

Comment: The EPA states that the September 2007 EA does not discuss any dredging plan or discuss what will be done to manage the sediments. The EA should clarify the dredge area, the prism (depth), and the cubic yards to be dredged. Dredging history and the age of the sediments at the site also should be addressed, the known history and current sources of contamination should be identified, and the method and location of the disposal of the dredge spoils also should be identified. In addition, the applicant should specify how the sediments would be contained during dredging and what measures it would use to minimize turbidity, reductions in dissolved oxygen, and other criteria to avoid effects on aquatic organisms.

Response: As stated in the September 2007 EA, the applicant indicates in its license application that it would determine the amount and composition of sediment to be removed during construction of the proposed project. In the case of potential sedimentation accumulation, due to project operations and maintenance, the applicant has agreed to long-term water quality monitoring during project operation. This monitoring, along with a requirement to mitigate for any violations of turbidity standards, should ensure that any operational effects related to sediment releases are minimized.

Comment: The EPA states that sediments should be characterized for chemicals of concern (COCs). The EPA indicates that they would be especially interested in test results for TOC, nitrate, phosphorous, and pesticides (especially p,p'-DDE, p,p'-DDD, p,p'-DDT, Aldrin, Dieldrin, Heptachlor, gamma-BHC and total PCBs).

Response: As indicated in the previous response, the applicant identifies in its license application that it would determine the amount and composition of sediment to be removed during construction of the proposed project.

Water Resources

Comment: The EPA states that the September 2007 EA does not mention how the project will comply with Clean Water Act (CWA) Section 404 requirements.

The EPA states that the construction of powerhouse and recreational facilities will disturb soils and increase impervious surface area, resulting in potential stormwater impacts that should be analyzed and may be subject to a NPDES stormwater permit.

Response: In the event that the proposed project is licensed, the applicant is required to obtain all relevant state and federal permits prior to construction.

Comment: Idaho Fish and Game states that the September 2007 EA provides no estimate of the time for vegetation succession at the edge of the new reservoir to adapt and move upslope to protect the new waters edge.

Response: An estimate of the time for vegetation succession at the edge of the new reservoir to adapt and move upslope to protect the new waters edge was not included because available information is not adequate to provide an accurate estimation. As explained in the September 2007 EA, however, we do not foresee erosion in riparian zones as an issue, due to the well-vegetated nature of the shoreline, the low, flat topography of the banks and adjacent floodplain, and minimal proposed water surface elevation fluctuation. Additionally, as mitigation for potential project effects, we continue to recommend that the applicant provide onsite rehabilitation and plantings to protect riparian vegetation and allow for expansion of the riparian zone in conjunction with elevated water levels.

Comment: The U. S. Geological Survey (USGS) states that it is unclear why the gaging station information is presented twice in section V.C.2, table 1, both in three- and four column formats. Also, the USGS states that real-time data collection at all three streamflow gaging stations listed in the table has not been discontinued and should be listed as continuous to date

Response: The final EA has been modified accordingly.

Aquatic Resources

Comment: The EPA states that the current analysis of the environmental impacts to the Henry's Fork and its tributaries seem insufficient and does not disclose the extent of impacts to the Falls River. The EPA also states that the September 2007 EA appears to dismiss the 1,200 foot Falls River inundation. The EPA recommends that additional analysis be done to describe the extent and types of riverine and riparian habitat of the Falls River that would be impacted and how these impacts would be mitigated.

Response: The final EA has been modified accordingly. Additionally, as stated in the September 2007 EA, we continue to recommend that the applicant develop

and implement a habitat enhancement plan, which would include a quantification of the Falls River habitat that could potentially be altered due to proposed project operations.

Comment: Idaho Fish and Game states that there is insufficient evidence provided in the September 2007 EA to determine how entrainment into the Last Chance irrigation canal will be affected. Idaho Fish and Game, however, goes on to state that the Settlement's requirement to screen the Last Chance irrigation canal provides assurance that fish mortality will be reduced.

Response: We have modified the final EA accordingly.

Comment: Regarding the staff's recommendation in the September 2007 EA that a single, angled, 1-inch-spaced screen placed across both the Cross Cut irrigation canal entrance and the turbine intake would prevent entrainment of fish 12-inches-long and longer, Idaho Fish and Game agrees, but states that they believe a significant number of fish 8-10 inches long would be lost from the system.

Response: We agree that fish smaller than 10 inches could potentially be entrained with a single, angled, 1-inch spaced screen. We have modified the final EA accordingly.

Comment: Idaho Fish and Game states that proper screen design and appropriate sweeping velocity, along with regular maintenance and cleaning of the screens to remove algae and other debris, would significantly reduce the likelihood of screen clogging, allowing the screen to function properly.

Response: We agree with Idaho Fish and Game that proper screen design and regular maintenance can minimize the likelihood of clogging. We have modified the final EA accordingly.

Comment: The Snake River Cutthroats recommend that the approach velocity to fish screens recommended in the final EA not exceed three-feet-per-minute.

Response: We believe that an approach velocity of three-feet-per-minute is virtually unattainable in a riverine environment, and therefore unreasonably slow. We believe that the approach velocity of four-feet-per-second, as recommended by the Settlement Parties, is well within reasonable bounds to ensure the protection of adult salmonids.

Comment: The Snake River Cutthroats state that "since some 95% of the water will go through the turbines, with up to 10% to 20% mortality of the entrained fish, it is also necessary to screen the Last Chance Canal, and to screen both canals

with an maximum opening of one quarter (1/4) inch, returning the screened fish to below the dam, providing downstream passage, thus compensating for the turbine mortality to the fishery."

Response: We have modified the final EA accordingly.

Comment: The Snake River Cutthroats state that the staff recommendation in the September 2007 EA of $35,000 for habitat-related improvements, as mitigation for the loss of 1,200 feet of free-flowing riverine habitat, is inadequate, as staff's analyses did not take in to account the adverse economic impact on the local community.

Response: We continue not to recommend the establishment of a mitigation fund for habitat enhancement, as suggested by the Snake River Cutthroats. While we recognize that the economic effect of the loss of riverine habitat may extend to local communities, we do not agree with the assumption that a loss of riverine habitat is necessarily equivalent to economic loss. Measures associated with potential licensing may in fact enhance economic attributes. Furthermore, as stated in both the September 2007 and the final EA, a mitigation fund could be used for other measures not related to the modification of the riverine habitat and would be inconsistent with recent Commission policy that discourages including such funds as license requirements.

Terrestrial Resources

Comment: Idaho Fish and Game comments that it agrees with statements in the September 2007 EA regarding the effects of project construction on habitat and the Commission's overall finding that project construction would have short-term impacts on wildlife species but would not affect overall population health.

Response: No changes to the final EA are necessary in response to this comment.

Comment: Idaho Fish and Game comments that it agrees with the conclusions in the September 2007 EA that, with the implementation of the applicant's proposed measures to aid in the reestablishment of riparian vegetation, the effects to riparian vegetation will be short-term. Idaho Fish and Game also state that they agree with the Commission's conclusions in the September 2007 EA that effects of the proposed project on waterfowl should be short-term and minor.

Response: No changes to the final EA are necessary in response to this comment.

Comment: Idaho Fish and Game states that while it originally recommended burying the transmission line to eliminate the risk of avian collisions or

electrocutions, it now agrees that marking the transmission line can sufficiently reduce the number of collisions and designing the line in accordance with raptor protection guidelines would reduce and may eliminate the potential for electrocutions.

Response: The final EA has been revised to include Idaho Fish and Games new recommendation.

Comment: Idaho Fish and Game comments that it agrees with the conclusions in the September 2007 EA that Ute ladies' tresses, whooping cranes, and the Utah valvata snail either do not occur or only incidentally occur within the project area.

Response: No changes to the final EA are necessary in response to this comment.

Recreational Resources

Comment: Idaho Fish and Game comments that a need for adequate recreational boating access exists at the project and the September 2007 EA included many necessary recreational enhancement measures proposed by Idaho Fish and Game and Idaho Parks and Recreation. The agency states that the Settlement includes many of these measures which would improve access to the project and provide necessary recreational enhancements.

Response: The final EA has been updated to include the new recreational enhancement proposals, as set forth in the Settlement.

Land Use and Aesthetics

Comment: Idaho Fish and Game comments that the Settlement addresses issues related to the effects of the project on aesthetic and land use resources and provides measures to mitigate for the long-term effects of placing new permanent facilities at the site.

Response: The final Ea has been updated to include the Land Use and Aesthetic resource measures proposed in the Settlement Agreement.

Document Content(s)