

PREPARING ENVIRONMENTAL ASSESSMENTS

GUIDELINES FOR APPLICANTS, CONTRACTORS, AND STAFF

Federal Energy Regulatory Commission
Office of Energy Projects
Hydroelectric Licensing Groups

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INTRODUCTION

The Commission's regulations at Sec. 4.34 give applicants for original, new or subsequent hydropower licenses, exemptions, and certain license amendments the option of using an alternative licensing procedure (ALP) for conducting the prefiling consultation process. One of the main aspects of an ALP is the preparation (by the applicant or its contractor or consultant) of a preliminary draft environmental assessment, or of a preliminary draft environmental impact statement prepared by a consultant chosen and directed by the Commission and funded by the applicant under a third-party contract.

These guidelines have been developed for applicants and their contractors who intend to prepare and submit an environmental document as part of their application for an original or new license (relicense) as well as for Federal Energy Regulatory Commission (Commission) staff. The guidelines reflect current National Environmental Policy Act (NEPA) standards within the office. They do not set Commission policy.

Use of these guidelines should help to expedite the post-filing environmental review process by minimizing staff revisions to applicant and contractor-prepared environmental assessments.

How to Use these Guidelines

These are general guidelines that discuss all sections of a draft environmental assessment. The exact content of Commission NEPA documents, and how particular issues are addressed, continues to adapt to changes in legislation, case law, and policy. Therefore, there is limited discussion of how to analyze individual resource issues. The best sources for current policy on particular issues are Commission staff and recently-issued NEPA documents and orders.

The guidelines are presented in the context of what an actual EA would look like, beginning with the table of contents. For each section, we: (1) provide a purpose for the section, (2) highlight what to include in the section, and (3) provide an example. Unless otherwise noted, the examples are fictitious.

Some sections include portions of NEPA or the Council on Environmental Quality's (CEQ) NEPA regulations which are found at 40 CFR Parts 1500-1508. Some general rules for text and graphics are found at the end of these guidelines. Although the format is slightly different, the concepts presented here apply for environmental impact statements (EIS). An EIS template is attached to the end of the guidelines for reference.

Updating these guidelines

Submit recommendations for changes or updates to vince.yearick@ferc.fed.us. As necessary, we'll review recommended changes and corrections and periodically post revised guidelines on the Hydro Licensing Web page.

CONTENTS

The CEQ recommends the basic content for environmental impact statements. Environmental Assessments generally follow the same format. Each federal agency, however, tailors its NEPA documents around its own set of statutes and regulations. Our EA's follow this general format with a number of additions. See the next page for an example of a Table of Contents for a Draft Environmental Assessment. Note that some sections will not apply to all projects, in particular, sections IV (F-J).

40 CFR Sec. 1502.10 Recommended format.

Agencies shall use a format for environmental impact statements which will encourage good analysis and clear presentation of the alternatives including the proposed action. The following standard format for environmental impact statements should be followed unless the agency determines that there is a compelling reason to do otherwise:

- (a) Cover sheet.*
 - (b) Summary.*
 - (c) Table of contents.*
 - (d) Purpose of and need for action.*
 - (e) Alternatives including proposed action (sections 102(2)(C)(iii) and 102(2)(E) of the Act).*
 - (f) Affected environment.*
 - (g) Environmental consequences (especially sections 102(2)(C)(I), (ii), (iv), and (v) of the Act).*
 - (h) List of preparers.*
 - (i) List of Agencies, Organizations, and persons to whom copies of the statement are sent.*
 - (j) Index.*
 - (k) Appendices (if any).*
-

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LIST OF FIGURES

Between the Table of Contents and Summary, you should list all figures contained in the DEA and the pages where they're found. At minimum, you should include figures showing the location of the project in the river basin and the major project features. Other figures may be added as appropriate to support the text.

Example of the list of figures:

| List of Figures | | |
|-----------------|--|-------------|
| <u>Figure</u> | | <u>Page</u> |
| 1. | Location of the Angus Hydroelectric Project, FERC No. 1111, WY | 2 |
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Example of a project location figure (FERC 1999):

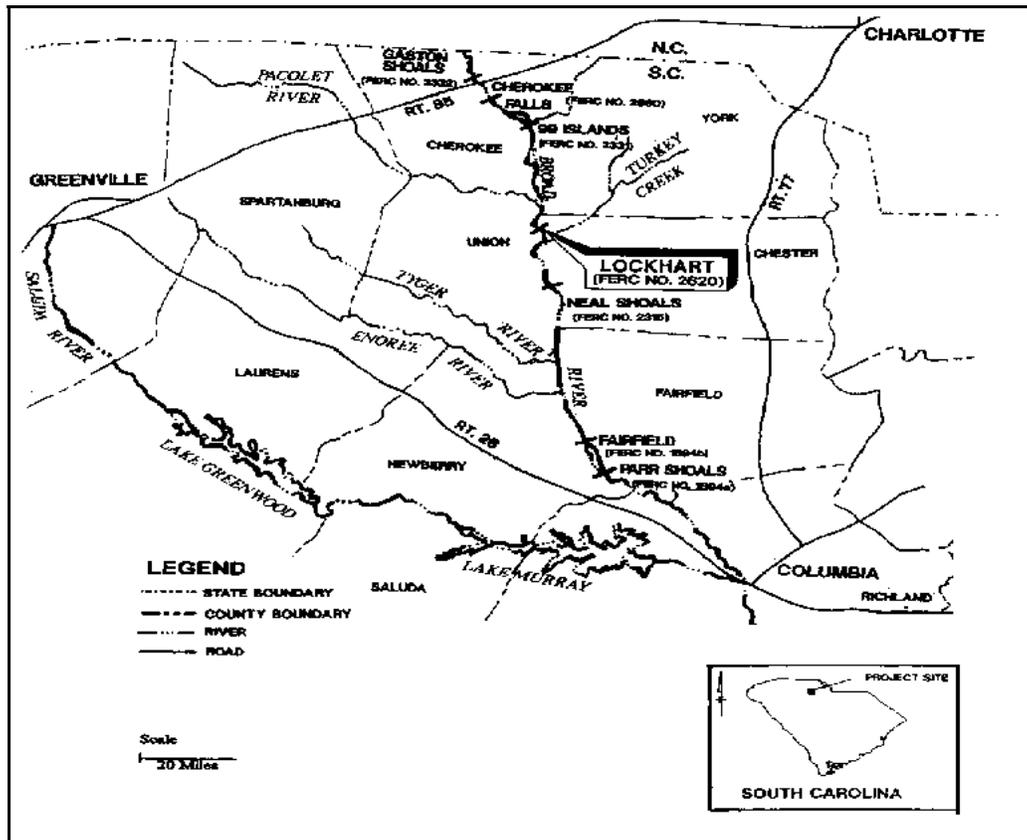


Figure 1. Location of the Lockhart Project

Example of a project features figure (FERC 2000):

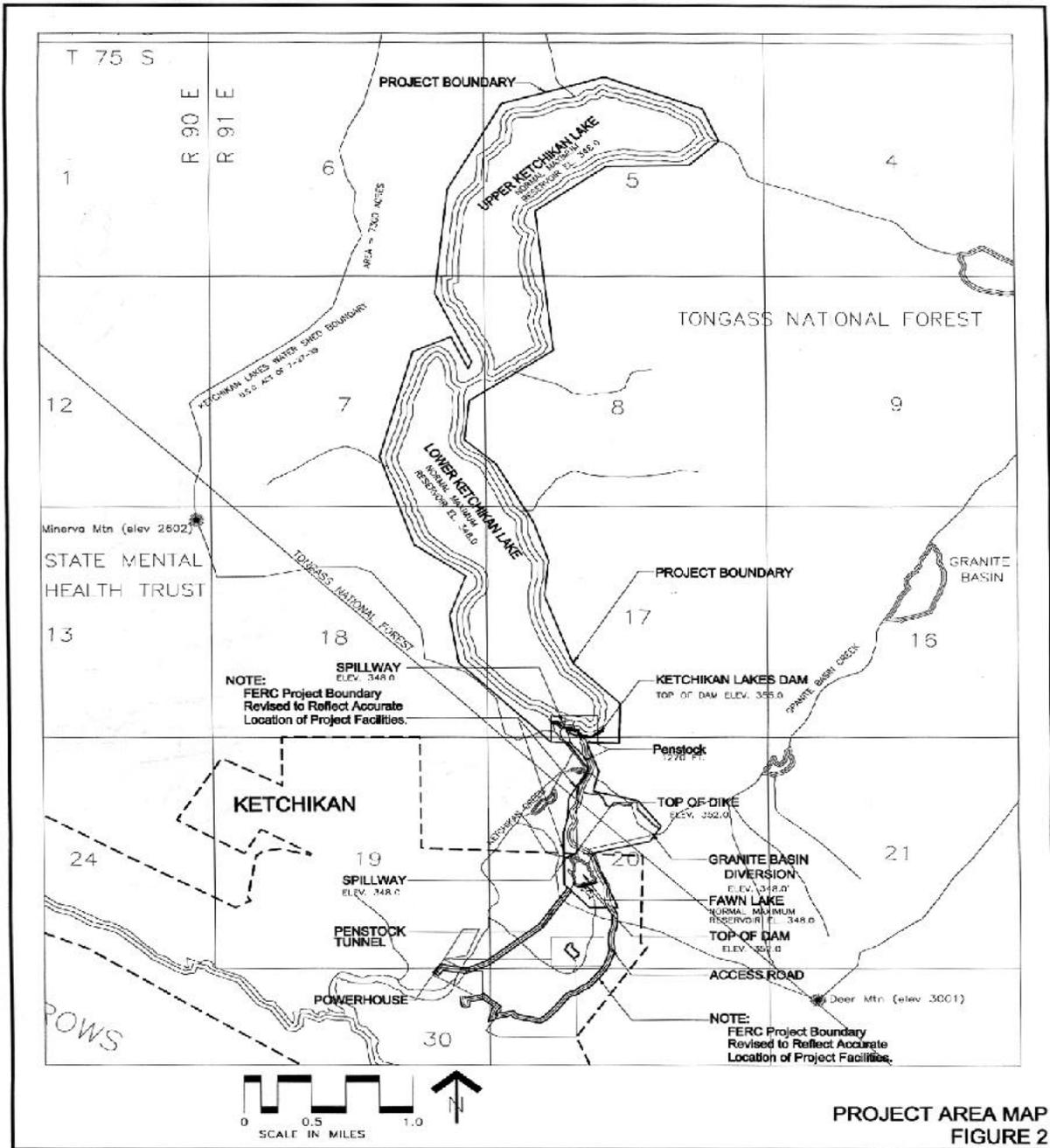


Figure 2. Location of project features

LIST OF TABLES

You will want to organize some information in tables to illustrate data, findings, or other information necessary to support the analysis in the DEA. If you have tables, list them and the pages where they're located after the List of Figures.

Example of the List of Tables:

| List of Tables | |
|---|-------------|
| <u>Tables</u> | <u>Page</u> |
| 1. Existing and Proposed Hydroelectric Developments in the Chugwater River Basin. | 11 |
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Example of a table used in the text of the DEA:

Table 1. Temperature and dissolved oxygen levels recorded at various project locations.

| Location | Temperature (degrees Celsius) | Dissolved oxygen (milligrams per liter) |
|--|-------------------------------|---|
| Copper Creek above Chugwater Lake | 0.5-20.2 | 8.5-10 |
| Chugwater Lake (1 meter) | 8.3-25.5 | 7.0-9.8 |
| Chugwater Lake (15 meters) | 6.7-11.0 | 3.2-9.4 |
| Chugwater Lake (23-29 meters) | 5.9-8.0 | 0.7-9.2 |
| Copper Creek in project tailrace | 0.2-21.0 | 8.1-10.2 |
| Copper Creek 1 mile downstream of tailrace | 1.0-21.9 | 7.5-11.3 |

SOME BASIC CONCEPTS FOR NEPA DOCUMENTS

The following are some basic NEPA concepts from the CEQ regulations that should guide your writing for all sections of EAs and EISs (emphasis added). Note the emphasis on being clear and concise.

Sec. 1500.1 Purpose.

(c) Ultimately, of course, it is not better documents but better decisions that count. NEPA's purpose is not to generate paperwork--even excellent paperwork--but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment. These regulations provide the direction to achieve this purpose.

*(b) Implement procedures to make the NEPA process more useful to decision makers and the public; to **reduce paperwork and the accumulation of extraneous background data; and to emphasize real environmental issues and alternatives. Environmental impact statements shall be concise, clear, and to the point, and shall be supported by evidence that agencies have made the necessary environmental analyses.***

Sec. 1500.4 Reducing paperwork.

Agencies shall reduce excessive paperwork by:

(a) Reducing the length of environmental impact statements (Sec. 1502.2(c)), by means such as setting appropriate page limits (Sects. 1501.7(b)(1) and 1502.7).

(b) Preparing analytic rather than encyclopedic environmental impact statements (Sec. 1502.2(a)).

(c) Discussing only briefly issues other than significant ones (Sec. 1502.2(b)).

(d) Writing environmental impact statements in plain language (Sec. 1502.8).

(e) Following a clear format for environmental impact statements (Sec. 1502.10).

(f) Emphasizing the portions of the environmental impact statement that are useful to decision makers and the public (Sects. 1502.14 and 1502.15) and reducing emphasis on background material (Sec. 1502.16).

SUMMARY

The purpose of the "Summary" is to give the reader a brief, and basic understanding of the type of action being proposed, the alternatives to the proposed action, and the main issues involved in analyzing the effects of the alternatives. The summary should highlight economic, environmental and other issues that were given special consideration, including cumulative impacts. Your summary should follow this format:

- (1) Describe the project (indicate which are existing project works and which are proposed for construction), including the location, capacity, use of power, and the applicant's proposal.

- (2) Describe the other alternatives you analyzed.
- (3) Present the major issues analyzed.
- (4) Present and justify your conclusions, including the trade-offs made.

Example of a summary:

Summary

Municipal Hydro Company (MHC) proposes to continue to operate the existing Angus Hydroelectric Project (project) located on Copper Creek near the City of Chugwater in Southeastern Wyoming. The project has a generation capacity of 1,200 kilowatts (kW). This combined purpose project supplies part of the electricity needs of the City of Chugwater and all of its municipal water supply requirements. Parts of the project occupy federal lands administered by the U.S. Forest Service (FS) and the Bureau of Land Management (BLM). The FS lands are managed by the Swift Ranger District of the Saddle National Forest. This draft environmental assessment (DEA) is a cooperative undertaking between the FS and the Federal Energy Regulatory Commission (the Commission or FERC).

MHC followed the Commission's alternative licensing procedures and filed an applicant prepared environmental assessment with its application for a new license in August, 1999. MHC proposes no capacity or operating changes, but does propose two measures for the protection and enhancement of environmental resources: cattle fencing along Chugwater Creek, and increased minimum instream flows. This DEA analyzes the effects of continued project operation and recommends conditions for a new license for the project. In addition to MHC's proposal, we consider two alternatives: (1) MHC's proposal with staff modifications and (2) no-action.

Based on our analysis, we recommend licensing the project as proposed by MHC with some staff modifications and additional measures. The recommended staff modifications include or are based in part on recommendations made by the federal and state resource agencies that have an interest in the resources that may be affected by continued project operation. The additional measures we recommend include: monitoring flows and water temperature; minimum instream flows for fish above those proposed by MHC; setting limits on the rate project flows are changed under normal operating conditions (ramping rates); and measures to protect resources, including cultural resources and values, from damages caused by any operating or maintenance actions that may arise during the term of a new license.

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.

DRAFT ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Environmental and Engineering Review
Washington, DC

Samples Hydroelectric Project FERC Project No. 22000-001-State

I. APPLICATION

This section explains what is being applied for and by whom. Include the following information:

- ! Date the application and any supplements or amendments were filed (for APEAs this will be in the present tense).
- ! Applicant's name.
- ! Type of license or exemption the applicant is seeking.
- ! Size (capacity) of the project and where it's located.
- ! Energy benefits produced by project (annual generation in kWh).
- ! Federal lands, if any, the project occupies. If none, say there are no federal lands.

Example:

I. APPLICATION

On November 13, 1991, Municipal Hydro Company (MHC) filed an application for a new major license for the existing Angus Hydroelectric Project. The 1.2 megawatt (MW) project is located on Copper Creek at river mile 19.5 near the City of Chugwater, Wyoming. The project does not occupy any federal lands. The project generates an average of about 10,758,000 kilowatthours (kWh) of energy annually. MHC proposes no new capacity and no new construction.

II. PURPOSE OF ACTION AND NEED FOR POWER

A. Purpose of Action

This section explains why the Commission requires a license for the project and therefore a National Environmental Policy Act (NEPA) analysis. It includes the alternatives that are assessed. In this section, we explain that the proposed federal action is the Commission's decision whether to issue a license for the proposed project and, if so, what conditions should be placed in the license. State that the purpose of the proposed action is to "determine whether to grant an application for the construction and operation, or continued operation, of hydroelectric and related facilities in compliance with FPA requirements and other laws". Additionally, include the following language in this section: "In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power 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, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality." In addition to this general description, include a brief description of the project-specific issues that will be addressed in the EA/EIS.

Example:

A. Purpose of Action

The Commission must decide if it's going to issue a license to MHC for the project and what conditions should be placed in any license issued. Issuing a new license for the Angus Project would allow MHC to generate electricity at the project for the term of a new license, making electric power from a renewable resource available to their customers.

This draft environmental assessment (DEA) assesses the effects associated with operation of the project, alternatives to the proposed project, and makes recommendations to the Commission on whether to issue a new license, and if so, recommends terms and conditions to become a part of any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing the waterway. In addition to the power 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, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality

In this DEA, we assess the environmental and economic effects of continuing to operate the project (1) as proposed by MHC and (2) with our recommended measures. We also consider the effects of the no-action alternative. Important issues that are addressed include fish passage, minimum flows in the bypassed reach, and recreational access.

B. Need for Power

This section presents the need--both from an applicant's and regional perspective--for the power the project would generate, including total energy and capacity needs, and fossil fuel displacement, and shows why providing that energy is important. You should cite any plans or reports used to project future power demand and explain how the project satisfies or would help satisfy these power demands. If the applicant's not a utility and would sell the project's power, discuss only the regional need for power, and include the amount of power to be sold and, if known, identify the purchasers.

Example of a Need for Power Section:

B. Need for Power

The power generated from the Project is sold to Kahuna Power Corporation (KPC) and used in the Wyoming Power Pool (WPP). The WPP is included in the West Central Power Coordinating Council's (WPCC) region.

According to the North American Electric Reliability Councils (1997), the net energy needed to meet the load demand for the WPCC in 2000 was 148.1 billion kWh and is expected to increase to 162.9 billion kWh in 2006. The average annual growth rate for this region is 1.07%. The project could displace existing and planned nonrenewable fossil-fueled generation which contributes to the production of nitrogen oxides and sulfur oxides which contribute to air pollution. In addition, the hydroelectric generation could contribute to diversification of the generation mix in the WPCC region.

By producing hydroelectricity, the Project displaces the need for other power plants to operate, thereby avoiding some power plant emissions and creating an environmental benefit. In the WPCC reliability region where the Project is located, the capacity mix includes a proportionately large amount of hydropower, relative to other parts of the country.

We conclude that the Project power contributes to a diversified generation mix, and helps meet a need for power in the Project area.

III. PROPOSED ACTION AND ALTERNATIVES

The purpose of this section is to explain: (1) the proposed project - the facilities and how they will operate, including any proposed environmental measures, (2) action alternatives to the proposal, and (3) the no-action alternative. In the following, we discuss each section separately and provide examples. All staff EAs will have, at a minimum, three alternatives; the applicant's proposal, a staff-recommended alternative, and a no-action alternative.

In addition to the applicant's proposal and the no-action alternative, alternatives could also include, depending on the circumstances, an agency alternative, and/or a project retirement alternative.

A. Proposed Action

1. Project Facilities and Operation

Describe the existing and/or proposed project facilities, their dimensions, and the project's mode of operation (peaking, run-of-river, storage). If it's an existing project, provide a short history of its development and operation. It's very important that readers understand how the project operates, and the connection between the project and the impacts discussed later. Otherwise, it will be very difficult to understand project-related impacts. Also, make sure it's clear what facilities are existing, and which, if any, are proposed.

You should describe the following features (specify dimensions and type of building materials where appropriate):

- ! Dams and spillways (including flashboards, if applicable)
- ! Conduits
- ! Trashracks
- ! Powerhouses (generating capacity)
- ! Reservoirs (surface area and capacity at full pond elevation)
- ! Transmission lines (voltage, length, right-of-way width)
- ! Bypassed reach (length, width, estimated flow in bypassed reach)
- ! Access roads
- ! Project lands within the project boundary

Note: All features described in this section should be clearly marked on the accompanying figure(s).

Example of a project facilities section:

Project Facilities

The project consists of the following existing facilities (figure 1): (a) a stone masonry and timber dam about 1,009 feet long, having from west to east (i) a non-overflow masonry wall section about 600.5 feet long; (ii) an intake section about 51.5 feet long and 28 feet high with four gates 9.5 feet wide by 9.5 feet high, protected by trashracks with 1.25-inch clear spacing; (iii) a sluice gate section about 47 feet long with four submerged sliding gates 4 feet wide by 5 feet high; (iv) a spillway section about 256.5 feet long; (v) a sluice section about 15.5 feet long; and (vi) a cutoff wall section about 38 feet long; (b) a reservoir with gross storage capacity of about 1,300 acre-feet at elevation 221.8 feet mean sea level; (c) four 8-foot-diameter steel penstocks extending approximately 50 to 70 feet downstream to two surge chambers; (d) two surge chambers; (e) a brick powerhouse about 58 feet wide and 71 feet long with two 1,460-horsepower (hp) turbines connected to two generating units each having 1,125 kilowatts (kW) of generating capacity; (f) a tailrace; (g) a transformer house; (h) a switch house; and (i) appurtenant facilities. Other than the generator leads, there's no primary transmission line included in the license.

Example of a project operation section:

Project Operation

The Angus powerhouse has semi-automatic operation, with supervisory control from MHC’s offices in Chugwater. The combined operation of the diversion dam and the forebay allow up to a normal maximum of 2,028 cubic feet per second (cfs) of diversion, while maintaining surface water levels in Copper Creek above the diversion dam in a manner that generally reflects natural seasonal levels in the river. The forebay is 12 to 15 feet deep and fluctuates about 3 feet per day in response to project operations.

Angus is the uppermost of nine projects in the Copper Creek Basin (figure 2). The Copper Creek projects are typically operated as peaking plants to help meet MHC’s daily load swings. Flows are released from Angus on a variable discharge schedule depending on the system energy demands and total available inflow. Under normal flow conditions, Angus output varies on a daily basis from its minimum load of about 5 to 10 MW (about 200 to 350 cfs) during the off-peak periods (from about midnight to dawn), up to the plant’s maximum output of about 65.5 MW (about 2,028 cfs) during peak demand periods (typically late morning through the afternoon). During the mid-peak demand periods (from about 3:00 to 5:00 PM), the plant is operated near its more efficient load of about 30 to 55 MW (about 900 to 1,800 cfs), depending on available flow. During periods of high Copper Creek flow, Angus is operated at maximum capacity 24 hours a day to minimize spills. Copper Creek flows in excess of 2,100 cfs are discharged into the non-project Copper Pond.

2. Environmental Measures

In this section, describe the environmental measures the applicant proposes, such as fish passage facilities and screens, minimum flows, waterfowl nesting platforms, revegetation planting, recreational facilities, etc. Provide further detail and locate any facilities on maps in the individual resource sections. If there is a settlement agreement, it typically is analyzed as the proposed action or as an action alternative.

Subheadings help to group measures associated with similar activities such as:

a. Construction [For original licenses and those with new construction, additional capacity, or both] Measures the applicant proposes to use to avoid or lessen impacts related to and/or during construction.

Example for when an applicant proposes new construction:

a. Construction

To control sediment and erosion, during construction and operation, MHC proposes to implement an Erosion and Sedimentation Control Plan. The plan includes guidelines for cofferdams used to de-water the excavation and construction sites, controlling erosion and sediment runoff during site access and project construction, disposing of excavated materials, and placing topsoil, seed, and mulch on all disturbed areas when construction is complete.

b. Operation [Environmental measures the applicant proposes to avoid or lessen impacts related to project operation]

Example for when an applicant proposes operational changes and other measures:

b. Operation

MHC proposes to: (1) operate the project by releasing a minimum flow of 222 cubic feet per second (cfs), or inflow, whichever is less; (2) maintain impoundment level fluctuations within 1 foot of full pond during normal operation; (3) monitor dissolved oxygen (DO), water temperature, and siltation at the project site; (4) and provide downstream fish passage facilities at Angus Dam (under certain provisions, as discussed in Fisheries Resources, Section V.B.2).

Subheadings may also be used to group measures associated with similar resources such as fishery, recreation, and terrestrial resources, or soils.

Example of grouping environmental measures together by resource:

Recreation

To enhance recreation opportunities at the Angus Project, MHC proposes to improve the canoe portage, install a barrier-free fishing pier at the tailrace fishing access, and construct a fish cleaning station at the impoundment access site.

B. Action Alternatives

The other action alternative that you'll definitely analyze throughout the DEA is the alternative you are recommending. There may be other action alternatives, but only if they comprise a complete package of measures. Providing a summary of these alternatives will give the reader some idea of the alternatives you'll look at in the DEA. To the extent possible, resource agencies should coordinate their recommendations and endeavor to minimize/eliminate inconsistencies to facilitate analysis. When possible, the agencies will submit to FERC a consistent set of recommendations, with a request that they be analyzed as an alternative. As long as you determine the set of recommendations are clearly a complete, separate alternative, you should analyze the recommendations as one of the action alternatives. If only one agency submits recommendations, then, upon that agency's request, you should analyze those recommendations and, if you determine that they provide the basis for a reasonable alternative, you should include them in the NEPA document as part of a complete NEPA alternative. If resource agency recommendations are not analyzed as a NEPA alternative, you need to ensure that all effects of the recommendations are disclosed in all appropriate resource sections.

Example of a recommended alternative section

B. Action Alternatives

Staff's Recommended Alternative

Under our preferred alternative, the project would include MHC's proposals for the following: (1) controlling erosion and sedimentation; (2) operating the reservoir; (3) protecting aquatic resources upstream and downstream from the project; (4) avoiding or mitigating adverse effects on threatened, endangered, and sensitive species; (5) mitigating the visual impacts of new project facilities; and (6) managing project lands and waters for recreation.

Our preferred alternative would also include the following measures: (1) monitoring water temperature and DO downstream of the project tailrace for a minimum of 3 consecutive years after license issuance; and (2) monitoring bank erosion and channel instability upstream of the reservoir.

Example of an additional alternative analyzed throughout the document:

Relicensing the projects with a reduced level of Environmental Measures: This alternative was recommended by the commentors at the public meeting conducted in Chugwater, Wyoming, on April 1, 2000. This option would include the modified operating regimes for the projects as proposed in the applicant's proposal, but would exclude most of the other environmental measures described in the applicant's proposal. Our analysis of this alternative is outlined in Section V.B.

Example of another alternative analyzed throughout the document:

Fish Passage Alternative

Based on discussions with the FWS and NMFS during pre-filing consultation, MHC analyzed the effects of a fish passage alternative on the Project's environmental and economic resources.

The Fish Passage Alternative, which was discussed during pre-filing meetings as a potential alternative, includes the measures listed in MHC's proposal (see Sections 3.3.1 and 3.3.2) plus downstream fish passage facilities for resident fish at the Project as follows:

- C at the Angus No.1 development, replace all existing trash racks with 1-inch racks; provide an attraction flow equal to 2% of turbine capacity (130 cfs) through the existing minimum flow gate for fish passage; provide a conveyance flow of at least 20 cfs through an open channel chute; and create a plunge pool at the bottom of the chute appropriately sized to cushion the impact of downstream conveyance; and
- C at the Angus No.2 development, replace the existing trashracks with 1 inch racks; provide an attraction flow of 150 cfs (2% of turbine capacity) and a conveyance flow of 20 cfs through a open channel chute on the spillway; and create a 20 foot deep plunge pool.

The FWS recommends that the Angus No.1 impoundment be limited to a maximum of one foot drawdown year-round. These recommendations are discussed in their respective resource areas.

C. No-Action Alternative

The no-action alternative lets the reader know that you're looking at the possibility and the effects of continuing to operate the project as it does now or of not building an original project. The no-action alternative is the baseline from which you'll compare the proposed action and all action alternatives that you assess in the DEA.

You should briefly describe the no-action alternative and its effects on the environment, the local community, and the region's energy supply. Standard no-action alternatives for original and new (relicense) projects are:

Original License Application - The project wouldn't be constructed; thus, no changes to the existing environment would occur. No action would be equivalent to denial of a license for the project. (If you'd need alternate energy sources to substitute for the power that would have been supplied by the project, describe the effects of developing or using these other energy sources.)

Example of no-action alternative for an original license:

C. No-action Alternative

Under the no-action alternative, the Commission would deny a license for the proposed Angus Project. The project would not be built, and no change to the existing environment would occur.

New License Application- The project would continue operating under the terms and conditions of the existing license. The baseline is the existing environmental conditions, and an applicant wouldn't be required to provide any environmental measures. Note that if there are ongoing project effects, they would continue.

Example of the no-action alternative for a new license (relicense):

C. No-action Alternative

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. Any ongoing effects of the project would continue. We use this alternative to establish baseline environmental conditions for comparison with other alternatives.

Unlicensed Project Application - The no-action alternative is to continue operating the project as it has operated historically. If the project is no longer operating, under no-action, it would continue to not operate. As above, if there are ongoing effects, they would continue.

Example of the no-action alternative for a unlicensed, operating project (UL):

C. No-action Alternative

Under the no-action alternative, the applicant would continue to operate the project and no environmental protection, mitigative, or enhancement measures would be implemented. Any ongoing effects of the project would continue. We use this alternative as the baseline environmental conditions for comparison with other alternatives.

D. Alternatives Considered but Eliminated from Further Analysis

Before you begin your analysis of the resource issues, you should look at a wide range of alternatives to the proposal. It is possible that circumstances of a particular project make license denial and/or project retirement a reasonable alternative for purposes of NEPA, and, if so, this analysis of license denial should be included. Otherwise, the document should briefly explain why license denial is being eliminated from further consideration.

Often, you'll look at these alternatives but decide not to give them detailed study for economic, environmental, or engineering reasons. In this section, you should document these alternatives to show the range of alternatives you considered in reviewing the project and why you don't think these alternatives warrant further analysis.

Example of language used for the Non-Power License alternative (for relicenses):

Non-power License

A nonpower license is a temporary license that the Commission will terminate when it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the nonpower license. At this point, no agency has suggested a willingness or ability to do so. No party has sought a nonpower license and we have no basis for concluding that the project should no longer be used to produce power. Thus, we do not consider a nonpower license a realistic alternative to relicensing in this circumstance.

Example of language used to address Federal takeover and operation of the project as an alternative (for relicenses):

Federal Takeover

We don't consider Federal takeover to be a reasonable alternative. Federal takeover and operation of the project would require Congressional approval. While that fact alone wouldn't preclude further consideration of this alternative, there is no evidence to indicate that Federal takeover should be recommended to Congress. No party has suggested Federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

Example of language used to address Project Retirement as an alternative (for relicenses):

Project Retirement

Project retirement could be accomplished with or without dam removal. Either alternative would involve denial of the relicensing application and surrender or termination of the existing license with appropriate conditions. No participant has suggested that dam removal would be appropriate in this case, and we have no basis for recommending it. [Explain why dam removal is considered unreasonable. For example, the reservoir may serve other important purposes, such as recreation, irrigation, municipal water supply, or flood control, regardless of whether power is produced.] Thus, dam removal is not a reasonable alternative to relicensing the project with appropriate protection, mitigation and enhancement measures.

The second project retirement alternative would involve retaining the dam and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require us to identify another government agency with authority to assume regulatory control and supervision of the remaining facilities. No agency has stepped forward, and no participant has advocated this alternative. Nor have we any basis for recommending it. Because the power supplied by the project is needed, a source of replacement power would have to be identified. In these circumstances, we don't consider removal of the electric generating equipment to be a reasonable alternative.

Addressing Project Retirement

The consideration of whether to include a detailed analysis of a project retirement alternative in a NEPA document should begin early in the process, that is, in the scoping stage. In addressing this issue, you should consider, where applicable, and where information is available, the beneficial or adverse effects of the project on a variety of resources or interests, including but not limited to: (1) listed threatened or endangered species; (2) economic viability of a project, including costs of resource protection measures; (3) river targeted for fish recovery; (4) feasibility of fish passage; (5) consistency with comprehensive plan(s); (6) protected river status (e.g., scenic river, wilderness area); (7) effectiveness of past mitigation measures and availability of future measures; (8) support by applicant or other party for project retirement; (9) Tribal lands, resources, or interests; (10) water quality issues, including presence of toxic sediments; (11) potential opportunities for recreation; (12) physical condition of project; (13) presence of existing project-dependent development (e.g., houses abutting reservoir); (14) other non-power project-related benefits (e.g., municipal water supply, flood control, irrigation); (15) project-dependent resource values (e.g., recreation, wetlands, wildlife, habitat); (16) need for power and ancillary services; and (17) historic properties. In comments on Scoping Document 1 or as early in the process as possible, resource agencies should provide information relating to these factors in their areas of expertise.

IV. CONSULTATION AND COMPLIANCE

A. Consultation

This section shows the process used to consult with agencies and the public on the proposed action and in complying with statutory requirements.

An example of standard language introducing this section of the EA:

A. Consultation

The Commission's regulations (18 CFR Section 4.38 and 16.8) require that applicants consult with appropriate resource agencies and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

Scoping

This section briefly describes the scoping process that was used to identify issues and alternatives to be address in the DEA.

An example of a scoping section:.

Scoping

Before preparing this DEA, we conducted scoping to determine what issues and alternatives should be addressed. A scoping document (SD1) was distributed to interested agencies and others on September 27, 2000. It was noticed in the Federal Register on October 3, 2000. Two scoping meetings, both advertised in the Chugwater Times, were held on October 27, 2000, in Chugwater, Wyoming, to request oral comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the Commission's public record for the project. In addition to comments provided at the scoping meetings, the following entities provided written comments:

| <u>Commenting Entities</u> | <u>Date of Letter</u> |
|---|-----------------------|
| State Department of Parks and Recreation. | November 18, 2000 |
| State Department of Fish and Game | November 22, 2000 |
| Municipal Hydro Company | November 23, 2000 |
| American Whitewater | November 24, 2000 |
| Cowboy Paddlers | November 25, 2000 |
| U.S. Fish and Wildlife Service | November 29, 2000 |

A revised Scoping Document (SD2), addressing these comments, was issued on April 5, 2000.

Interventions

This section is prepared by Commission staff after a final application is filed and a notice seeking interventions is issued. While it wouldn't need to be included in an APEA, other preparers may want to include the framework for the section.

Example of an interventions sections:

| Interventions | |
|---|-----------------------|
| <p>On July 19, 1994, the Commission issued a notice that MHC had filed an application to relicense the Angus Project. This notice set September 29, 2000, as the deadline for filing protests and motions to intervene. In response to the notice, the following entities filed motions to intervene:</p> | |
| <u>Intervenors</u> | <u>Date of Letter</u> |
| Chugwater Department of Parks & Recreation | August 24, 1994 |
| Wyoming Trout, Inc. | September 16, 1994 |
| U.S. Department of the Interior | September 22, 1994 |
| Wyoming Department of Fish and Game | September 26, 1994 |
| Chugwater Chamber of Commerce | September 26, 1994 |

Comments on the Application

Identify comments/recommendations as a result of the notice that the application is Ready for Environmental Analysis (traditional process) or the combined notice issued on the ALP. Applicants should include a similar section for comments received on the notice seeking preliminary recommendations on the draft application and draft PDEA.

An example (note that the date should be the date on the letter):

| | |
|--|-----------------------|
| <p>A notice that the application is Ready for Environmental Analysis (REA) was issued on September 1, 1990. The following entities commented:.</p> | |
| <u>Commenting agencies and other entities</u> | <u>Date of letter</u> |
| State Department of Environmental Protection | November 10, 1990 |
| Department of the Interior | November 10, 1990 |
| State Department of Inland Fisheries and Wildlife | November 10, 1990 |
| Department of the Army, Corps of Engineers | November 11, 1990 |
| State Executive Department, State Planning Office | November 11, 1990 |
| American Rivers | November 12, 1990 |
| <p>The applicant responded by letter dated December 12, 1990</p> | |

B. Compliance

This section briefly describes conditions and prescriptions filed under mandatory conditioning authorities, recommendations filed under Section 10(j) of the FPA, and the status of any related consultation.

Water Quality Certification

The applicant must file a request for a water quality certification (WQC), required by Section 401 of the Clean Water Act, before the deadline for filing the license application. In an ALP, the request for the WQC should be early enough during pre-filing to address preliminary WQC conditions in the PDEA that gets circulated with the draft application.

In this section, include the date the certifying agency received the request for certification and the date or status of the certifying agency's action (denying, granting, or waiving the 401 WQC, or the action may be pending). Describe the conditions of the water quality certificate, if known.

Note: The 401 WQC is waived if the certifying agency doesn't act within 1 year of receiving the applicant's request.

Example for when a 401 WQC is waived:

Water Quality Certification

On November 21, 2000, MHC applied to the Wyoming Department of Natural Resources (Wyoming DNR) for 401 water quality certification for the Angus Project. The Wyoming DNR received this request on November 24, 2000. The Wyoming DNR waived the Section 401 WQC on December 6, 2000 (letter from Earle. Everett, Water Management Supervisor, Wyoming Department of Natural Resources, Locality, Wyoming, December 6, 2000).

Example for a 401 WQC with conditions:

Water Quality Certification

The conditions of the Section 401 Water Quality Certification (WQC), as issued by the Department of Environmental Services (DES), require the following:

- ! The licensee must monitor dissolved oxygen and water temperature at three stations in Copper Creek (upstream of the impoundment, at three depths in the impoundment--surface, bottom, mid-depth-- and downstream of the tailrace);
- ! Monitoring must occur once each month during a non-rain condition for a 3 day period during June, July, August, and September, and samples are to be collected between 6 a.m. and 8 a.m.;
- ! Equipment calibration and quality control measures must be instituted to assure accurate reporting;
- ! Monitoring must be conducted under as close to limiting water quality conditions as possible [i.e., water temperatures of 20 degrees centigrade (EC) or greater and river flows below 50 cfs];
- ! Water quality monitoring and quality assurance/quality control procedures must be reported on an annual basis and a yearly summary report must be submitted to the DES-Division of Water Supply and Pollution Control; and
- ! All existing water uses will be maintained and protected and at no time shall the project cause Class B water quality standards to be violated.

Section 18 Fishway Prescriptions

Identify any fishway facilities prescribed by the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, or both, pursuant to Section 18 of the FPA. For APEAs, these would be preliminary prescriptions. In some cases, these will be preliminary conditions along with a schedule for filing finals. Note whether both requirements have been met.

Example for a reservation of authority for fishways:

Section 18 Fishway Prescription

Interior, by letter dated January 1, 2001, has requested reservation of authority to prescribe fishways under Section 18 to be included in any license issued for the project.

Example for a fishway prescription:

Section 18 Fishway Prescription

The U.S. Fish and Wildlife Service (FWS) timely filed the following measures under authority of Section 18 of the FPA: (i) an upstream Denil fish ladder; (ii) construction of Denil ladder in 1994 and operation by April 1, 1995; (iii) a fish lift/elevator, with final design modifications based on consultations with the FWS [the fish lift/elevator should be constructed in the summer/fall of the year following the passage of 20,000 American shad or 200,000 river herring, or a combination of the two, with one shad equal to twenty herring; the lift is to be operational by April 1 of the year following construction]; (iv) downstream fish passage facilities, with guidance screen and a bypass sluice; and (v) construction of downstream fish passage facilities in 1994 and operation by April 1, 1995 (concurrently with upstream fish passage).

Section 4(e) Federal Land Management Conditions

Identify any conditions that federal land management agencies submitted pursuant to Section 4(e) of the FPA to protect and ensure proper use of public lands (reservations) occupied by the project. In some cases, these will be preliminary conditions along with a schedule for filing finals. Note whether both requirements have been met.

Example for listing 4(e) conditions:

Section 4(e) Conditions

The Forest Service (FS) provided final conditions by letter dated January 23, 1992 (Attachment 1). These conditions were filed pursuant to Section 4(e) of the Federal Power Act and 18 C.F.R. §4.34 (b) by May 15, the deadline for conditions.

The FS filed 6 conditions under the provisions of section 4(e) of the FPA. In summary, these conditions are as follows: Conditions 1 through 4 are standard conditions that would involve obtaining FS approval on final project design and project changes, and yearly consultation with the FS to ensure the protection and development of natural resources; Condition 5 requires a specific minimum flow regime and passive fish screening with downstream passage; and Condition 6 requires MHC to pay for some of the operation and maintenance associated with project-related recreation use.

Section 30(c) Fish and Wildlife Conditions

These conditions described in Section 30(c) of the FPA pertain only if the applicant is seeking an exemption from licensing or seeking PURPA benefits for constructing a new dam or diversion. If applicable, identify conditions provided by federal and state fish and wildlife agencies for the protection of fish and wildlife resources. In some cases, these will be preliminary conditions along with a schedule for filing finals. Note whether both requirements have been met.

Example for exemption conditions:

Section 30(c) Fish and Wildlife Conditions

Terms and conditions provided by Interior:

- (a) MHC should maintain the existing trashracks and screens over the water intake structures to reduce possible fish entrainment.
 - (b) MHC should maintain a minimum discharge of 11 cfs below the project dam during the two week period in the late fall and early winter when discharges may be reduced or curtailed. For the remainder of the year, minimum flows should be maintained at the existing 100 cfs.
-

Endangered Species Act (ESA)

This section briefly describes the consultation process used to address project effects on federally listed or proposed species in the project vicinity. It references the analysis section of the DEA, but does not give the conclusion for each listed or proposed species, any recommended measures, and the status of consultation under the Endangered Species Act.

An example of an ESA section:

Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. One federally listed species is known to occur in the Angus Project vicinity: the Copper mudpuppy. There is also critical habitat for the Copper mudpuppy in the project vicinity. Our analyses of project impacts on threatened and endangered species are presented in section V.C.4 and our recommendations in section VII, Comprehensive Development.

Copper mudpuppy

The known range of the endangered Copper mudpuppy is limited to the midsection of the Copper Creek drainage. Project operation has enhanced Copper mudpuppy habitat by importing riprap to help to stabilize levees in the project area. Past dredging operations to maintain the levees may have resulted in direct and indirect (sedimentation) impacts on Copper mudpuppy. Lack of flow to the bypassed reach resulted in diminished water quality in portions of Copper Creek, which may have limited the amount of habitat available for Copper mudpuppy.

We recommend several measures that would benefit Copper mudpuppy. Development of a levee maintenance plan designed to limit or eliminate dredging and to restore native vegetation would enhance habitat conditions for this species. Implementing the proposed continuous flow release into the bypassed reach would enhance Copper mudpuppy habitat by improving water quality conditions. Development of a cooperative management plan for the mid-reaches of Copper Creek also would benefit Copper mudpuppy populations by enabling coordination of MHC's enhancement activities with concurrent restoration and protection tasks implemented by others. All of our recommendations are consistent with the final recovery plan for Copper mudpuppy (FWS, 1998). However, specific measures that would be developed as part of the levee maintenance and cooperative management plans would need to be carefully reviewed by FWS and Commission staff to ensure that no inadvertent adverse impacts would be likely to occur.

We conclude that relicensing of Angus Project as proposed with staff-recommended measures is not likely to adversely affect the Copper mudpuppy. We requested FWS concurrence with our conclusion by letter dated May 29, 1998. The FWS requested that after a draft Levee Management Plan, and Copper mudpuppy Monitoring and Management Plan have been developed, the Commission initiate formal consultation pursuant to Section 7 of the Act. We agree, and will initiate formal consultation at that time.

Section 10(j) Recommendations

In this section, briefly describe recommendations filed by state and federal fish and wildlife agencies pursuant to Section 10(j) of the FPA. Refer the reader to Sections VII and VIII for a complete discussion of which recommendations were adopted.

An example of a 10(j) Section:

10(j) Recommendations

Under Section 10(j) of the 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 an 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.

NMFS and ODFW included 10(j) recommendations in their comments dated November 10, 1990. The agency-recommended measures include intake screening, several fish passage measures, tailrace barriers, consultation requirements, and water quality plans. Table 4, in Section VIII lists each of the 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 EA.

Coastal Zone Management Act

Section 307(c)(3) of the CZMA requires that all federally licensed and permitted activities be consistent with approved state Coastal Zone Management Programs. If the project is located within a coastal zone boundary or if a project affects a resource located in the boundaries of the designated coastal zone, the applicant must certify that the project is consistent with the state Coastal Zone Management Program.

In this section of the DEA, give the date the applicant contacted the state coastal zone management agency. If the project isn't in or wouldn't affect the coastal zone, say so and cite the coastal zone program office's concurrence. If the project is within or affects a resource within the coastal zone, provide the date the applicant sent the consistency certification information to the state agency, the date the state agency received the certification, and the date and action taken by the state agency (for example, the agency will either agree or disagree with the consistency statement, waive it, or ask for additional information). Describe any conditions placed on the state agency's concurrence and assess the conditions in the appropriate section of the DEA. For APEAs, these would be preliminary conditions. If the state agency doesn't respond within 6 months of receiving an adequate consistency certification from the applicant, we presume the state agency concurs. Its response could be to ask for additional information, which may extend beyond the six months from the certification filing.

Example for a coastal zone certification that was waived:

Coastal Zone Management Act

On September 10, 1993, MHC requested that the State Department of Administration, review the consistency certification for the Angus Project. The Department of Administration received the request on September 12, 1993 and waived its right to review by letter dated November 1, 1993.

Example for a coastal zone certification that was granted, with conditions:

Coastal Zone Management Act

On September 10, 1992, MHC submitted a consistency certificate to the DNR for compliance with the Coastal Zone Management Act

In MHC's submittal, they certified that the proposed activities for Angus Project comply with the Wyoming approved coastal management program. Further, MHC asked the DNR to confirm that the project would not affect the coastal zone.

The DNR received the request on September 12, 1992. By letter dated October 13, 1992, the DNR stated that the Angus Project has the potential to impact coastal resources. Provided that the project is licensed and operated with the terms agreed upon in the negotiated Offer of Settlement, no adverse impacts to coastal resources are anticipated. Therefore, the Angus Project would be consistent with the Wyoming Coastal Management Program.

Pacific Northwest Power Planning and Conservation Act

Under Section 4(h) of the Pacific Northwest Power Planning and Conservation Act (Act), the Pacific Northwest Planning Council (Council) developed the Columbia River Basin Fish and Wildlife Program (Program) to protect, mitigate, and enhance the fish and wildlife resources associated with development and operation of hydroelectric projects within the Columbia River Basin. Section 4(h) of the Act states that responsible federal and state agencies should provide equitable treatment for fish and wildlife resources, in addition to other purposes for which hydropower is developed, and that these agencies shall take into account, to the fullest extent practicable, the Program adopted under the Act.

The program directs agencies to consult with federal and state fish and wildlife agencies, appropriate Indian tribes, and the Council during the study, design, construction, and operation of any hydroelectric development in the basin. Section 12.1A of the Program outlines conditions that should be provided for in any original or new license. The program also designates certain river reaches as protected from development. If the project is not within the Columbia River Basin, this section would not be included. This section typically includes a brief description of how the act applies to the project and how the proposal would or would not be consistent with the program.

Example of a discussion under this section:

Pacific Northwest Power Planning and Conservation Act

Under section 4 (h) of the Pacific Northwest Power Planning and Conservation Act, the Council developed the Columbia River Basin Fish and Wildlife Program to protect, mitigate, and enhance the operation of the hydroelectric projects within the Columbia River Basin. Section 4(h) states that responsible federal and state agencies should provide equitable treatment for fish and wildlife resources, in addition to other purposes for which hydropower is developed, and that these agencies shall take into account, to the fullest extent practicable, the program adopted under the Pacific Northwest Power Planning and Conservation Act.

The program directs agencies to consult with federal and state fish and wildlife agencies, appropriate Indian tribes, and the Council during the study, design, construction, and operation of any hydroelectric development in the basin. At the time the application was filed, our regulations required the applicant to consult with the appropriate federal and state fish and wildlife agencies and tribes before filing, and after filing, to provide these groups with opportunities to review and comment on the application. Kittitas has followed this consultation process, and the relevant federal and state fish and wildlife agencies and tribes have reviewed and commented on the application.

The program also states that authorization for new hydroelectric projects should include conditions to mitigate the impacts of the project on fish and wildlife resources (sections 12.1A.1 & 12.1A.2). The specific provisions of section 12.1A.1 & 12.1A.2 that apply to the proposed project call for: (1) specific plans for fish facilities prior to construction; (2) assurance that the project will not degrade fish habitat or reduce numbers of fish; (3) assurance all fish protection measures are fully operational at the time the project begins operation; (4) timing construction activities, insofar as practical, to reduce adverse effects on wintering ground; and (5) replacing vegetation if natural vegetation is disturbed.

Our recommendations in this EA (section V.B 2 & 3) are consistent with the applicable provisions of the program, listed above. Further, a condition of any license issued would reserve to the Commission the authority to require future alterations in project structures and operations to take into account, to the fullest extent practicable, the applicable provisions of the program. The project is not located within a protected area.

V. ENVIRONMENTAL ANALYSIS

In this section, you'll provide the substance of the DEA: the analysis of issues and alternatives. The environmental analysis section is divided into a general description of the river basin; the scope of environmental analysis, including the resources that are cumulatively affected; an analysis of the proposed action and other recommended environmental measures; other action alternatives; the no-action alternative; and a comparison of alternatives.

Below, we break down each part of the environmental analysis section, describe its purpose in the DEA, and provide examples.

A. General Description of the River Basin

In the following, briefly describe the general setting in which the project is located, or will be located.

- ! Describe the river system, including relevant tributaries
- ! Give measurements of the area of the basin and length of stream
- ! Identify the project's river mile designation or other reference point
- ! Describe the topography and climate
- ! Discuss major land uses and economic activities

Example of a river basin description:

A. General Description of the River Basin

The Copper River is formed by the confluence of the Sugar and Swet Rivers near Foster, Wyoming. The river flows generally southeast for 30 miles into the Gulf of Mexico. The topography of the basin is characterized by mountainous areas in the western part, gradually changing to low, rounded hills, and level areas of unconsolidated soils in the eastern section. The total drainage area of the basin is about 10,060 miles. Water from the river is used by most of the cities, towns, and industries along the river for industrial uses (73 percent), public water supply (17 percent), and agricultural uses (10 percent). Annual precipitation for the basin is about 40 inches and average temperature is about 57 degrees Fahrenheit.

Drainage to the project's impoundment comes from the mountainous areas in the western part of the basin. The terrain of the project area is hilly with common changes in elevation from 200 to 600 feet. Immediately next to the project impoundment, rock formations are exposed, forming valley walls up to 200 feet high with very steep slopes.

At the project, located at river mile 11, the river drains about 3,257 square miles of land, representing about one-third of the total drainage area of the basin. The primary use of the project waters is for city water supply. The area upstream of the project is rural, with small farms. The city is located on the south side of the river downstream of the project. Within the city limits, there is a spillway dam called the city dam, located 3.75 miles downstream of the project. The headpool of the city dam backs up to the tailrace of the Angus Project; there is no hydroelectric facility at the city dam.

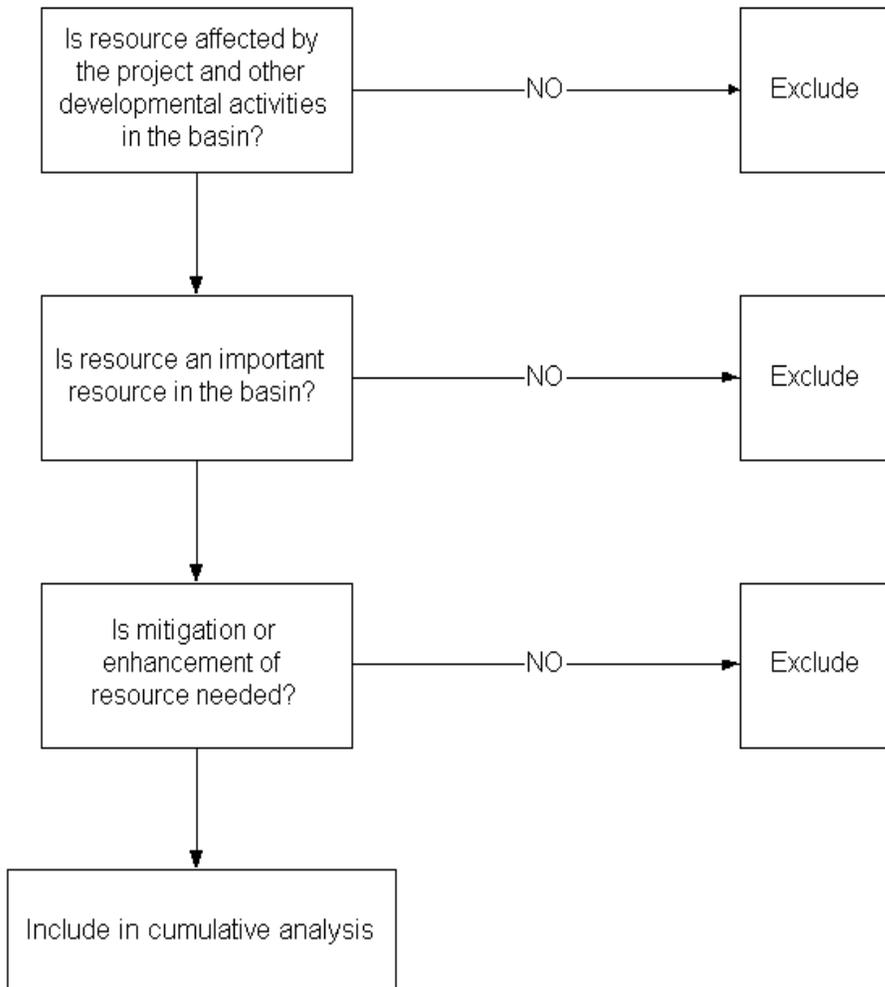
B. Cumulative Effects

In this section, you'll identify resources that will get a cumulative impacts analysis based on the scoping meetings, site visit, and comments on the scoping documents; the license application; and consultation with the agencies and nongovernmental organizations (NGOs). With that information, you'll determine the appropriate geographic and temporal scope of analysis for those resources. Below, we discuss (1) how to determine which resources need a cumulative effects analysis; (2) the geographic scope of the cumulative analysis and (3) the temporal scope of analysis.

(1) Selecting Resources for Cumulative Analysis: CEQ defines cumulative impacts as impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes the actions. Hydro projects can contribute to cumulative effects when their effects overlap with those of other activities in space, or time, or both. Effects can be either direct or indirect. Direct effects are those that occur in the same place and at the same time and are a direct result of the proposed action. For example, water quality might be affected by reduced spillage at the dam. Indirect effects can occur at a distance from the proposed action, or the effects may appear some time after the proposed action occurs. For example, an upstream timber harvest area and upstream water sewage treatment plant may affect water quality, in addition to the effects on water quality from the proposed action. Scoping meetings, the application, agency correspondence, and agency and public interest in a particular resource will help you to define whether a resource is cumulatively affected.

When selecting resources for cumulative analysis, it can be very helpful to run the resource through a process such as shown below.

SHOULD RESOURCE/ISSUE BE INCLUDED IN THE CUMULATIVE ANALYSIS?



Additional guidance on defining cumulative analysis resources can found in Considering Cumulative Effects Under the National Environmental Policy Act (Council on Environmental Quality, 1997) which is available on the web at <http://ceq.eh.doe.gov/nepa/ccenepa/ccenepa.htm>.

Example of a Cumulative Effects section with a resource selected:

B. Cumulative Effects

According to the Council on Environmental Quality's regulations for implementing NEPA (§1508.7), an action may cause cumulative impacts on the environment if its impacts overlap in time and/or space with the impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of MHP's license application and agency and public comments, we have identified the coldwater fisheries resource as having potential to be cumulatively affected by the project in combination with other past, present, and future activities. The coldwater fisheries resource was selected because irrigation, domestic water treatment, and hydroelectric developments and diversions along the waterway have affected the fishery and habitat by altering the flow regime, blocking or delaying fish movement, and entraining fish into diversion canals or penstocks.

Example of a Cumulative Effects section with no resources selected:

B. Cumulative Effects

According to the Council on Environmental Quality's regulations for implementing NEPA (§1508.7), an action may cause cumulative impacts on the environment if its impacts overlap in time and/or space with the impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time to include hydropower and other land and water development activities. Through scoping, agency consultation, and our independent analysis we've identified no resources that would be cumulatively affected by continuing to operate the Angus Project. The project is located in a very small watershed with very little existing or planned future developmental activity other than the existing hydro project.

(2) Geographic Scope of Cumulative Analysis: As the CEQ says, without spatial boundaries, a cumulative effects assessment would be global, and while this may be appropriate for some issues such as global warming, it's not appropriate for most other issues. The scoping process, consultation, site visits, and the license application will help you identify resources that are cumulatively affected. Here, you should briefly describe how those resources are cumulatively affected and explain your choice of the geographic scope of analysis It's important to remember that not every resource will have the same geographic scope.

To determine spatial boundaries, consider the distance the impact can travel in the context of resource effects from other hydro and non-hydro activities that might affect a wide area. Specifically, you should determine the area(s) that will be affected by the proposed action (impact zone), list the cumulative effects resources within that area that

could be affected by the proposed action, and determine the geographic area outside of the impact zone that is occupied by those resources. Finally, you should consider the management plans and jurisdictions of other agencies for the cumulatively affected resource.

For hydropower projects, the geographic scope may be the river basin or mainstem river for some resources such as anadromous fish, or the stream reach and surrounding lands for an endangered plant. You should describe the geographic scope for each cumulatively affected resource.

When defining your geographic scope, discuss the location of other hydro projects and other major developmental activities within the area (such as water withdrawals for irrigation or public water supply; a steam plant that discharges into the impoundment; a water sewage treatment plant located upstream of the project; or a paper mill located on the river that affects water quality). Include a schematic diagram of these developments and/or list them in a table. Briefly describe how your project interacts, affects, or is affected by, these other hydro and water resource developments. The length of discussion should reflect the significance of the interaction. Include details of the effects of these interactions in the environmental impacts analysis section.

Example of a geographic scope of analysis section:

1. Geographic Scope

There are about 44 other dams used for hydroelectric generation in the Copper River Basin. About half of these dams are located on the lower 80-mile-long part of the basin while the other half are located in the upper 70-mile-long part of the basin. An 80 mile-long segment of the river separates these two groupings of dams.

These dams have cumulatively affected the fishery (anadromous fish species) and recreation (canoeing and kayaking) on the Copper River. In the Fishery (Section V.B.2) and Recreation (Section V.B.5) sections of this DEA, we discuss the site-specific as well as the cumulative effects of relicensing the Angus Project on anadromous fish and recreational boating.

Since a series of dams in the lower reach of the Copper River block the access of several anadromous fish species, we limit our look at the cumulative fishery effects of the Angus Project to potential measures that would help restore fish populations in the basin.

To look at the cumulative impacts on boating recreation, we limit our analysis to the upper river-the 20 mile reach between the Falls and the city where there are eight existing dams.

(3) Temporal Scope of Analysis: The temporal scope includes a brief discussion of past, present, and future actions, and their effects on resources based on the new license term (30-50 years). In this section, you should highlight the effect on the cumulatively affected resources from reasonably foreseeable future actions (for example, the effect on wetlands from a planned timber harvest, or the effect on project operations from a proposed water withdrawal for a ski resort). You should discuss the past actions' effects on the resource in the affected environment section [for an example, see section C below].

Example of a temporal scope section:

2. Temporal Scope

The temporal scope of analysis includes a discussion of the past, present, and reasonably foreseeable future actions and their effects on water, fishery, and recreational resources. Based on the term of the proposed license, we will look 30-50 years into the future, concentrating on the effects on water, fishery, and recreational resources from reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

C. Proposed Action and Action Alternatives

This is the section of the EA that explains the effects of the action alternatives on a variety of environmental resources. It begins with a brief description of how the section is organized, and includes a brief discussion of resources that wouldn't be affected by the proposed action, and, therefore, won't get a detailed analysis. The discussion should explain why those resources did not get the more detailed analysis.

Example of the Proposed Action and Action Alternatives introductory paragraph:

In this section, we discuss the effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the specific environmental issues.

MHC does not propose any new construction, modifications, or changes to the project itself that would cause land-disturbing activities. However, MHC does propose to periodically remove sediments from the reservoir. This issue is discussed in the Aquatic Resources Section (section V.C.1-Sediment Removal). There are no other issues dealing with geology and soils resources; therefore, we do not address them further.

For all resources that will be addressed, you should describe--by resource--(a) the affected environment, (b) your analysis of the proposed action and any other recommended alternatives or measures, and (c) any unavoidable adverse impacts. Use this format for all resource areas affected.

Condensed, the resource sections look like this:

Resource

Affected Environment

Environmental Impacts and Recommendations

Analysis

Conclusion

Unavoidable Adverse Impacts

Some other general tips for writing the affected environment section:

- ! Quantify information contained in descriptions
- ! Indicate the biological and economic importance of the resources
- ! Cite supporting literature and letters
- ! Provide only the necessary background in the affected environment for the impacts analysis that follows

Affected Environment:

40 CFR Sec. 1502.15 Affected environment.

The environmental impact statement shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in a statement shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced. Agencies shall avoid useless bulk in statements and shall concentrate effort and attention on important issues. Verbose descriptions of the affected environment are themselves no measure of the adequacy of an environmental impact statement.

The affected environment is the existing condition and the baseline against which to measure the effects of the proposed project and any alternative actions. For cumulatively affected resources, the affected environment is divided into two parts: a discussion of past actions and activities within the geographic scope of analysis, and the resource as it is today. First, you should discuss the effects of past activities/actions on the cumulatively affected resource; the amount of available information will limit the length of this discussion (this doesn't require a detailed account of everything that has happened). Quantify the effects on a resource when information is available. Then you should discuss the existing environment--what currently exists and what's affected by the project and non-hydro activities. Finally, include information on the resource's status and expected future condition, based on trends and anticipated developmental activities in the basin.

Example of Affected Environment section with no cumulatively affected resources

Terrestrial Resources

Affected Environment

The project is located in the foothills of the Wild River Range, just above Copper Valley. The landscape is characterized by high relief, with extremely steep side slopes, and a narrow valley. Photographs of the project area show a vegetative community dominated by mixed coniferous forest on the slopes above Copper Creek, interspersed with open areas in talus and grasses. Riparian areas are confined to narrow bands of vegetation along the reservoir and the banks of Copper Creek. A variety of wildlife occupy the project area including, elk, fox, mule deer, and mountain lion. However, the project does not include any crucial big game or bird habitats.

Example of an affected environment section with cumulative effects resource:

Riverine, Riffle and Shoal Habitat

Affected Environment

Before the Angus Project was built, the Cooper River Basin included about 60 miles of riverine habitat that was characteristic of the southern Wild River Mountains and the Copper physiographic province. That is, riverine habitat that has high to moderate gradients, fast currents, high velocities, bedrock-boulder-cobble-gravel substrates, cool to warm water, and seasonal hydrologies with peak flows in the spring and low flows in the late summer.

Another characteristic of riverine habitat in this basin is the presence of riffle and shoal areas. These are relatively, shallow, and fast flowing areas that have surface turbulence often over a gravelly substrate. Some of the reasons riffle and shoal habitat are valuable to the continuation of a complete and healthy river ecosystem are that they provide spawning and rearing sites for fish and aquatic invertebrates, and water is aerated by the turbulence found in riffles preventing stagnation.

Riverine habitat supports aquatic organisms, in particular fish, that are adapted to living and surviving in a flowing water environment. Many of the species that occupy the riverine environment in the project area, particularly Copper Gorge, are not game fish. Nevertheless, they are important because they help maintain a complete, healthy, and viable riverine ecosystem.

Since project construction in 1930, about 40 miles of riverine habitat in the Copper River basin has been replaced with still-water, lake habitat. Likewise, species specifically adapted to the river environment, such as some darters, stonerollers, and madtoms, have been displaced by lake-adapted species, such as largemouth bass and other sunfishes. Many of the newer inhabitants of the basin are game species, and as such, they have a high consumptive, tangible, and recreational value.

Throughout the Tugalo River Basin only about 13 miles of what might be classified as riverine habitat is present today.

Remember, you only need to discuss past actions for cumulatively affected resources, but you need to discuss the existing environment (including ongoing effects that would continue if not changed) and the effects of any proposed future actions/activities for all resources.

Environmental Impacts and Recommendations

In this section, you should describe the beneficial and adverse effects of the applicant's proposal, other recommended action alternatives, and environmental measures. Again, you should assess effects on the basis of changes from current conditions (baseline), but in the context of present and reasonably foreseeable development in the watershed. Within your analysis, describe any future actions that may affect the resources. Where appropriate, divide this section using subheadings that detail the impacts and agency and NGO recommendations associated with a specific resource issue (for example, in the Water Quality section, use subheadings to talk about dissolved oxygen, water temperature, and suspended sediment issues).

You should begin by briefly describing or stating the issue (1 paragraph at most). Next, present the applicant's proposal for each resource area. Follow with any federal and state agency recommendations, and any recommendations by NGO's or others. Include the applicant's response to the agencies' recommendations and finally, your analysis of the proposed action, recommended measures, and any other measures you wish to consider (see Appendix A for Analysis Checklist). If your recommendation would have a significant effect on project economics or other environmental resources, you should defer any recommendations for protection, mitigation, or enhancement measures to the Comprehensive Development section. All measures have some cost, so determining which measures would have a significant effect on project economics requires some judgement and experience. When in doubt, it would be reasonable to defer all recommendations to the Comprehensive Development section.

Example of an analysis for minimum flows in a bypassed reach where we defer to the Comprehensive Development Section for the final recommendation because the recommendation has a significant cost and affects fisheries:

Environmental Impacts and Recommendations

Fish Stranding

Project operation affects fish habitat and stranding in the bypassed reach. The bypassed reach receives about 24 cfs continuously from leakage through the dam or gate seals. No other flow occurs in the 1,500-foot-long bypassed reach unless water overflows the spillway. Under current operation, spillway releases occur only when the reservoir is filled and natural inflow exceeds 750 cfs (maximum amount used to generate power), or when the plant is out of service. From 1983 through 1990, natural inflow exceeded project capacity about 17 percent of the time, or an average of 62 days per year. Plant outages for more than a few hours are rare. At most times, then, the only continuous flow in the bypassed reach is 24 cfs from leakage. The bypassed stream reach has a rough substrate that causes pockets of water to remain after water has stopped flowing over the spillway. Fish that swim into the bypassed reach while water is spilling become stranded in these pockets and can be subjected to desiccation and predation.

MHC proposes to maintain a minimum flow of 28 cfs in the bypassed reach so that fish can return downstream rather than become stranded. MHC would supplement the current 24 cfs leakage with an additional 4 cfs flow released through the overflow sluice gate located at the top of the spillway. MHC proposes to install a staff gage in the bypassed reach to monitor the minimum flow. MHC and DNR conducted field observations, which concluded that 28 cfs would be adequate to keep fish from becoming stranded in pools in the bypassed reach. Based on these observations, Interior and DNR agree with MHC's proposal to provide a 4-cfs minimum flow into the bypassed reach.

Releasing a minimum flow to the bypassed reach would enhance this habitat by ensuring enough water in this section of the river to prevent fish stranding. Since the costs of the modifications required to provide minimum flows are significant, we consider the effects this enhancement would have on project economics in the Developmental Analysis section and defer to the Comprehensive Development and Recommended Alternative section for our recommendation.

Any minimum flow enhancement required by the Commission should include provisions for MHC to develop a plan for: (1) providing the required flow, and (2) monitoring compliance with the required flow, after consultation with the USGS, FWS, and DNR. The plan should be filed with the Commission for approval, and include the installation, operation, and maintenance of streamflow monitoring equipment in the Copper River. The plan should, also, include provisions for providing operation and flow data to the applicable agencies within 30 days of the agencies' request.

Example of a recreation analysis where we defer to the Comprehensive Development Section for the final recommendation because of the cost:

Environmental Impacts and Recommendations

Canoe Portage

The Angus dam is an obstacle to paddle recreation, and contributes to cumulative impacts on paddling opportunities in the 200-mile reach between the upper limits of its reservoir and Copper Rapids, downstream in Wyoming. There are six hydroelectric projects in this reach, four of which have impounded relatively large areas of the mainstem river.

To enhance paddling opportunities in the project vicinity, MHC proposes to provide a canoe portage on the north side of the river. The portage would consist of: (1) a take-out just upstream of the existing boat barrier; (2) a pathway that would use an existing gravel maintenance road along with some Forest Service land downstream of the powerhouse; and (3) a put-in located beneath the existing Copper Parkway bridge. Constructing the portage would involve some clearing of existing vegetation, some minor grading, and the installation of a gravel take-out pad.

The portage would also involve public use of an existing railroad right-of-way. MHC states that an agreement with the railroad appears to be forthcoming. MHC's proposed canoe portage is shown as Figure 3 in their November 18, 1992, additional information filing. MHC estimates that it would cost about \$10,080 to construct, plus about \$3,026 in levelized operation and maintenance costs over the term of a new license. MHC would construct the portage within two years of receiving a new license for the project.

In their August 6, 1992, letter, the Canoeists, Inc. (CI), state that project facilities hinder downstream passage of canoe and kayaks. They also state that access to the river at the project is dangerous, which they feel has limited use of the scenic gorge below the project.

In a November 5, 1992, letter, the Forest Service concurs with MHC's proposal to provide a canoe portage at the project. They also state that, since canoeing is an activity that is open to the general public, their letter serves to grant permission for MHC to construct the parts of the portage that would be on Forest Service land.

The Wyoming Department of Conservation and Recreation (WDCR), in an October 19, 1992, letter, agrees that, if a canoe portage is provided, the put-in should be located near the Parkway bridge versus an alternative that would have placed the put-in nearer to the powerhouse. In their October 20, 1992, letter, the DNR agrees that the preferred location for the put-in is downstream of the powerhouse near the Parkway bridge.

A portage at the project would provide safe passage around the dam for those wishing to paddle the short reach downstream into Copper Mountain lake. It would also help decrease cumulative impacts on paddling opportunities that have resulted from multiple hydroelectric developments on the mainstem Copper River. We consider the effects this measure would have on project economics in the Developmental Analysis section and defer to the Comprehensive Development and Recommended Alternative section for our recommendation.

Recommending Resource Plans

Staff often recommend that the applicant develop various resource management and monitoring plans to address environmental issues, for example, a land use, recreation, wildlife, water quality, or a fisheries management plan. Two costs are associated with a resource plan: 1) the cost to develop the plan and 2) the cost to implement the plan. Although the cost of developing and implementing a plan might be considered "nominal" compared to the cost of any other recommended measure, a resource plan should be deferred to the comprehensive development section. Finding an exact cost of a plan, including your recommended components, may be difficult. Here are a few ways to estimate the cost of a recommended plan:

- " Review other EA's where a resource agency, applicant or staff has provided the cost of the plan.
- " Talk with staff who've worked with consulting firms that develop and implement such plans.
- " Ask for the cost information at a scoping session.
- " Ask applicants to provide costs and supporting documentation in an AIR.
- " Ask a resource agency to provide costs with their recommendations.

Cumulatively Affected Resources

For cumulatively affected resources, it may be helpful to structure your thoughts and writing as presented in the chart below in order to see how each alternative would affect these resources. Later in the EA, you'll need to summarize cumulative effects--the table below may help in preparing that summary.

| Resource | Past Actions | Present Action | Proposed Action or Alternative | Future Actions | Cumulative Effect |
|---------------------|---|---|---|---|---|
| Fisheries | Decrease in numbers and species diversity from water diversions and forestry management. | Occasional documented fish kills from unplanned spills. | Decrease in the number of fish kills from unplanned spills. | Loss of cold water species due to change in temperature from water withdrawals. | Significant decline in numbers and species diversity. |
| Wetlands | Large reduction in acreage of wetlands from housing, water diversion, forestry management. | Loss of small amount of wetlands due to flow reduction in bypasses reach. | Disturbance of a 5-acre wetland. | Continued loss of wetlands from future development | Significant cumulative loss of wetlands |
| Recreational Access | Reduced opportunities for the public to use the reservoir as a result of private development. | Two facilities exist to allow public access. | Increase public access by 50%. | Increase public opportunities | Significant increase in available public access for recreation. |

For some issues, the analysis sections can be quite lengthy and it's easy to lose the reader by not providing some closure. Therefore, present your biological conclusions (i.e., a summary of the advantages and disadvantages of each option or measure considered) when you finish analyzing each issue. If a measure affects any other resource, regardless of size or magnitude, it will require trade-offs and your recommendation should be deferred to the Comprehensive Development Section [Balancing -- 10(a)(1)]. Remember, your recommendation may affect other nondevelopmental (environmental, cultural or recreational) and developmental resources (e.g., typically the measure involves a cost that affects overall project economics; may also affect water supply, irrigation, etc).

Examples of how to conclude your analysis section:

Conclusion

Because the costs of the modifications required to provide [put in resource, e.g., minimum flows] are significant, we consider the effects this measure would have on project economics in the Developmental Analysis section and defer to the Comprehensive Development Analysis section for our recommendation.

Because the alternatives for enhancing wetlands could affect other resources at the project, measures to protect wetlands and project operation are considered further in Section VII (Comprehensive Development Analysis).

Because our recommendation for the duration of whitewater flow releases would affect fisheries and project generation, we make our final recommendation in Section VII (Comprehensive Development Analysis).

Unavoidable Adverse Impacts: You should look at your assessment and determine if any adverse impacts will occur despite your recommended environmental measures. You should discuss any impacts to the resources--whether they are short or long-term, minor or major, cumulative or site-specific--that may occur.

Example of Unavoidable Adverse Impacts:

Unavoidable Adverse Impacts

Some entrainment mortality will continue under the applicants' proposal. This long-term impact is expected to be minor, given the existing condition of the fishery in the project area and in the impoundment.

SPECIFIC GUIDANCE FOR RESOURCE DISCUSSIONS

For each of the following resource sections, we provide information on what to include in the affected environment section within the individual resource sections, and examples of typical issues discussed in the Environmental Impacts Analysis section.

1. Geological and Soil Resources

a. Affected Environment: Briefly discuss the following:

- ! Soil types and characteristics
- ! Site characteristics (slope, vegetation, drainage, topography)
- ! History of landslides or erosion
- ! Existing erosion control measures
- ! Description of any eroded sites, including the reservoir shoreline

b. Environmental Impacts and Recommendations: Typical issues addressed in this section include:

- ! Impacts of constructing project or project-related facilities (such as recreation facilities)
- ! Removal and disposal of hazardous waste sites
- ! Impacts of constructing rights-of-way for access roads and penstock routes
- ! Effects of potential penstock rupture
- ! Proposed and recommended mitigation and enhancement measures (such as: transmission line burial, penstock burial, soil erosion control measures, spoil and disposal measures)

2. Water Resources

a. Affected Environment: Briefly discuss the following:

- ! Water quantity (high, mean, low flows)
- ! Annual runoff patterns
- ! Any storage and release of project's inflow
- ! Effects of flow releases (including those of outside users) on reservoir, downstream reach, and bypassed reach
- ! Flows released for specific purposes, if applicable
- ! Flows released at special times (for example, annual boat races, water supply, ski season- snow making)
- ! Description of water rights, if any
- ! Water quality in the project reservoir and downstream
- ! Source and type of any pollutants associated with the project
- ! Use classifications of water bodies (for example, drinking water, non-contact recreation)

b. Environmental Impacts and Recommendations: Typical issues addressed in this section include:

- ! Existing state water quality standards and the project's effects on water quality
- ! Requirements of the Section 401 water quality certificate
- ! Effects of project operation on streamflow, dissolved oxygen and nitrogen supersaturation, water temperature, and sediment flushing
- ! Flow gaging and plans for monitoring water quality
- ! Effects of proposed, mandatory and recommended environmental measures
- ! Changes in minimum flow to protect water quality

3. Fishery Resources

a. Affected Environment: Briefly discuss the following:

- ! Species in the project area, including rare and sensitive species, threatened and endangered species
- ! Recreational or commercial value of fishery (refer to angler use, catch rate, or other means of estimating value, if available and relevant)
- ! State management objectives for fishery or fish habitat, if available
- ! Sport fishery maintenance (that is, naturally reproducing, self-sustaining, or stocked)
- ! Quantity and size of fish stocked and frequency of stocking

b. Environmental Impacts and Recommendations: Typical issues addressed in this section include:

- ! Fish habitat affected by project operation (type of habitat such as: spawning, rearing, juvenile; quantity and quality)
- ! Impacts associated with impoundment fluctuation
- ! Fish entrainment and mortality, mortality rates
- ! Instream flows in the bypassed reach and amount of habitat gained or lost
- ! Ramping rates
- ! Effect of proposed and recommended environmental measures (for example, fish passage facilities, fish screens, habitat improvement structures).

4. Terrestrial Resources

a. Affected Environment: Briefly discuss the following (Use range or habitat maps as needed):

- ! Vegetation and wildlife in the vicinity of the project
- ! Dominant plant species
- ! Recreational or commercial value of terrestrial resources
- ! State protected wildlife or vegetation
- ! Quality and quantity of habitats with recognized special botanical or wildlife value (for example, wetlands, old growth forests)
- ! Essential habitat requirements of wildlife (for example, deer wintering area)
- ! Agency management goals for important wildlife species

b. Environmental Impacts and Recommendations: Typical issues addressed in this section include:

- ! Amount and type of habitat that would be permanently removed or temporarily cleared and revegetated for construction of project-related facilities

- ! Effects on plant and wildlife populations
- ! Effects on wildlife feeding, reproduction, and migration requirements
- ! Effects on wetlands and other habitats with recognized special value to wildlife
- ! Effects of proposed and recommended terrestrial protection, mitigation or enhancement measures
- ! Effects of terrestrial measures that may conflict with other resources (such as recreation resources)

5. Threatened and Endangered Species (See "Hydropower Licensing and Endangered Species", Paper No. DPR-7, February 1993 for detailed instructions on preparing this section)

a. Affected Environment: Briefly discuss the following:

- ! Identify federally-listed or proposed threatened and endangered species, candidate species, and designated and proposed critical habitats present in the project area. Do not provide the specific locations of species or habitat components (for example, bald eagle nest trees or stands of endangered plants)
- ! Cite a letter or other document from the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), or both, dated or informally verified within 90 days of the DEA, that says which listed species and habitats (if any) may occur in areas affected by the project
- ! Briefly discuss for each species, as appropriate, the abundance, distribution, available habitat, and use of the area affected by the project for nesting, feeding, roosting, etc.

b. Environmental Impacts and Recommendations

If endangered or threatened species or critical habitat may occur in the project area, prepare a "biological assessment" of the impacts of the project with recommended alternatives, and proposed measures for these species. When an applicant has been designated to act as a non-federal representative for purposes of informal ESA consultation, staff should work closely with the applicant to see that their studies include information needed for the biological assessment. The biological assessment should be part of the DEA, but can be written and issued as a separate document and summarized in the DEA. The preparer should conclude either that the project is "not likely to adversely affect," or is "likely to adversely affect" the threatened or endangered species, or have "no effect" on listed species or designated critical habitat. For proposed species or critical habitat, you should conclude whether the project would jeopardize the continued existence of the proposed species or destroy or adversely modify proposed critical habitat.

As noted above, specific locations of the species or habitat components described should not be disclosed, as doing so may adversely affect the species.

6. Aesthetic Resources

a. Affected Environment: Briefly discuss the following:

- ! Visual and aesthetic character and quality of the project area (provide detail about the features that may be affected by constructing or operating the proposed project)
- ! Public's vantage point(s) for viewing natural features (for example, waterfalls, cascades) and project structures and the quality of this view
- ! Federal land management restrictions on development, if applicable (for example, standards outlined in Forest Service plans)

b. Environmental Impacts and Recommendations: Typical issues addressed in this section include:

- ! Visual and auditory effects of project-related construction and operation on aesthetic resources evaluated at key viewing areas
- ! Significance of aesthetic resources to surrounding communities (quantify public use if possible)
- ! Effects of proposed and recommended environmental measures (such as minimum flows over a scenic waterfall or spillway) on aesthetic resources

7. Cultural Resources

Section 106 of the National Historic Preservation Act requires the Commission to take into account the effect of licensing a hydropower project on any historic properties, and allow the Advisory Council on Historic Preservation (Advisory Council) a reasonable opportunity to comment on the proposed action. "Historic Properties" are defined as any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP). . If there would be an adverse effect on historic properties, the applicant should develop a management plan to seek to avoid or mitigate the effects. During development of the management plan, the applicant should consult with the Commission, the Advisory Council, the State Historic Preservation Office (SHPO), and any other consulting party that may be involved with the licensing process. In some cases, the management plan will be implemented by execution of a Programmatic Agreement which, would be signed by the Commission, Advisory Council, SHPO, and other consulting parties.

Other laws, such as the American Indian Religious Freedom Act or the Native American Graves Protection and Repatriation Act, may also apply when sacred areas or burials of Indian tribes have been identified. These and other cultural resources that possess religious or cultural significance to an Indian tribe can be considered as historic properties and treated through the Section 106 process if they meet the criteria for eligibility.

a. Affected Environment: Briefly discuss the following:

- ! Properties located within the project area that are listed or eligible for listing in the National Register of Historic Places (cite a State Historic Preservation Office letter that documents the National Register status of any properties)
- ! Results of applicant's archaeological, historical, and traditional cultural resource surveys
- ! Any special study arrangements made between the applicant and Indian tribes affected by the project to ensure confidentiality of privileged information or to restrict distribution of study results
- ! Description of area of potential effect including any Federal or tribal lands involved

b. Environmental Impacts and Recommendations: Typical issues addressed in this section include:

- ! Effects of constructing or operating the project on historic properties, including traditional cultural properties (if they are eligible).
- ! Effects of proposed and recommended environmental measures (such as the measures outlined in a management plan, programmatic agreement, or measures for recreational resources) on cultural resources
- ! Measures to be taken if sites are discovered during project operation

8. Recreation and Other Land and Water Uses

If you have many recreation issues, land use issues, or both, we suggest dividing these resources into two sections: (1) Recreation, (2) Other Land and Water Uses.

a. Affected Environment: Briefly discuss the following:

- ! Existing recreational uses of project lands and waters
- ! Estimated annual use in user days, visitor days, etc. (by activity if possible)
- ! Formal and informal public access to the project area, including the reservoir, bypassed reach, and tailwaters
- ! Type, number, and location of existing recreational facilities
- ! Importance of recreational opportunities and facilities to the public
- ! Recreational opportunities and facilities outside, but in the immediate vicinity of, the project impact area (if appropriate)
- ! Specially designated areas at or near the proposed project and the administering agency for the designation (for example, National Wild and Scenic rivers, state protected rivers, national trails, wilderness areas, Land and Water Conservation Fund Act lands)
- ! Existing uses of project lands, such as residential, farming, forestry, grazing, and

commercial use

- ! Non-power uses of project waters, such as irrigation, industrial, and municipal uses

b. Environmental Impacts and Recommendations: Typical issues addressed in this section include:

- ! Effects of constructing or operating the project and any alternatives to the proposed project on existing recreational opportunities and facilities (provide monetary value, if possible)
- ! Effects of proposed and recommended environmental measures (such as, recreational access, facilities, flows, safety measures, future recreational development or monitoring plans) on recreation resources
- ! Proposed and recommended measures to provide for the recreational needs of disabled persons
- ! Conflicts between competing uses and alternatives considered (such as, flows to increase fishery habitat vs. flows for whitewater boating)

9. Socioeconomics

Most EA's do not include a section on socioeconomics, because the kind of effects envisioned by the Commission's regulations typically only occur from major new construction - employment, population, housing, personal income, local government services, and local tax revenues. If the proposed action does involve major new construction or would have significant socioeconomic effects for other reasons you should include a socioeconomics section. Also, if a new license is for a major project or multiple projects in a river basin, and the EA is examining project retirement, you may want to discuss the impact of not issuing a new license on the local economy or tourism in the basin.

D. No-Action Alternative

This section describes the effects of implementing the no-action alternative on the environment and on energy production. Discuss the no-action alternative for your project. In relicensing cases, be sure to discuss any ongoing effects that would continue.

Example of the no-action alternative for an original license:

D. No-Action Alternative

Under the no-action alternative, the Angus Project would not be constructed. There would be no changes to the physical, biological, or cultural resources of the area and electrical generation from the project would not occur. The power that would have been developed from a renewable resource would have to be replaced from nonrenewable fuels. The noise and air quality impacts of the existing diesel fuel-fired generation system would continue unabated or at increased levels as the local electrical demand increased. The risk of spills of diesel fuels would likewise continue at current or increasing levels. The financial benefits to the residents of Old Harbor in the form of lower electrical rates and to AVEC in terms of project operating revenues would not be realized.

Example of the no-action alternative for a new license (relicense):

D. No-action Alternative

Under the no action alternative the project would continue to operate as it has in the past. None of the licensee's proposed measures would be required. Public access to project waters would continue to be very limited, and the benefits of the shoreline buffer zone and resource management plan would not be realized.

E. Comparison of the alternatives' resource effects

To summarize the proposed action, action alternatives, no action and effects of these alternatives on the resources, it can be very helpful to include a chart or matrix briefly listing the proposed action and alternatives for each resource. This will help the reader see how the alternatives affect each resource. The summary should consist of a short explanation of each alternative's effects on the resource. Quantify the effects, if possible (for example, a loss of 500 acres of wetlands under the applicant's proposal, and a loss of 275 acres under staff's proposal).

Example of a chart summarizing the resource effects of the alternatives .

| Resource | No Action Alternative | Proposed Action | Staff Recommended Alternative | Agency Alternative | Project Retirement Alternative |
|--|--|--|---|--|--|
| <i>Fisheries</i> | Continue to entrain fish at present rate of 100,000 annually | Estimated 60,000 entrained annually | Estimated 50,000 entrained annually | Estimated 35,000 entrained annually | No turbine related mortality to fish |
| <i>Wetlands</i> | No changes to wetlands | Reduce wetland habitat by 10% - loss of 100 acres | Loss of 50 acres of wetlands | Loss of 60 acres of wetlands | No change to existing wetlands unless dam were removed as a part of project retirement |
| <i>Threatened and Endangered Species</i> | No existing Bald Eagle management Plan | Bald Eagle Management Plan | Bald Eagle Management Plan with environmental education program | Bald Eagle Management Plan | No federal protection |
| <i>Cultural Resources</i> | Eligible sites protected under existing license | Cultural Resources Management Plan | Programmatic agreement | Cultural Resources Management Plan | Powerhouse and eligible sites wouldn't be protected under Section 106 of the Historic Preservation Act; the characteristics of the powerhouse that make it eligible may be altered, diminishing the value of the historic property |
| <i>Land Use</i> | 25 foot buffer zone around reservoir | 50 foot buffer zone around reservoir | 200 foot buffer zone plus land management plan | 300 foot buffer zone plus land management plan | Lands wouldn't be retained within a project boundary and therefore, wouldn't be afforded the protection under the license; no buffer zone and no land management plan |
| <i>Recreational Access</i> | 1 access point on the impoundment - estimated 300 user days | Two new facilities (impoundment, and tailwater)-- estimated 25% increase in visitor days | Three new facilities to increase access | One new facility at tailwaters | Recreation facilities associated with the project would be closed. Other facilities in the area may become crowded as users of the closed facilities seek other recreational opportunities. |

VI. DEVELOPMENTAL ANALYSIS

This section analyzes the economic benefits of the proposed action, the estimated costs of various alternatives, and environmental recommendations and their effect on project economics. By putting this discussion in its own section, it limits any new information you have to introduce in the comprehensive development section, which makes the basis for your balancing decisions clearer.

Evaluate the cost of each measure considered and give the total and annual levelized costs and net benefits of: (1) the existing conditions --the way the project operates now; (2) as proposed by the applicant (the proposed action); and (3) staff's recommended alternative, and (4) any other action alternatives.

This section typically has three parts: (1) power and economic benefits, (2) cost of environmental measures, and (3) effects on air pollution and any related environmental effects.

Estimate the value of the developmental resources--power generation, water supply, irrigation, navigation, and flood control--under each alternative considered. Provide the appropriate economic analysis for the proposed project.

For All projects (original, subsequent, and new licenses):

- ! Discuss economic benefits of the project or project capacity expansion.
- ! Discuss the costs of environmental measures. For those measures that reduce the amount of project power or the value of the project power, estimate the cost to replace these power benefits.

Cost studies for every application should include the cost of any environmental measures recommended by the applicant, the agencies, and other entities involved. Provide separate economic information for each recommended measure so that you can calculate the approximate cost of any reasonable combination of measures.

- ! Effects on air pollution and related environmental effects of using alternate power sources. Discuss the increase in pollution as a result of the environmental measures you considered that would reduce the project's generation.

Below, is an example of a developmental resources section for an EA on an application for a new license.

Alternative power value 75.00 mills/kWh ³

Based on this information, the existing project (without any new environmental measures) annually generates an average of 19,400 MWh of electricity; has an annual power value, based on the current cost of the alternative power source, of \$1,455,000; and costs \$561,000, annually to operate, resulting in a positive annual net benefit of about \$894,000 (or 46.1 mills/kWh). As described below, MHC's proposed measures would not change the amount of generation, but would increase the cost of operation (and, therefore, decrease the net benefits) by about \$23,900,⁴ annually, producing a positive net annual power benefit of about \$870,100 (or 44.9 mills/kWh).

The additional measures recommended by staff would increase the cost of operation by \$10,200, annually, reducing the total annual net benefits to \$859,900 (or 44.3 mills/kWh).

B. Cost of Environmental Measures

Most of the measures proposed or recommended by the applicant, agencies, and staff would affect project economics by requiring capital outlays for construction, equipment and studies, as well as annual operation and maintenance (O&M) costs. The following is a brief discussion and the estimated costs for the environmental measures we consider in this EA.

Water Quality Measures

The estimated capital costs and levelized annual costs for the recommended water quality measures are presented below in **Table 21**. The water temperature monitoring and modeling study was a recommendation resulting from a February 9, 2000 meeting in Chugwater to resolve inconsistencies with agency 10(j) recommendations and the FPA.

Instream Flows and Gaging

The current license conditions require a year round minimum continuous flow of 35 cfs through the project. MHC proposes to continue this minimum flow which provides a minimum flow in Copper Creek below the project of the 35-cfs project flow plus any flow in the bypassed reach. Flow in the bypassed reach consists of leakage flows from the Copper Basin Creek diversion dam and the Copper Lakes dam, and any incremental flow additions from the drainage area between the dams and the point where the tailrace returns the project flows to Copper Creek. Currently, none of these flows are gaged.

The 35-cfs project flow is ensured by controls placed on the wicket gate valve arm of one of the turbines. Based on a review of its operating records MHC reported that, most of the time, the actual minimum flow has been 45 cfs. ⁵ Based on this information, Fish and Game and NMFS are recommending a minimum flow of 47 cfs to ensure that existing minimum flows in Copper Creek downstream of the tailrace would be maintained over the term of a new license.

Table 21. Estimated capital costs and levelized annual costs of alternative water quality enhancement/mitigation measures.

³ Chugwater Hydro Machine Calibration and Ramping Rates, Municipal Hydro, November 1998.

⁴ Estimate includes costs associated with restoration of public access to Copper Lakes.

⁵ Chugwater Hydro Machine Calibration and Ramping Rates, Municipal Hydro, November 1998.

| Item | Recommending Entity | Cost Estimate | Levelized Annual Cost |
|--|---------------------------------------|---|-----------------------|
| Treat condensate and leakage from project turbines and other equipment prior to discharge | FWS Fish and Game MHC FS | see note ⁶ | see note ⁶ |
| Monitor water temperature of project leakage flows for one year prior to any proposed improvements to Copper Lakes dam during the next license period | MHC | Capital: \$3,800 O&M: \$1,400/yr | \$500 |
| Conduct a water temperature monitoring and modeling study to simulate project effects on water temperatures in the anadromous fish reach of Copper Creek. | Fish and Game FWS NMFS STAFF | Capital: \$50,000 | \$5,000 |

MHC says that, while they do not object to operating at 47 cfs under normal conditions, they oppose increasing the minimum flow required by the license because they have already made capital improvements to ensure the 35-cfs flow requirement would be met in the event of an upset causing the plant to go off line (August 13, 1999, letter to the Commission from Henry H. Ford, General Manager, MHC).

For our analysis we assume that there would be no additional cost for MHC to meet either the 35-cfs minimum flow currently required or, under normal operating conditions, the 47-cfs minimum flow recommended by the agencies. For MHC to ensure the continuation of a different minimum flow, including during project shutdown, would require changes that could be costly and would be unnecessary, if the objective is to maintain existing minimum flows. The staff-recommended alternative would require a minimum flow of 47-cfs except when the plant is tripped off-line by an emergency or when flow and storage conditions necessitate reducing the flow through the turbines to 35 cfs to avoid drawing the reservoir down too low. We assume the staff alternative would impose no additional costs or loss of power benefits.

Our analysis considers several alternatives proposed by MHC, the agencies and staff for monitoring flows. **Table 22** lists the alternatives and their estimated cost. At the February 9, 2000, section 10(j) meeting in Chugwater, the agencies agreed with the staff-recommended measure that would require MHC to consult with the agencies and prepare a detailed plan for flow monitoring. This plan would be subject to Commission approval prior to implementation.

Table 22. Estimated capital costs and levelized annual costs of stream flow gaging alternatives.

⁶This measure was completed in 1997; staff assumed that the O&M cost associated with this measure is included in the overall plant O&M cost.

| Item | Recommending Entity | Cost Estimate | Levelized Annual Cost |
|--|-------------------------------------|--|-----------------------|
| Monitor flow for 5 years immediately upstream of tailrace (not according to USGS specifications) | MHC Staff | Capital: \$15,000 O&M: \$4,500 | \$3,000 |
| Monitor leakage flow below Copper Lakes and Copper Basin diversion dam for 5 years | Fish and Game FS Staff | Capital: \$21,000 O&M: \$3,900 | \$3,300 |
| Install and maintain continuously recording devices which meet USGS specifications to monitor flows in the anadromous fish reaches of Copper Creek | MHC Fish and Game FS Staff | Capital: \$25,000 O&M: \$9,000/yr | \$11,300 |
| Install and maintain remote water level monitoring equipment at Copper Lake | MHC Fish and Game Staff | \$8,300 | \$800 |
| Develop a flow gaging and reservoir stage monitoring plan | Staff | \$5,000 | \$500 |

Ramping Rates

A detailed description of the ramping criteria recommended by the Fish and Game and FWS is presented in the aquatic resources section of this document. Based on the information on ramping project flows provided by MHC and Greystone, flow changes under normal conditions are within the agency-recommended limits except for Fish and Game's zero ramping recommendation for daylight hours during the period February 16 to May 31. MHC could not meet this requirement because of the need to adjust flows to maintain water supply pressures and avoid drawing down Fawn Lake too low, which results in sediment in the water supply. Complying with a zero ramping rate requirement could require the construction of new water treatment facilities, which MHC says would cost about \$20 million. The agencies agreed to the staff-recommended ramping rates at the February 9, 2000, Section 10(j) meeting.

The staff-recommended ramping rates are the same as the agencies' but would allow MHC to ramp at a rate of 1 inch per hour in daylight hours from February 16 to May 31 and would not affect total project generation or have an appreciable impact on power value.

To improve its ability to meet ramping rate limits and avoid water supply pressure and sediment problems, MHC proposes to add water level monitoring at Copper Lake with remote readout at the operations control center to help the operators avoid water supply problems and abrupt changes in flow. Fish and Game and staff both recommend this measure, which would cost about \$8,300 (see table 22).

Fish Habitat Enhancements

The fishery agencies identified four structural fish habitat enhancement measures: (1) removing or modifying the 5-foot falls located about 1,300 feet upstream from the tailrace to allow fish passage and use of habitat above the falls; (2) improving access to Copper Creek habitat which is restricted under some flow conditions by a non-project perched culvert through which the lower 300 feet of the creek flows before entering Copper Creek; (3) providing 2,000 square feet of structurally enhanced fish rearing habitat downstream of the project tailrace; and (4) extending the existing fish ladder further upstream to reduce fallback potential. Staff added a fifth measure: requiring MHC to conduct a study in consultation with the agencies to develop the conceptual design, estimated cost and feasibility for each of the agency-recommended measures and to submit the study to the Commission for approval prior to the implementation of any measures the Commission determines would be best adapted to a comprehensive plan for development of the Copper Creek watershed.

Without the results of a study such as that recommended by staff, there is little basis for estimating the cost or determining the feasibility of most of the agency-recommended habitat enhancement measures. We estimate the study could be completed at a cost of \$10,000. The following is a discussion of our preliminary cost estimates for the four measures recommended by the agencies.

Removing the 5-foot falls

For our economic analysis, we estimate that the Copper falls, which is located in a narrow rock gorge and created by a fallen tree behind which some large boulders have lodged, could be removed for \$5,000.

Access to Copper Creek

The lower 300 feet of Copper Creek flows through a 6-foot diameter corrugated metal pipe culvert beneath a city street and parking lot. The invert elevation of the culvert where it discharges into Copper Creek is higher than the water surface elevation of Copper Creek under some streamflow conditions. Under such conditions, fish access to Copper Creek habitat would be difficult, if not impossible. At the February 9, 2000, Section 10(j) meeting the agencies recommended that MHC only be required to provide access into the culvert, not through it. Modifications to improve fish access into the culvert, as recommended by the agencies, may cost as much as \$10,000 to implement. One possible solution would be to construct a grouted stone or concrete baffle in Copper Creek at the entrance to the culvert to submerge the pipe invert enough to allow fish to enter the pipe. Fish access to the pool created by this baffle would be designed into the baffle.

Fish rearing habitat

Our estimate of \$10,000 for providing 2,000 square feet of rearing habitat is based on anchoring boulders or heavy timber at selected sites in the stream channel. We assumed a total of 10 sites, providing 200 square feet per site and costing \$1,000 per site.

Extend fish ladder

The existing fish ladder located near the mouth of Copper Creek was constructed to help fish pass a steep cascade located at the head of the tidal portion of Copper Creek. The fish ladder was reportedly built prior to 1960. The need for extending the ladder, as recommended by Fish and Game, was not discussed or brought up by any of the agencies during NEPA scoping. Our estimate of \$25,000 is based on extending the existing reinforced concrete fish ladder an assumed distance of 50 feet along the right bank. **Table 23** summarizes the estimated capital costs and levelized annual costs of the structural fish habitat enhancement measures considered in this EA.

Table 23. Estimated capital costs and levelized annual costs of alternative fish habitat enhancements.

| Item | Recommending Entity | Estimated Cost | Levelized Annual Cost |
|---|---------------------------------------|----------------|-----------------------|
| Modify/remove Copper Falls | FWS NMFS Fish and Game STAFF | \$5,000 | \$500 |
| Improve fish access to Copper Creek culvert | FWS NMFS Fish and Game | \$10,000 | \$900 |
| Extend existing Copper Creek fish ladder | Fish and Game STAFF | \$25,000 | \$1,800 |
| Improve 2,000 square feet of salmonid rearing habitat below the tailrace | FWS NMFS STAFF | \$5,000 | \$500 |
| Hold annual project review meetings with resources agencies | Fish and Game STAFF | \$1,000 | \$1,000 |
| Provide \$15,000 for removing Copper Falls, improving fish rearing habitat in Copper Creek, and/or habitat/passage improvement in Copper Creek | MHC | \$15,000 | \$1,400 |
| Develop a plan for the conceptual design, estimated cost, and feasibility of removing Copper Falls, improving access to Copper Creek culvert, extending fish ladder, and improving 2,000 square feet of rearing habitat | STAFF | \$10,000 | \$900 |

Public Access to the Copper Lakes

MHC proposes to continue to restrict access to Copper Lakes. However, if MHC installs a filtration system for the domestic water supply, public access to the lakes could be restored. The costs of Copper Lakes fishery enhancement and recreation measures shown in **table 24** would be incurred only if public access to Copper Lakes is restored.

C. Pollution Abatement Benefits

Continuing operation of the Angus Project would benefit air quality and the environment because the need for fossil-fueled generation and the resulting pollutants would be avoided or minimized.

Table 24. Estimated capital costs and levelized annual costs of alternative Copper Lakes enhancement measures.

| Item | Recommending Entity | Cost Estimate | Levelized Annual Cost |
|---|-------------------------------------|---------------|-----------------------|
| If recreational access is allowed at Copper Lakes, conduct a study of the lakes' fishery and develop a lake fishery management plan | Fish and Game MHC FS STAFF | \$45,000 | \$4,100 |
| Reopen Copper Lakes to public recreation if water treatment facility is constructed | MHC STAFF | \$31,000 | \$2,800 |
| If MHC decides to add water treatment, allowing public access to Copper Lakes, it must conduct a study, develop and implement a plan for recreational use of the Copper Lakes | FS STAFF | unknown | unknown |

VII. COMPREHENSIVE DEVELOPMENT ANALYSIS

This section--sometimes called the "balancing" section--comes from Sections 4(e) and 10(a) of the FPA, which require the Commission to give equal consideration to all uses of the waterway on which a project is located. Your purpose in this section is to let everyone know which proposal you think provides the best use of developmental and non-developmental resources in the public interest --and why.

This section should spell out how you decided between the action alternatives--the applicant's proposal, other action alternatives or measures you considered such as agency recommendations, and the no-action alternative. You should base your conclusions for this section on the information provided in Sections V (Environmental Analysis) and VI (Developmental Analysis). Remember, in this section you should show the "bang for the buck"--that is, for the environmental measures you propose, you should get an appropriate level of resource benefits for the economic cost (See "Evaluating Relicensing Proposals at the Federal Energy Regulatory Commission", Paper No. DPR-2).

Compare the economic and environmental effects of adopting various combinations of environmental measures and development options considered in the DEA. Alternatives for complex proposals may contain a variety of minimum flows, trashrack and fish passage designs, whitewater releases, capacity expansions, etc. (a table may be useful to make a graphic comparison of costs). For applicants preparing the DEA, you should evaluate your proposal, the agencies' and others' alternatives (if they are a complete set of measures), and the no-action alternative at a minimum.

Below is an example of a Comprehensive Development section for an EA on an application for a new license.

VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When we review a proposed project, we equally 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 preferred option. We recommend this option because: (1) issuance of a new hydropower license by the Commission would allow MHC to operate the project as an economically beneficial and dependable source of electrical energy for its customers; (2) the 4.2-MW project would eliminate the need for an equivalent amount of fossil-fuel derived energy and capacity, which helps conserve these nonrenewable resources and limits atmospheric pollution; (3) the public benefits of this alternative would exceed those of the no-action alternative, and (4) the recommended measures would protect and enhance fish and wildlife resources; and would provide improved recreation opportunities at the project when the water supply protection restrictions are no longer required.

The following summarizes the environmental measures we recommend be included in any license the Commission issues for the Angus Project:

Measures proposed by MHC

- C Continue to operate and maintain the oily water separator installed in the powerhouse in 1997 to remove all oil from water before it is discharged into the project tailrace.
- C MHC would continue to manage the watershed to protect the water quality and would continue to operate Copper Lake to minimize turbidity to protect the water quality.
- C MHC would install remote water level monitoring equipment at Copper Lake to allow greater lead times for making flow ramping decisions which would in turn enable a decrease in ramping rates.
- C MHC would continue to provide 4.5-cfs flow to the Wild River Mountain Fish Hatchery.
- C Use of the Wild River Mountain Trail within the Copper River watershed would continue.
- C MHC would install weirs below both the Copper Lakes dam and the Copper Basin diversion to monitor the seepage that currently occurs from the Copper Lakes dam and the Copper Creek diversion and, if future repairs would reduce seepage, commits to maintain through some other means an amount of flow equal to the amount of the seepage flows measured during the first 2 years of seepage monitoring.
- C MHC would conduct flow monitoring for 5 years just upstream of the tailrace to measure seasonal variability of flows in the bypassed reach of Copper Creek.⁷ The gaging would not be conducted to USGS specifications, but would obtain similar results.
- C If public recreation access is opened to Copper Lakes, MHC would consult with Fish and Game

⁷ June 10, 1999, letter to David P. Boergers from Henry P. Ford, General Manager, Copper Public Utilities.

about conducting fish studies in Copper Lakes.

- C If MHC constructs a water treatment facility, MHC would consult with the FS about reopening the Copper Lakes watershed to public recreation.

Additional Measures Recommended by Staff

- Conduct a water temperature modeling study to identify the effect of project operations and facilities on water temperatures in Copper Creek downstream of the project tailrace
- Maintain a continuous minimum flow through the project of 47 cfs, except in the event of a plant power trip or for the purpose of protecting the water supply purposes of the project, when the flow may be reduced to 35 cfs.

- C Limit ramping rates to obtain the following maximum stage changes in Copper Creek downstream from the project tailrace:

| | |
|-----------------------|---|
| February 16 to May 31 | No ramping except that ramping up to 1 inch/hour would be permitted when needed to ensure adequate quantity and quality of water for domestic water supply; when flow ramping is needed for these purposes, MHC would notify a designated fishery agency representative that a flow change is required to allow the agencies to investigate aquatic resource-related impacts; 2 inches per hour maximum at night |
|-----------------------|---|

| | |
|------------------------|-------------------------|
| June 1 to September 15 | 1 inch per hour maximum |
|------------------------|-------------------------|

| | |
|-----------------------------|---------------------------|
| September 16 to February 15 | 2 inches per hour maximum |
|-----------------------------|---------------------------|

- C Develop and implement a plan to monitor project flows and ramping rates, in consultation with NMFS, FWS, FS, and Fish and Game.

- C Develop and implement a fisheries habitat enhancement plan showing the detailed design and feasibility of: (1) removing the 5-foot barrier on Copper Creek, (2) improving access to (but not passage through) the Copper Creek culvert, (3) enhancing 2,000 square feet of salmonid rearing habitat, and (4) extending the existing fish ladder on Copper Creek. The plan shall be developed , in consultation with NMFS, FWS, FS, and Fish and Game.

- C Adopt appropriate measures if any cultural resources are disturbed during future project operation and maintenance activities.

The following is a discussion of the basis for the additional staff-recommended measures.

Minimum Flow

The staff-recommended minimum flow of 47 cfs in Copper Creek downstream from the project tailrace with a minimum of 35 cfs during plant outages or if needed to protect the water supply purposes of the project, is designed to ensure that the current minimum flow regime is maintained. Currently, MHC tries to operate the project at a minimum flow of 47 cfs (even though the existing license only requires 35 cfs) because at lower flows the operating efficiency of the project turbines falls off. Allowing a minimum flow of 35 cfs during project outages and for the protection of water supply, would avoid the necessity of modifying the power plant's minimum flow turbine bypass system, and allow MHC to reduce the flows, as they do now, when needed to ensure an adequate and high quality water supply.

Although our recommendation is intended to maintain the existing minimum flow, and not as an enhancement of existing conditions, it would ensure that MHC does not change its operations to reduce the flows to 35 cfs on a regular basis. At the February 9, 2000, 10(j) meeting the agencies and staff agreed on this minimum flow recommendation. Other than the cost of monitoring (see below) to check compliance with minimum flow and ramping rate limits, MHC would incur no loss of power benefits nor would it be required to modify existing minimum flow bypass facilities or build costly water treatment facilities to comply with the new minimum flows. The new minimum flows would protect the fishery resources by ensuring that the minimum flows over the period of a new license remain at the normally higher level of 47 cfs and are not routinely reduced for long periods of time to the 35-cfs level allowed by the current license.

Ramping Rates

The staff-recommended ramping rates are the same as the ramping rates Fish and Game recommended before we issued the DEA except for the February 16 through May 31 (day time) period, when Fish and Game recommends no ramping and we recommend allowing MHC to ramp the flows up to a rate of 1 inch per hour, if needed for domestic water supply purposes.

Before the DEA was issued, FWS recommended downramping not exceed the rate of 30 cfs per hour, which is equivalent to an instream rate of about 1 inch per hour. The operating data MHC provided indicates that most of the time the project operates within this criteria, however, we don't believe there is a biological need to restrict ramping rates to less than Fish and Game's recommended 2 inches per hour February 16 to May 31 (nights), and September 16 to February 15 (day and night). Our recommended ramping rates provide adequate protection for the critical periods when juvenile fish may be impacted.

Eliminating MHC's ability to ramp project flows for municipal water supply quantity and quality control purposes could put MHC in the position of having to choose between violating a license condition, risking public health or constructing a water filtration plant at a cost of about \$20,000,000. The ramping rate issue was discussed at the February 9, 2000, 10(j) meeting and the agencies agreed to adopt our recommended ramping rates, which sets the target of zero ramping for the critical daytime period between February 16 and May 31, but allows MHC to ramp 1 inch per hour during this period, when needed to protect the water supply.

The staff-recommended ramping rates would not affect project generation or power value and would not require any new capital expenditures. MHC plans to add lake level monitoring with remote readout at the Chum operations control center for an estimated cost of \$8,300. This capability would improve MHC's ability to manage project flows to meet the required ramping rate limits. Limiting ramping rates to the recommended maximums would reduce the possibility of fish stranding, which has been reported to fishery agency representatives in the past. We conclude that any loss in operating flexibility caused by this measure would have minimal economic consequences and would provide valuable protection to the fishery resources over the term of a new license.

Monitoring Project Flows and Ramping Rates

In a June 10, 1999, letter commenting on agency recommendations for terms and conditions to include in a new license for the Copper Lakes Project, MHC agreed to install a stream gaging station to USGS standards on Copper Creek downstream of the project tailrace and to monitor Copper Creek flows upstream of the tailrace for a period of 5 years. MHC is currently monitoring seepage flows from Copper Lakes at several locations and has agreed to additional flow monitoring to establish a baseline for leakage from the Copper Creek diversion. The agencies' flow monitoring recommendations include specific requirements that may differ somewhat from what MHC is proposing and other agencies are recommending. We are, therefore, recommending that MHC develop a plan, in consultation with Fish and Game, FS, FWS and NMFS, for monitoring project flows and reservoir water surface elevations for approval by the Commission prior to implementation. We estimate the plan would cost MHC \$5,000

or, about \$500 per year over the 30-year period of analysis. The potential savings from a well designed monitoring plan is worth this cost.

Fisheries Habitat Enhancement

The staff recommends that MHC consult with the agencies and develop a plan for implementing stream habitat enhancements. We recommend that MHC include, at a minimum, the following measures in the plan: 1) remove the 5-foot-high barrier on Copper Creek; 2) modify the existing fish ladder on Copper Creek; 3) improve 2,000 square feet of salmonid rearing habitat in Copper Creek below the tailrace; and 4) improve fish access to the culvert at the mouth of Copper Creek.

MHC proposes to provide funding of \$15,000 for the agencies to implement whatever stream habitat enhancement measures they choose. Based on our economic analysis, these four measures would cost about \$45,000, however, the exact cost cannot be determined until MHC develops final plans and feasibility studies. We recommend that MHC prepare the plan, in consultation with Fish and Game, FWS, NMFS and FS, and give the resource agencies the opportunity to comment on the plan before filing it with the Commission for final approval. Our estimated cost for preparing the fish habitat improvement plan is \$10,000.

The total estimated cost, including implementation, for the staff-recommended fishery habitat enhancements is \$55,000 (equivalent to a levelized annual cost of about \$5,500 over the 30-year period of analysis). We believe the habitat enhancements created by this recommendation would substantially improve the existing conditions for the important Copper Creek anadromous fish population. Removing the 5-foot Copper Falls in the Copper Creek bypassed reach would open up 1,855 feet of stream with relatively good spawning and rearing habitat despite the reduced flows. Likewise, improving the access to Copper Creek, which was historically considered an important salmon spawning area, would allow more fish to access this tributary habitat. Improving 2,000 square feet of rearing habitat and extending the existing fish ladder at the cascade located where Copper Creek drops into the area of tidal influence near the mouth of the creek, may, also, contribute to improved conditions for the fishery, if these measures are found feasible by the staff-recommended study. The potential benefit of these measures would be worth the additional cost, which is \$40,000 more than MHC proposed to contribute for these measures.

Cultural Resource Protection

MHC is not proposing nor are we recommending any changes to project facilities. However, we recommend any new license contain provisions requiring MHC to take appropriate measures should any cultural resources be discovered or disturbed during future operations and maintenance at the project.

In conclusion, from our evaluation of the environmental effects and public benefits of the project, we find that licensing the Angus Project with our recommended environmental protection measures would best adapt the project to a comprehensive plan for the Copper River drainage basin.

Forest Service Requirements under section 4(e)

The FS' final preliminary 4(e) conditions are included as Appendix A.

VIII. FISH AND WILDLIFE RECOMMENDATIONS

Section 10(j) of the FPA requires the Commission to:

- " Include license conditions for protection, mitigation, and enhancement of fish and wildlife resources based on the recommendations received pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) from the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and State fish and wildlife agencies [subsection 10(j)(1)]; unless the Commission determines that they are inconsistent with provisions of Part 1 of the FPA or other applicable law.

- " When the Commission believes any such recommendation is inconsistent with Part I of the Federal Power Act or other applicable law, attempt to resolve inconsistencies with the specified agencies giving due weight to the recommendations, expertise, and statutory responsibilities of the agencies [subsection 10(j)(2)].

The DEA should indicate whether you think the recommendation is a specific measure for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project [within the scope of 10(j), and if not, why not], and your preliminary call on whether the recommendations are or are not consistent with the FPA or other applicable law and should be adopted by the Commission. For those recommendations you do not propose to adopt, discuss in detail the reason for not adopting, and the basis for your recommendation, including why the measures you recommend will protect the resource.

Include a summary table as shown below. An example of a 10(j) section is also included below.

VIII. FISH AND WILDLIFE RECOMMENDATIONS

Under the provisions of the FPA, each hydroelectric license issued by the Commission shall 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.

Section 10(j) of the FPA states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the 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.

Table 4 lists the federal and state recommendations subject to Section 10(j), and whether the recommendations are adopted 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 and are addressed in the specific resource sections of this document.

We are making a preliminary determination that the portion of NMFS's section 10(j) recommendation regarding the location of the tailrace barrier at the project is inconsistent with the public interest standard of Section 4(e) and the comprehensive planning standard of Section 10(a) of the FPA, and consequently we do not recommend adopting this measure under the staff alternative. NMFS's recommendation is intended to prevent turbine injuries within the powerhouse and potential migration delays within the tailrace. We agree that a barrier is needed to keep fish out of the project turbines; however, we recommend that this structure be located at the draft tube opening, which would not exclude fish from the tailrace area and would not address NMFS's concern for migration delays. Fish and Wildlife suggested during scoping and we agree that the small size of the tailrace (approximately 30 feet long) makes significant migration delays unlikely. Additionally, MHC provided statements during scoping that suggest that the tailrace may serve as spawning habitat; therefore, exclusion of fish from this area could constitute a loss of habitat. Construction of a barrier to exclude fish from the tailrace would be costly (about \$10,000) because it would require construction of separate support structures and because it may require a special design so as not to diminish the values of the state designated wild and scenic river. Construction of new support structures for a barrier to exclude fish from the tailrace would result in the loss of some terrestrial and riparian habitat at the confluence of the tailrace and Copper River. Therefore, we conclude that NMFS's recommendation to install a barrier to exclude fish from the tailrace and prevent potential migration delays conflicts with the comprehensive planning and public interest standards of Sections 4(e) and 10(a) of the FPA.

In a letter dated July 17, 1998, we sought to resolve the apparent inconsistency between NMFS' recommendation for the tailrace barrier and the FPA. NMFS did not provide additional evidence or recommend other measures in response to the July 17, 1998, letter; therefore, we are not proposing any changes in the Commission staff recommended location of the tailrace barrier.

In a separate letter dated July 17, 1998, Commission staff sought clarification from Fish and Wildlife regarding the location of the tailrace barrier. In its response filed August 21, 1998, Fish and Wildlife indicated that it did not object to locating the tailrace barrier at the draft tube opening.

In the DEA, we did not adopt Fish and Wildlife's recommendation to require MHC to develop a mitigation plan because Fish and Wildlife did not specify what types of mitigation may be appropriate or provide evidence that mitigation in addition to the mitigation recommended by Commission staff would be needed. However, Commission staff held a meeting to resolve this disagreement regarding the need for a mitigation plan on October 21, 1998. Through this and a subsequent meeting at the project site, Fish and Wildlife developed a plan, in consultation with the applicant, for improving juvenile salmonid habitat and protecting water quality in the power canal. Fish and Wildlife submitted this plan to the Commission as an amended section 10(j) recommendation on December 9, 1998. Because Fish and

Wildlife has provided evidence that the plan would be beneficial and the plan itself specifies what actions should be taken, we recommend that the Commission adopt Fish and Wildlife's amended section 10(j) recommendation.

Table 4. Analysis of fish and wildlife agency recommendations.

| Recommendation | Agency | Within scope of 10(j) | Levelized Annual Cost (1998 \$) | Recommend Adopting? |
|---|----------------------------|-----------------------|---------------------------------|--|
| Install a screen and downstream bypass system. | NMFS and Fish and Wildlife | Yes | \$31,000 | Yes |
| Develop a final design plan for the downstream passage facility. | Fish and Wildlife | Yes | \$1,000 | Yes |
| Develop a written schedule and construction plan. | Fish and Wildlife | Yes | \$1,000 | Yes |
| Develop an evaluation plan and conduct an effectiveness study of the downstream passage facility. | Fish and Wildlife | Yes | \$1,000 | Yes |
| Develop an operation and maintenance plan for the downstream fish passage facility. | Fish and Wildlife | Yes | \$1,000 | Yes |
| Install a barrier to exclude fish from the turbine or conduct a study to determine if fish would be able to enter the turbine from the tailrace during operation. | Fish and Wildlife | Yes | \$2,000 | Yes |
| Install a barrier to exclude fish from entering the powerhouse and the tailrace. | NMFS | Yes | \$10,000 | No Recommend installing a barrier to exclude fish from the powerhouse but not the tailrace. |

| Recommendation | Agency | Within scope of 10(j) | Levelized Annual Cost (1998 \$) | Recommend Adopting? |
|---|----------------------------|---|---------------------------------|--|
| If MHC proposes to rebuild the diversion dam, he should consult with and gain approval from fishery agencies. | NMFS and Fish and Wildlife | No - not a specific measure to protect fish and wildlife. | None | No MHC is not proposing this action now. If proposed, the effects of the action would be reviewed at that time. |
| If MHC proposes to dredge sediments from the headgate area, he should consult with and gain approval from fishery agencies. | NMFS and Fish and Wildlife | No - not a specific measure to protect fish and wildlife. | None | No MHC is not proposing this action now. If proposed the effects of the action would be reviewed at that time. |
| Implement a plan to improve fish habitat and protect water quality in the power canal. | Fish and Wildlife | Yes | \$3,000 | Adopt |
| Commission should consider Wyoming's Fish and Wildlife Habitat Mitigation Policy under Section 10(j) of the FPA. | Fish and Wildlife | No - not a specific measure to protect fish and wildlife. | None | No Commission licenses set out federal requirements and do not incorporate specific state requirements. |

The draft and final NEPA documents issued by the Commission will include findings concerning whether the recommendations are within the scope of Section 10(j) and should or should not be adopted.

IX. CONSISTENCY WITH COMPREHENSIVE PLANS

Under 18 CFR, section 4.38(e)(6) and 16.8(e)(6), you must identify relevant comprehensive plans and explain how and why the proposed project would, would not, or should not comply with such plans. Section 10(a)(2)(A) of the Federal Power Act requires the Commission, before licensing, to consider each proposed project's consistency with relevant federal or state comprehensive plans for developing or conserving a waterway. Some examples of those plans include federal watershed management plans prepared by the U.S. Army Corps of Engineers; plans to protect waterfowl and unique ecosystems by the U.S. Fish and Wildlife Service; and land and resource management plans prepared by the U.S. Forest Service and Bureau of Land Management. State plans include: state comprehensive outdoor recreation plans, fish and wildlife plans, water quality, and river basin plans.

While consulting with the agencies about your project, ask them about relevant federal and state plans. We'll provide applicants with an updated list of plans that meet the requirements of 18 C.F.R. §2.19 so that you may discuss your project's consistency or inconsistency with relevant plans. If the project is inconsistent, you should evaluate mitigative measures to reduce the project's conflicts with the goals of the accepted plan. For inconsistencies that can't be adequately mitigated, the Commission may recommend an alternative project design or deny the license.

Example of a project that is consistent with Comprehensive Plans:

VIII. 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 or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Twelve comprehensive plans are currently on the Commission list for the State of Wyoming that address various resources in the state. Of these, we identified and reviewed one relevant to this project: Bridger-Teton National Forest Land and Resource Management Plan (USDA Forest Service 1990). No inconsistencies were found.

Note: If there are several relevant plans, list them in a footnote.

Example of an inconsistency with a Comprehensive Plan:

VIII. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving waterways affected by the project. We reviewed six Section 10 (a)(2)(A) comprehensive plans to determine whether the Angus Project would be consistent with their provisions:

- " Columbia River Basin Fish and Wildlife Program
- " Northwest Conservation and Electric Power Plan and Protected Area Amendments
- " Wyoming State Water Plan
- " Wyoming Fisheries Management Plan
- " Wyoming Water Quality Standards
- " Wyoming Outdoor Recreation Plan

Wyoming's State Water Plan: The State Water Plan (Plan) calls for equal consideration of the needs of fish, wildlife, and recreation, and requires maintenance or enhancement of environmental quality. However, the Plan also favors projects that promote economic development and encourage and promote uses of the state's water resources to meet the needs and wishes of the public. We determined that the Applicant's Proposal would be inconsistent with the Plan, because it would not sufficiently accommodate the needs of fish, wildlife, and recreation or maintain environmental quality. With staff-recommended supplemental measures, the project would more closely meet these and other concepts in the Plan such that the staff considers the Applicant's Proposal with Supplemental Measures to be consistent with the Plan. Similarly, the Upstream Alternative would provide sufficient accommodation of wildlife, fish, and recreation to be considered consistent.

Wyoming Fisheries Management Plan, 1986-1990: The overall goal of the Fisheries Management Plan is to maintain and improve the quality of fish habitat, especially cold-water habitat. The Applicant's Proposal is inconsistent with the Plan's goal to maintain and improve the quality of stream fish habitat, because it would reduce flow, increase water temperature, and result in the loss of 3.4 miles of river habitat. The fishery improvements under the Applicant's Proposal with Supplemental Measures would allow a greater consistency with the Plan than under the Applicant's Proposal. The project would remain inconsistent, however, due to adverse reservoir-related effects on free-flowing trout habitats. The Upstream Alternative would also be inconsistent due to the adverse reservoir effects on free-flowing trout habitat, although these effects would be minor because of the smaller reservoir, limited affected spawning habitat, and existing unfavorable temperature conditions.

In summary, the Upstream Alternative would be generally consistent with all but one of the relevant comprehensive plans (Wyoming Fisheries Management Plan). As discussed, the degree of inconsistency is minor. The Upstream Alternative would provide greater consistency with all plans than either the Applicant's Proposal or the Applicant's Proposal with Supplemental Measures. We conclude that the No-Action Alternative would not lead to inconsistencies with any of the relevant plans.

X. FINDING OF NO SIGNIFICANT IMPACT (OR SIGNIFICANT IMPACT)

In this section you'll say whether, based on the environmental analysis, the action (licensing the project) constitutes a major federal action significantly affecting the human environment. Include a summary of any unavoidable adverse impacts. If you conclude that there wouldn't be a significant impact, then state a finding of no significant impact and incorporate the environmental assessment by reference.

Example of a Finding of No Significant Impact (FONSI):

X. FINDING OF NO SIGNIFICANT IMPACT

Continuing to operate the Angus Project, with our recommended measures, involves no land-disturbing or land-clearing activities. Our recommended measures would ensure state water quality standards, ensure natural flow patterns below the project, and prevent potential dewatering of the impoundment shoreline and tailwater areas. Restoration of the river channel below the spillway and improvements to the canoe portage would cause minor, short-term increases in soil erosion and sedimentation. Project operation and the associated fish entrained through the project's turbines would result in some minor, long-term effects on resident fish in the Copper River. Maintaining the existing trashracks would continue to minimize these effects.

On the basis of our independent analysis, the issuance of a license for the Angus Project with our recommended environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

XI. LITERATURE CITED

In this section, you should cite all materials referenced in the EA: including final study reports, journal articles, other books, agency plans, and local government plans.

Example of Literature Cited Section:

XI. LITERATURE CITED

Federal Energy Regulatory Commission (FERC). 1999. Environmental Assessment for the Lockhart Hydroelectric Project

Federal Energy Regulatory Commission (FERC). 2000. Environmental Assessment for the Ketchikan Lakes Hydroelectric Project.

XII. LIST OF PREPARERS

Provide the name of each person who worked on the DEA, including: the section they prepared, current position, highest educational degree received, and field in which the degree was received.

Example of list of preparers:

Name -- EA Coordinator, Recreation and Land Use (Environmental Protection Specialist, M.S., Parks and Recreation).

Name -- Cultural Resources (B.A., Anthropology, Master of Public Administration).

Name -- Water Quality, Flows, and Fishery Resources (Fisheries Biologist, PhD, Fisheries Ecology).

Name -- Terrestrial Resources, Threatened and Endangered Species (Ecologist, M.S., Marine Estuarine Biology-Environmental Science).

Name -- Purpose and Need for Power, Developmental Resources (Electrical Engineer, B.S., Electrical Engineering).

General Guidance for Text and Graphics

- ! WordPerfect is the standard word processing software. Documents should be created in WordPerfect, not converted from other software. The Commission's current font standard is Times New Roman 13PT.
- ! Set margins at 1". Use left justification only. Do not use full justification (this includes footnotes). Do not use hard returns, except at the end of paragraphs.
- ! Use the tab key instead of the space bar for paragraph indentation and tabular material. Use indent when multiple lines are to be indented.
- ! Two spaces follow colons and periods. One space follows a semicolon or comma.
- ! Graphics should be digitized and embedded within the document file.
- ! Graphics should immediately follow the text they support--on the same page, if possible.
- ! Be sure to explain the most important feature(s) of the graphic in the accompanying text.
- ! Keep graphics simple. Use additional graphics or appendices to display large amounts of information.
- ! Make all project features, project boundaries, and land marks clearly visible on maps. To illustrate complex projects, use a schematic diagram.
- ! Make maps and figures large enough that they are legible. Text within graphics should not be less than 10 point.
- ! Be sure to include a north arrow in all maps, and indicate the direction of flow, if possible.
- ! Include reference scale lines on maps. Measurement conversions (1 inch = 2,000 feet) won't remain accurate if maps are reduced.
- ! Identify on your map all project and related features mentioned in the text of the EA.
- ! Always include a river basin map showing the project location and other hydro developments within the geographic scope of analysis.

General Guidance for Text and Graphics - continued

- ! WP 8.0 default for the footnote number is bolded superscript and indented (do not use the _/). The rest of the footnote is not indented.

 - ! In order to prevent single lines at the top and bottom of document pages, the Widow/orphan has been set as the default in WP8.0. Try to avoid using block protect because it can affect macros used by the Secretary's office to issue the final document.
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