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August 1, 1984

ISSUE PAPER HYDROELECTRIC ASSESSMENT STUDY

ISSUE: Should the Council approve the proposal for a hydroelectric assessment study described in Attachments 1 and 2 as the basis on which the Council will designate protected areas, rank hydroelectric sites (including an interim ranking) and develop a hydropower supply curve?

INTRODUCTION

This attached issue paper describes a proposal for a hydroelectric assessment study which would help the Northwest Power Planning Council accomplish three objectives under its Columbia River Basin Fish and Wildlife Program and Northwest Conservation and Electric Power Plan. First, the study would provide information to help the Council designate areas to be protected from hydroelectric development in the Columbia River Basin. Second, it would provide the Council with information to be used in the hydropower site ranking process described in the Power Plan. Third, it would provide the information on environmentally-sound hydroelectric sites which the Council needs to improve the "hydropower supply curve" it uses in its Power Plan to project the amount of hydropower likely to be available to the region in the future. In each case the Council would consider information from this study of environmental values along with information on hydropower potential provided by other studies before making its decisions on protected areas, site ranking, and hydropower supply.

The hydroelectric assessment study proposal is based on the work of the Council's Hydropower Assessment Steering Committee (HASC) and Rivers Assessment Task Force (RATF) with the assistance of the Council staff and the National Park Service. HASC is composed of 16 members representing states, federal agencies, developers, utilities, and Indian tribes and has been meeting twice monthly since October 1983 to work on this proposal. RATF is composed of 19 members representing local governments as well as the aforementioned groups and has been meeting since May. Both groups meet in public and already have heard extensive public comments on their work.

The study proposal is outlined and analyzed in the issue paper and described in detail in Attachments 1 and 2. The proposed budget and schedule for the proposed study also are included. Major alternatives to the proposal are described as well.

The Council will accept written comments on the issue paper through 5 p.m. Tuesday, August 14. Comments should be addressed to Peter Paquet, Manager,

Project Operations and Development, at 700 S. W. Taylor Street, Suite 200, Portland, Oregon 97205. Oral comments will be taken at the Council meeting on August 9 in Kalispell, Montana and at the HASC/RATF meeting at 9 a.m. on August 14 in Portland, Oregon. The Council staff will review the comments and recommend a Council decision on the study proposal at the Council's August 29-30 meeting in Portland.

BACKGROUND

It is important for the Council to develop an overall approach to assess the hydropower potential of the region and to ensure that its development will be consistent with the Council's responsibility to protect, mitigate and enhance the fish and wildlife resources of the Columbia River Basin.

Measure 1204(c)(1) of the Council's Fish and Wildlife Program calls on Bonneville, upon approval by the Council, to conduct a study which will provide the basis for designating certain streams and wildlife habitat in the Columbia River Basin to be protected from future hydroelectric development. Based on the results of that study, the Council, pursuant to Measure 1204(c)(2) of the program, will designate such protected areas. Action item 14.2 of the Council's Northwest Conservation and Electric Power Plan states that the Council will design a study to identify and rank potential hydropower sites throughout the region based on fish and wildlife concerns. Action item 14.3 calls on the Council to continue its efforts to refine the data base on existing and potential hydropower sites that are environmentally sound and cost effective. The HASC was established by the Council to advise the Council on the coordination of these actions.

In April and May of this year, the Council staff presented to the Council a draft prospectus for carrying out a Northwest rivers assessment study. As a result of these presentations, the Council authorized the formation of the Rivers Assessment Task Force (RATF) and directed it to help develop a work plan for a river assessment study that would meet the Council's needs for supply curve estimates, site ranking and protected area designation.

Over the last two months the RATF, in consultation with the HASC, has identified various steps and options likely to be necessary to meet the Council's needs as defined in the Fish and Wildlife Program and the Power Plan. This issue paper provides a synthesis of these steps and options.

BUDGET/ECONOMIC IMPACTS

The proposed maximum cost of this study is \$1.2 million. Of that amount, \$243,000 is expected to come from FY 1984 Council funds already for hydro assessment studies. The remainder would come from Bonneville funds that have been budgeted for a protected areas study and for supply curve estimates. A breakdown of expenditures is included in Attachment 1.

ANALYSIS

The policy issues that need Council action at this time to initiate the hydroelectric assessment studies are described below.

A. Protected Area Designation and Site Ranking.

For anadromous fish, the proposed study would characterize stream reaches on the basis of their productivity and their significance to tribal entities. The data for this characterization would be provided by the fish and wildlife agencies and tribes. HASC would help ensure consistency of the data. Once productivity has been established, the Council staff would review the data and prepare recommendations to the Council on alternative uses of that data to establish "break points" for designating protected areas and for ranking hydropower sites among the three categories specified in the Power Plan.

For resident fish and wildlife the process described below under "Hydro Supply Curve" would be used to provide the data which again would allow the Council staff to recommend alternative "break points" for protected areas and site ranking.

Alternatives to characterizing the value of rivers to anadromous fish based on productivity include:

1. Making the policy decision now that until past damage by the hydro system is corrected, no new hydro should be developed on streams with anadromous fish, either currently or potentially. The advantage of this approach is that it ensures that no means for protecting, mitigating, or enhancing the anadromous fisheries of the Columbia River Basin would be foreclosed by new hydrodevelopment. This kind of decision would preclude essentially any new hydroelectric development on the Columbia River and its tributaries for an indefinite period of time. It is conceivable that nothing ever could be developed if past damage by the hydro system cannot be corrected. Following this approach, no recognition would be given to specific project types, some of which may have no impact or positive impacts on fish and wildlife.

2. Adopting criteria for Categories I, II, and III, as proposed or as modified, then allowing fish and wildlife agencies and tribes to apply the criteria. This alternative would provide a rapid method for categorizing proposed projects. However, it would be difficult to develop criteria for Category II sites (sites which have significant impacts on fish and wildlife that can be mitigated) without having some sort of review process for evaluating individual projects.

3. Asking the fish and wildlife agencies to use their judgment as to the significance of each stream reach for anadromous fish. This alternative is analogous to the process used by the fish and wildlife agencies and tribes in making their original recommendations to the Council for protected areas in the Columbia Basin. It has the advantage of being rapid and inexpensive, but it could result in nonuniform recommendations which would not be based on common criteria.

B. Interim Report on Project Ranking.

The above action will not be completed for a year or more. In the interim, the Federal Energy Regulatory Commission (FERC) and developers will be making decisions on new hydro projects. Some of these decisions may foreclose further

Council action, particularly for anadromous and migratory resident fish where a project may have an impact beyond its immediate area. Therefore, it may be useful for the Council to make an interim statement on new hydro.

There is disagreement about how interim ranking should be accomplished. Originally the HASC tried to reach consensus on criteria which would further distinguish between sites which have insignificant impacts (Category I) and those that have significant impacts (Category III). Attachment 2 lists criteria based on proposals by HASC members. The difficulty with Attachment 2 is largely that Category III is imprecise as to what levels of habitat loss or downstream migrant loss is acceptable.

As an alternative, the Pacific Northwest Utilities Conference Committee (PNUCC) suggested that fish and wildlife agencies and tribes apply the criteria listed in Attachment 2 to identify only those sites which are acceptable for development (Category I). It was implied that in the interim no Council statement would be made about non-Category I sites. Fish and wildlife agencies and tribes believed that this approach would be inequitable because, while sites were open for development, no commitment was made to BPA to protect sensitive habitat.

Another alternative, contained in the proposed study, would apply only the criteria for Category I sites listed in Attachment 2 to identify Category I sites, i.e., those hydro projects which the Council believes can be developed without further study of their impacts on anadromous and migratory resident fish. The proposed criteria are conservative in that they probably overprotect the anadromous and migratory resident fish resources. It is anticipated that the study described above would identify additional Category I sites.

The Council staff believes that simply identifying Category I sites alone on an interim basis may be insufficient without a statement about other stream reaches which contain anadromous or migratory resident fish. It recommends that the Council should state that development of Category I sites will not adversely affect anadromous and migratory resident fish. Development at other sites should not proceed until completion of the above study to identify protected areas and each site. The staff also proposes that at the time the Council adopts an interim ranking, it should also request that FERC provide an extension of preliminary permit and license applications until the Council completes its broader study. In addition, the staff believes the Council should state that the interim ranking will expire one year after adoption whether or not the broader study is completed.

ALTERNATIVES

1. No interim ranking. This is attractive because power and fish interests cannot reach agreement, and the Council otherwise would be placing itself between these groups to solve a problem which will have to be addressed with once again in one year at the end of the Hydroelectric Assessment Study. The argument against the no action alternative is that the Council will have existed for nearly five years before providing clear guidance for new hydro development.

2. Identify developable sites only. This approach may demonstrate to developers that some new hydro can be built. However, fish and wildlife interests are given no equivalent assurances that fish and wildlife resources will be protected.

3. Adopt but not apply criteria. The Council could adopt the proposed criteria and let others use them as a means of choosing suitable projects. However, other than Category I, criteria themselves are controversial; thus, greater consensus is not achieved. Further, each group could apply the criteria differently which would result in no clearer direction to FERC.

4. Ranking by fish and wildlife agencies and tribes of all sites into Categories I through III. The difficulty with this approach is that criteria are not agreed upon sufficiently to avoid widely varying judgments. Without unequivocal criteria, it would be difficult for agencies and tribes to allow hydro development on anadromous and migratory resident fish streams.

C. Hydro Supply Curve.

A realistic estimate of hydropower development will be developed by identifying the electrical capability and cost of all protected hydro projects in the Northwest (to be supplied by work currently underway by the Corps of Engineers, the Bonneville Power Administration, and the Council), then reducing this estimate by an amount consistent with the Council's designation of protected areas and site ranking. The estimate will be reduced further by actions of federal land managers (Bureau of Land Management and U. S. Forest Service), licensing agencies (federal, state and local), resource managers (fish and wildlife, historic and archeology, recreation, etc.), and the public. The purpose of this portion of the Hydroelectric Assessment Study would be to evaluate the impact of the decisions of these entities on hydro availability. The Council would use this information to obtain a realistic estimate of hydropower; it would not substitute its judgment for that of the other decisionmakers on whether a resource could be developed.

The process for collecting the views of the decisionmakers has three elements: (1) The states would compile, but not screen, the views of all the institutional decisionmakers; (2) Decisionmakers would be asked to respond in a way that allows interstate comparisons; and (3) The public would be asked to participate in Council hearings held jointly with the decisionmakers.

Step 1 envisions a state-managed approach. Two exceptions are proposed -- anadromous fish would be treated regionally. So would Indian cultural values. Because Indian cultural values are unique and sensitive, the staff believes they should be considered by direct arrangement with the Council.

Step 2 would ask each decisionmaker to identify the significance of each stream for several river values as is appropriate to the responsibility of each. River values to be considered would be institutional (e.g., Wild and Scenic Rivers), resident fish, wildlife, recreation, cultural (e.g., historic and archeological), and natural features. The net result of information from all decisionmakers would be one or more statements about the significance of each river value for each stream. From this data the Council can judge the likely impacts on hydro development.

Alternatives to this approach include:

1. Regional approach. An alternative to the state-managed approach (except for anadromous fish and Indian cultural values) would be a regional approach. The tribes and some federal agencies have indicated that they prefer this approach.

However, the staff believes that, except for anadromous fish and Indian cultural values, the other resources that are proposed for study are for the most part under control of the states, and therefore, the staff believes it is appropriate that the states make recommendations to the Council.

2. No action. This alternative appears to be unsatisfactory since the Council needs to address the role of new hydro, both in terms of fish and wildlife impacts and as a new energy resource.

3. Rely on the original recommendations of the fish and wildlife agencies and tribes for protected areas. The Council already rejected these recommendations based on the fact that they were incomplete and not based on a uniform approach.

4. Site-by-site approach. Following this alternative, the Council would undertake a detailed analysis of each proposed and potential hydro site identified in the Regional Data Base. This does not appear to be feasible due to the large number of sites (over 2,000) and the cost that would be involved.

D. Relationship to other Council studies.

The Council has called for a "goals" study (Program Section 201) and a cumulative impact study (Section 1204). Neither of these studies has been initiated, so it is not possible to ensure that the Hydroelectric Assessment Study is consistent. However, the Hydroelectric Assessment Study has been designed so that it stands independent of whether these other studies proceed and so that it can be adjusted to be compatible with a range of possible approaches to these other studies.

Attachment 1.

PROPOSED WORK PLAN
PACIFIC NORTHWEST HYDRO ASSESSMENT STUDY

PREPARED BY
THE NORTHWEST POWER PLANNING COUNCIL
700 S. W. Taylor
PORTLAND, OREGON 97205

AUGUST 1984

Note: This proposed work plan describes the general framework of the study. A more detailed work statement (identifying all specific work products and deadlines, for example) will be prepared to aid contracting. The work statement will be consistent with the work plan.

PACIFIC NORTHWEST HYDRO ASSESSMENT STUDY

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Attachments

Montana Department of Fish, Wildlife and Parks Procedures for Classifying Montana Streams, Spring 1980

Application of Wildlife Values to Montana's Stream Classification System.

I. INTRODUCTION

The Pacific Northwest Hydro Assessment Study will develop data from which the Northwest Power Planning Council will address new hydroelectric development in the region. The Council plans to determine how much cost-effective hydro is realistic within the region for the purpose of preparing its power plan. Additionally, the Council plans to specify whether hydro sites would be consistent with the Council's efforts to protect, mitigate and enhance fish and wildlife in the region. Council preparation of a power plan and a fish and wildlife program are required by the Northwest Electric Power and Conservation Planning Act of 1980.

In its initial consideration of hydro availability, the Council was presented with estimates from 400 Mw to 4000 Mw. This study will help provide a more factual basis for estimating hydro availability but it will not answer all questions. This study does not review hydro sites with the same rigor as will be done in the licensing process. It does attempt to anticipate the results of the licensing process through use of relatively simple surrogate techniques. This work is done in a way that future work can build on it if such a need is identified.

The Hydro Assessment Study would provide the Council with information to aid in:

- determination of the theoretical potential of hydro and its cost by characterization of both proposed and potential sites (work by the Corps of Engineers, BPA and the Council is currently underway).
- ranking of hydro sites and designation of areas which should be protected from development based on fish and wildlife concerns (see Section II).

-an interim ranking of hydro sites based on anadromous and migratory fish concerns (see Section III).

-determination of how river values (fish, wildlife, recreation, cultural, natural features and institutions) will affect hydro development (see Section IV).

The Hydro Assessment Study will consider all rivers and streams at least as far upstream to include all hydro sites which have been proposed or that are potential as identified by the Corps of Engineers and tributaries as necessary to characterize their relative significance to river values.

The duration of the study is less than 15 months and will cost less than \$1.2 million (see Sections VII and VIII, respectively).

II. SITE RANKING AND PROTECTED AREAS (ANADROMOUS FISH ASSESSMENT)

A. Purpose. The Council is required to develop a program to protect, mitigate and enhance fish and wildlife affected by hydropower facilities in the Columbia River Basin (Section 4(h) of the Regional Power Act). New hydroelectric development has the potential to adversely affect fish and wildlife by impeding migration or loss of habitat and may be beneficial by improving flows or water temperatures. Consequently, new hydro will have a spectrum of impacts -- some will be more or less desirable than others.

In its 1982 Columbia River Basin Fish and Wildlife Program, the Council committed to designate stream reaches and wildlife habitat areas which shall be protected from further hydroelectric development (Section 1204(c)(2)). In its 1983 Northwest Conservation and Electric Power Plan, the Council committed to ranking hydro sites in three categories based on their likely

impacts on fish and wildlife (Action Item 14.2). The purpose of this effort is to provide the data needed to fulfill these commitments.

B. Concept. The best method to rank hydro sites and to designate protected areas would be to design a hydro project for each stream reach, evaluate its impact on fish and wildlife as would be done in the licensing process, then rank and designate site based on the degree of impact. Such an effort would be expensive. Consequently, the Council has selected a less costly surrogate. The Council will make its decisions based on an estimate of the fish and wildlife resource values for each stream reach. The impacts of hydro development are assumed to be uniform from site to site.

For anadromous fish the assessment will estimate the resource value by characterizing the productivity of each stream reach. Productivity is defined to be comprised of three factors: smolt production, migration use and upstream geography which may, through sedimentation, affect downstream anadromous fish areas. This study will quantify the smolt productivity of each stream reach. Migration will be accounted for by including in any estimate of smolt production for an individual stream reach upstream productivity as well, i.e., the productivity will accumulate as one moves down a stream. Stream reaches upstream of anadromous fish areas which have the potential to adversely affect downstream use will be identified quantitatively.

For resident fish and wildlife, the Council will rely on state estimates of the value of stream reaches as identified in the River Assessment Study for non-Anadromous Fish Values (See Section IV).

C. Method. This subsection identifies the method for quantifying productivity of stream reaches which may support anadromous fish. The following data will be provided:

1. Estimate the amount of existing productivity for each stream reach
 - a. species
 - b. number of smolts
 - c. wild or natural fish

2. Estimate the amount of potential productivity for each stream reach
 - a. identify how much the existing levels identified in Step 1 could be increased;
 - b. identify what actions are needed to achieve these higher levels.

The existing productivity is an observable fact. However, data may not be on hand. During the study process decisions will be made as to what techniques should be used to estimate missing data and to collect such data within the constraints of the budget and schedule.

The potential productivity of each stream reach and each species will be calculated in number of smolts (migrants) that could be produced at full seeding. It will be based on estimated rearing area and average production values (per unit area) determined from existing information sources. This measure of maximum natural smolt production is designed to quantify each system's maximum carrying capacity or smolt production potential if limiting factors, other than those inherent in calculation or average production values, were removed. Subsequently, those other limiting factors will be considered. The productivity will be estimated by the following steps:

Step 1. Review existing literature on salmon/steelhead smolt production per unit area. Identify the habitat characteristics and limiting factors in operation for each applicable study and develop a format for correlating habitat characterization and species with

average production values. Habitat characterization should be generalized and based only on the most critical elements of productivity as determined by the HASC.

Step 2. Compare the above attributes from relevant productivity studies to habitat classification for each basin and species (Step 5), and to the extent possible, determine the productivity value(s) that apply to each basin or subbasin and species.

Step 3. Review the literature and consult the involved fisheries entities and land management agencies to determine the most appropriate unit of measurement for quantification of rearing habitat. It should lend itself readily to the application of production factors previously identified.

Step 4. Survey the involved fisheries entities and determine the appropriate species for consideration in each river basin or appropriate subbasin.

Step 5. Survey all appropriate fisheries entities and land management agencies for existing habitat inventory data. Review the available data and determine the most appropriate method(s) for estimating and displaying the quantity and classification of rearing area quality between and within river basins or subbasins. Implement the methodology determined above and/or use maps, aerial photographs, and flow records in conjunction with local fisheries personnel (where other more specific information is not available) to estimate the size and classify the relative habitat quality of rearing area for each basin and for each appropriate species. The following are the only areas not to be considered in measuring rearing habitat: the areas upstream from Chief Joseph, Hells Canyon, Dworshak, Round Butte, Lookout Point, Detroit, Mossyrock, Merwin, Tieton, Bumping and McKay Dams and the habitat currently inundated by operational hydroelectric dams. Areas above upstream passage blocks should be included and optimum flows should be used

in calculating the rearing capacity of over-appropriated streams. Limiting factors are itemized and will be used elsewhere to rationalize the maximum potential obtained in this section of the study. Other innate constraints to production potential (e.g. summer-winter flows; stream geomorphology, etc.) should be identified and addressed for each basin or appropriate subbasin, and incorporated into the assessment of rearing area.

Step 6. Develop a numerical estimate of maximum smolt production potential for each river basin and applicable species using the data generated on quantity and quality of rearing area and smolt production per unit of area.

Step 7. Productivity estimations resulting from the above steps will provide a maximum migrant output number for each basin and stock. This number will be generated without considering factors limiting production which were not considered during the studies on unit area productivity. Consideration of factors which could prevent realization of the potential (limiting factors) is essential and will be provided.

Step 7a. For non-quantifiable limiting factors shown below, an empirical method for determining the relative influence of limiting factors will be developed by the HASC. Since there is insufficient information on direct fish loss resulting from non-quantifiable limiting factors, the relative magnitude of the effect of each factor will be defined in general terms from worst to least.

I. Quantifiable Limiting Factors

A. Up and downstream passage problems:

1. dams (smolts and adults)
2. low water flow

3. irrigation water systems
 4. natural barriers (adult passage)
- B. Spawning escapement (natural and artificial production) problems
- C. Spawning area constraints

II. Non-Quantifiable Limiting Factors

A. Biological limiting factors:

1. fish disease
2. fish genetics
3. competition and predation

B. Man-induced limiting factors:

1. riparian habitat loss
2. streambed sedimentation - causes
3. pollution
4. irrigation water systems
5. streambed damage

Step 7b. For quantifiable limiting factors criteria will be established to assure that loss estimates are technically defensible and fully documented.

Step 7c. For each limiting factor the appropriate methods and/or procedures will be used from Steps 7a and 7b above to determine the effect. The limiting factors identified will be ranked from least to most important in terms of adverse production effect.

Step 7d. For each basin-specific limiting factor, information will be obtained to assess if the limiting factors will change in

the future and why.

Step 8. Factor in existing and potential hatchery productivity to the results of Steps 1 through 7.

III. INTERIM RANKING OF HYDRO PROJECTS

A. Purpose. New hydro projects are currently proposed for the Northwest. Some of these projects, if built, could foreclose the ability of the Council to achieve its goal of protecting, mitigating and enhancing fish and wildlife. It is the purpose of this effort to identify which projects in the licensing process or proposed for construction by the federal government could go forward without foreclosing Council opportunities.

B. Concept. The Hydro Assessment Steering Committee has identified a list of criteria for Category I sites, i.e, those projects which will have insignificant adverse impacts on anadromous and migratory fish. These groups believe that they can quickly identify projects within the Federal Energy Regulatory Commission (FERC) process and which are proposed by the federal government which will meet these criteria.

The Council will ask fish and wildlife the agencies and tribes to identify Category I projects currently in the FERC process and proposed by the federal government. The Council will consider these recommendations, adopt a list of Category I projects, then advise FERC that these projects could be licensed without interference with the Council's Columbia River Basin Fish and Wildlife Program and Appendix E of the Power Plan and conversely, that other sites have the potential to be inconsistent with the Fish and Wildlife Program and Appendix E and until a regional need for power exists, as identified in the Power Plan, or until completion of the Council's site ranking protected area designations these non-category I projects should not be licensed. further, the council intends to request that FERC allow extensions

to permit and license applications, pending completion of the Council's study. Moreover, the Council intends to do away with the interim ranking one year after adoption.

C. Method. The agencies and tribes will apply the attached criteria to the projects in the FERC process and proposed by the federal government and report to the Council via the HASC.

IV. HYDROPOWER SUPPLY CURVE

A. Purpose. The Council is required by the Regional Power Act to prepare a power plan which includes a forecast of power resources (Section 4(d) and (e)). In its 1983 Northwest Conservation and Electric Power Plan, the Council identified new hydroelectric power plants as the preferred source of new power following conservation. Estimates of the amount of cost-effective power available in the Northwest ranged from 400 to 4000 megawatts. The purpose of this study is to provide a reliable basis for future estimates of hydro availability.

B. Concept. A hydro supply curve (a graph showing the amount of new hydro available as a function of cost) will be developed by recognizing the various constraints which will reduce the theoretical hydro potential of the region. Constraints include Council actions necessary to "protect, mitigate and enhance" fish and wildlife in the region and actions by public, federal, state and local decision-makers.

The theoretical hydro potential of the region and its cost is currently being assessed by the Corps of Engineers and BPA with assistance from the Council through a contract with Ott Engineers. Council actions which will affect hydro will be determined as described in Section II. The degree to which other decision-makers may affect new hydro will be assessed as described in the following subsection. The Council staff will collect these three inputs and recommend to the Council an appropriate hydro supply curve.

The Council will not make value judgments on its own as to the significance of resources identified by state, federal and tribal decision-makers and their likelihood to result in negative decisions on hydro projects. The Council will not arbitrate differences among decision-makers. The Council is only interested in learning where others will resist hydro development so that the Council has an accurate estimate of the amount of available cost-effective hydropower. Decision-makers who may affect hydro development include licensing agencies (federal, state and local), those that may influence licensing agencies (public, tribes, and resource managers) and resource/land managers (federal and state).

The Council could obtain one level of understanding of decision-makers' influence on new hydro by simply compiling existing decisions. The decisions, called institutional constraints, are usually generic determinations which restrict hydro development. Examples could include federal wilderness designations, state and federal wild and scenic river designations or local zoning ordinances. These constraints need to be identified but further efforts are needed because the decision-makers many times do not take a prospective view. Consequently, decision-makers may impose further constraints at the time new hydro is actually proposed for consideration.

It is the Council's intent to anticipate the reaction of the decision-makers to new hydro by asking them to categorize stream reaches in terms of their significance for river values. River values include resident fish, wildlife, recreation, cultural values (e.g., historic and archeologic) and natural features (e.g., endangered and threatened plants). The information will be collected from the decision-makers by the four states except that Indian cultural and archeologic values will be assessed by the tribes.

C. Method. The objective of this portion of the River

Assessment Study is to identify the significance of stream reaches for several river values. Comparative assessment is the major feature of the process. The result is not rivers ranked in numerical order; rather, it is a clustering of stream reaches into general groups according to their significance. To ensure objectivity all streams are evaluated without regard to special development proposals. The process does not require collection of field data. The emphasis is on the use of existing information, expert evaluation and user and public input.

The method consists of the following steps:

1. Refine criteria to be used to categorize the importance of stream reaches for each river value. The following river values will be evaluated:

Resident Fish

- cold water
- warm water

Wildlife

- migratory birds
- resident birds
- big game
- furbearers
- small mammals
- endangered and threatened species (Federal and state)

Natural Features

- endangered and threatened plants
- unique plant communities and other recognized natural areas
- undeveloped segments
- free flowing segments
- scenic corridors
- sensitive riparian wetlands

-gorges, waterfalls, rapids, miscellaneous geologic features

Social/Cultural Features

- archaeological sites
- river related architectural sites
- miscellaneous heritage sites
- historic trails
- current Indian cultural use sites
- current public use sites

Recreation

- white water boating
- flat water boating
- river camping
- miscellaneous water based recreation

Institutional Constraints

- wild and scenic rivers
- wilderness areas
- research natural areas
- national parks
- unroaded areas

For each river value identified above the states will identify criteria by which data will be evaluated for significance. Both quantitative and qualitative criteria may be employed as appropriate. The terms highest significance, high significance, moderate significance, limited significance and no significance will be used to denote relative value. An effort will be made to standardize criteria among the states. The HASC will recommend the criteria. Each state will consider these recommendations in adapting the study methodology to meet individual state needs. Consistency among the states will be facilitated throughout the process by the HASC and BPA.

Unless the HASC develops recommended alternative criteria by November 1984 the following criteria will be used:

Wildlife - "Application of Wildlife Values to Montana's Stream Classification System." See attached.

Resident Fish - "Montana Department of Fish, Wildlife and Parks Procedure for Classifying Montana Streams", Spring 1980. See attached.

Other Values - "Maine Rivers Study", May 1982.

2. Evaluate the significance of each stream reach for each river value. The final result of the category assessment will be the identification of all river areas which should be recognized for possessing a particular fisheries, wildlife, natural, recreational, or cultural value and an identification of the relative significance of each area. The assessment should include the identification of facilities, such as roads and transmission lines, which would be needed to service any proposed hydro site on the stream reach under study.

3. Document the results of the evaluation. Results will be displayed in tabular form and also recorded on base maps at an appropriate scale for each river value. Where available and applicable, a scale of 1:24,000 will be used. The basis for the results will be recorded in narrative form for each river segment or segments. Maps of a scale suitable for public presentation will also be developed. Information regarding sensitive fish and wildlife, plants and archeological sites will be displayed in accordance with state and tribal policy and conservation of these resources.

Information obtained for all river values will be combined. All significant values associated with a given stream will be identified and all tributaries which contribute to these values

will be noted. A matrix format will be used as the mechanism for displaying this information. The matrix will identify the total number of values associated with each stream reach and will indicate the significance ratings.

4. Review Indian cultural and archeological values. Indian values will have an important impact on new hydro development. Tribes will be a full partner in the Anadromous Fish Assessment described in Sections II and III. Tribes will provide information in the River Assessment Study for Non-Anadromous Fish Study through the states (but not modified by the states) that will affect river values identified in steps 1, 2 and 3 above. Finally, the Council will request the tribes to present an independent assessment of how Indian cultural and archeological values would be affected by hydro development.

Historically, Indian values have been closely associated with rivers because they frequently lived adjacent to them. Their cultural and archeologic values will be uniquely affected by hydro development. Information as to how these values may be affected could be sensitive if religiously-based. Therefore, the Council will contract with a person acceptable to Tribal interests to work with the tribes of the Northwest to identify how Indian cultural and archeological values may be affected by new hydro.

The results of this assessment would be held confidential by the tribes for use of only the Council and its staff.

V. STUDY RECOMMENDATIONS AND PUBLIC INVOLVEMENT

Recommendations will be made to the Council by its staff for site ranking, protected areas and hydro supply curves. These recommendations will be made based on data collected from the Anadromous Fish Assessment, Indian Cultural and Archeologic Values assessment, River Assessment Study for Non-Anadromous Fish Values, and hydro supply and cost data from the Corps of Engineers, BPA and

Ott Engineers.

Upon receipt of recommendations from the staff, the Council will propose appropriate amendments to its Power Plan and Fish and Wildlife Program. These proposed amendments will be reviewed through the Council's usual public process including formal public hearings in each of the four states. Hearings in each state will be held jointly with the State Task Force.

The public will also have input in the development of the study data through attendance and participation at meetings of the HASC and State Task Forces. These meetings will be announced through a coordinated state-Council effort.

Once a hydro supply curve, site ranking and protected area designations have been adopted, changes can be proposed, considered and acted upon, based on new information in the context of the Council's routine amendments to its Plan and Program.

VI. ORGANIZATION

The Council's Hydropower Assessment Steering Committee (HASC) will review and make recommendations for the River Assessment Study. The HASC will periodically review participant progress at key milestones. If the HASC cannot reach a consensus on issues the Chairman will make policy decisions important to continuation of the study. BPA will coordinate the four state-level assessments with the HASC and will administer contracts with the participants.

The Indian Cultural and Archeological Values study will be performed by direct contract between the Council staff and a person acceptable to Tribal interests.

The Anadromous Fish Assessment will be managed by either Council staff or an individual anadromous fish coordinator. The role of this individual is to coordinate agreements, if possible,

between the various agencies and tribes on technical matters (methods and techniques) and facilitate collection, either directly or by subcontract, of needed data. Because BPA will be providing some funds for this effort, BPA will retain its statutory responsibilities for contract administration in accordance with existing agreements between BPA and the Council.

The River Assessment for Non-Anadromous Fish Values will be conducted at the state level by a task force under the leadership of a study coordinator. A regional coordinator for this portion of the study will assist the State Task Force. The study is designed to produce consistent results by use of common evaluation criteria (see subsection C1 above). The state task force will consist of state, federal and tribal authorities and will be comprised of technical experts with river resource expertise. The state task force should include cognizant state agencies, local jurisdictions to the extent it is possible and consistent with a local government jurisdiction over hydro within the state, National Marine Fisheries Service, U.S. Fish and Wildlife Service, BLM and USFS.

Figure 1 shows the regionwide organization and Figure 2 shows the state organization. The roles and responsibilities of each group are defined below.

FIGURE 1: Organization Chart: Regional Level

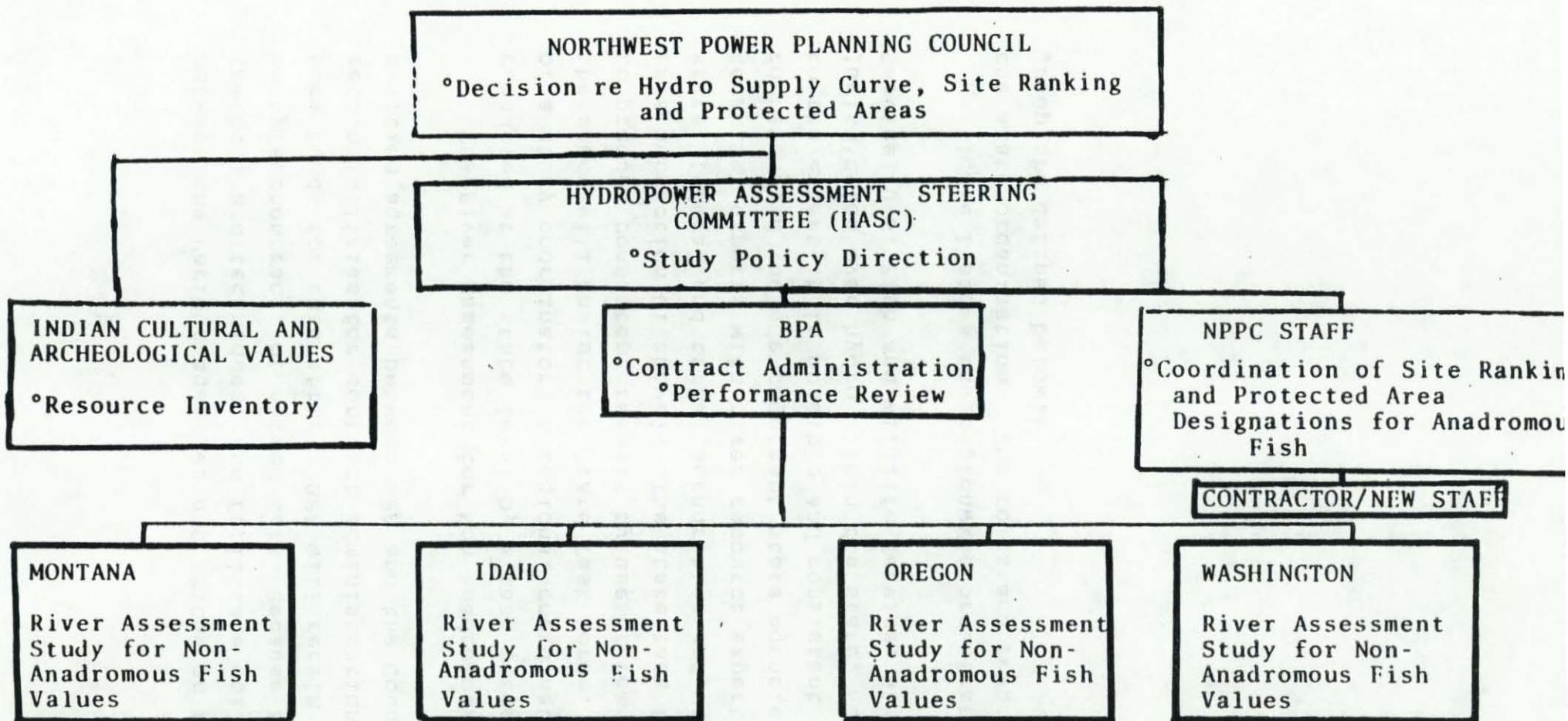
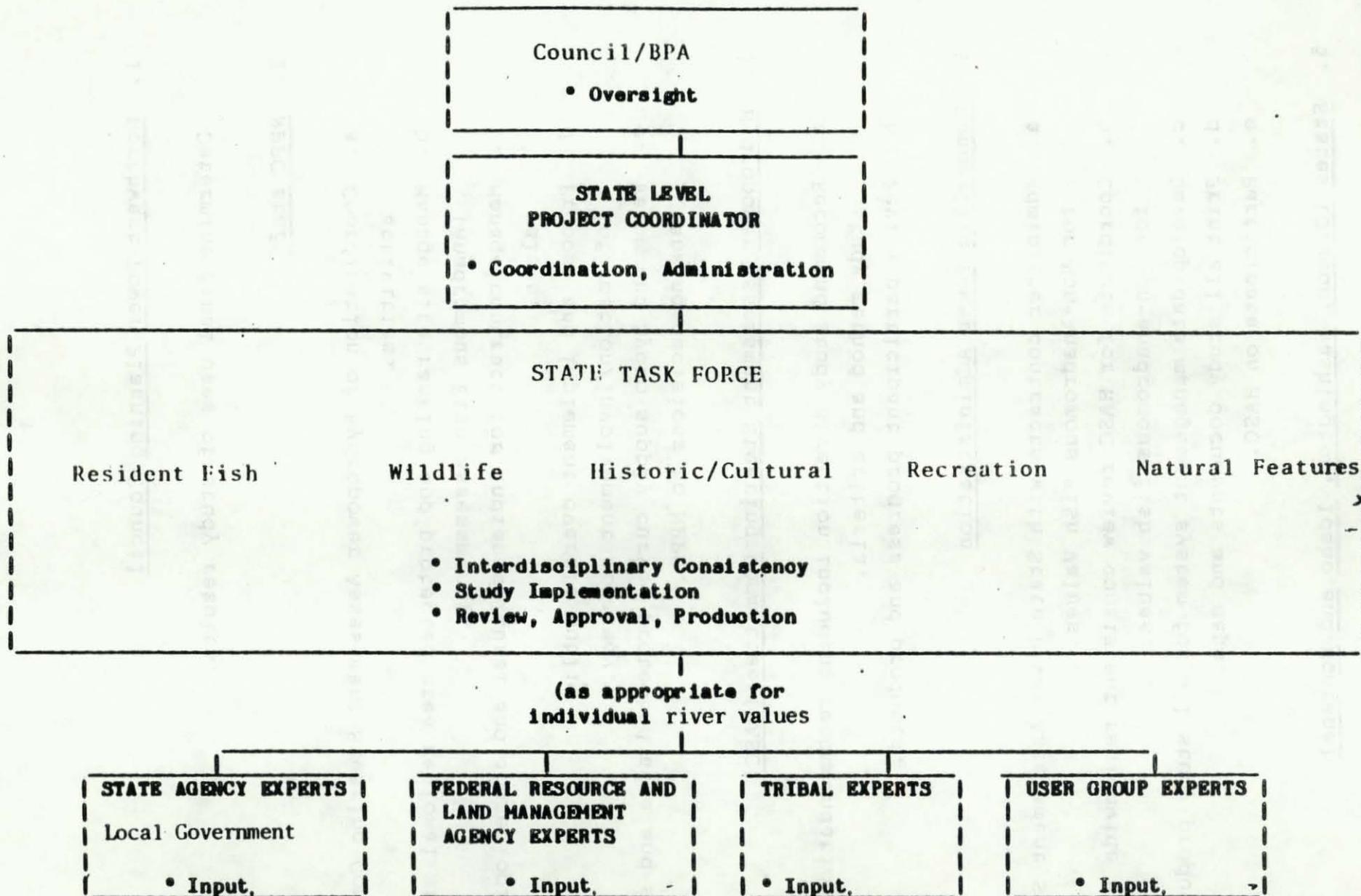


FIGURE 2 - ORGANIZATION CHART: STATE LEVEL



16A

State level study organizations will be designed to meet individual circumstances.

1. Northwest Power Planning Council

Determine final uses of study results.

2. NPPC staff

- a. Coordination of Hydropower Assessment Steering Committee activities.
- b. Manage site ranking and protected area regional studies (Anadromous Fish Assessment).
- c. Manage contract for Indian cultural and archeological values.
- d. Propose and implement overall public information/involvement strategy.
- e. Recommend hydro supply curve, protected area and site ranking decisions to NPPC.

3. Hydropower Assessment Steering Committee (HASC)

- a. Recommend study direction including recommendation on study method and criteria.
- b. Review participant progress and products.

4. Bonneville Power Administration

- a. Administer contracts with State River Assessment Studies for Non-Anadromous Fish Values.
- b. Coordinate for HASC review consistent regionwide criteria for non-anadromous fish values.
- c. Develop data management system for all study products
- d. Print all study documents and maps.
- e. Participate on HASC.

5. States (Oregon, Washington, Idaho and Montana)

- a. Perform River Assessment Study for Non-Anadromous Fish Values.
- b. Coordination of the study with HASC and BPA and federal resource/land management agencies, Indian tribes and local governments.
- c. Participate on HASC.
- d. Participate in site ranking and protected area designations (Anadromous Fish Assessment).
- e. Recommend interim site ranking to NPPC (fish and wildlife agencies).

6. Indian Tribes

- a. Perform assessment of Indian cultural and archeological values.
- b. Participate in site ranking and protected area designations (Anadromous Fish Assessment).
- c. Participate in state River Assessment Studies for Non-Anadromous Fish Values.
- d. Participate on HASC.
- e. Recommend interim site ranking to NPPC.

7. Federal Resource and Land Management Agencies (U.S. Fish and Wildlife, U.S. Forest Service, U.S. Bureau of Land Management, National Marine Fisheries Service, Corps of Engineers)

- a. Participate in site ranking and protected areas designations (Anadromous Fish Assessment).
- b. Participate in state River Assessment Study for Non-Anadromous Fish Values.
- c. Participate on HASC.

8. Pacific Northwest Utilities Conference Committee/Resource Developers

Participate on HASC

VII. SCHEDULE

The schedule for the River Assessment Study follows.

FIGURE 3

PACIFIC NORTHWEST RIVERS STUDY
SCHEDULE OF PRODUCTS

<u>TASK</u>	<u>RESPONSIBLE PARTIES</u>	<u>COMPLETION DATES</u>
1. Approve Work Plan	Council	August 29-30, 1984
2. Identify Rivers to be studied	NPPC Staff	Sept. 10, 1984
3. Designate State Coordinators	Council Members/ State Governors	Sept. 15, 1984
4. Completed Contracts	Council/BPA	Sept. 30, 1984
5. Select Anadromous Fish Assessment Coordinator	NPPC Staff	Sept 1984
6. Convene State Task Force	State Coordinator	Oct 1984
7. Adopt criteria for river values	BPA/State Task Force	Nov 1984
8. Prepare evaluation format and base maps for state use	BPA	Dec 1984
9. Interim ranking report	HASC/Agencies/Tribes	Jan 1985
10. Council Action on Interim ranking	Tribes	March 1985
11. Indian Cultural and Archeologic Assessment	Tribes	Oct-Mar 1985
12. Anadromous Fish Assessment	HASC/Coordinator/ Agencies/Tribes	Oct-June 1985
13. Perform River Resource Assessments	State Task Force	Jan-June 1985
14. Publish Results	BPA	July 1985
15. Computerize River Assessment	BPA	July 1985
16. Overlay Hydropower Sites	NPPC Staff	July 1985
17. Recommend Supply Curves	NPPC Staff	Aug 1985
18. Recommend Protected Area Designations	NPPC Staff	Aug 1985

VIII. BUDGET

A budget for the Hydropower Assessment Study follows. This is a maximum budget which will not be exceeded. It is anticipated that actual costs will be less.

BUDGET

<u>CONTRACT</u>	<u>CONTRACTOR</u>	<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>
Interim Site Ranking	Agencies/Tribes	--	No cost
Indian Cultural and Archeological Values	Individual	NWPPC	\$40,000 ¹
Anadromous Fish Assessment	NWPPC Staff or Individual Contract (Subcontracts with agencies and tribes as necessary to collect data)	NWPPC, supplemented by BPA as needed	500,000
River Assessment Study for Non-anadromous Fish Values	States ² (Oregon, Washington, Idaho, and Montana)	BPA	400,000
	Tribes		130,000
	Federal Agencies		130,000
			<u>\$1,200,000</u>

¹ This figure is based on the estimated time of one individual to coordinate this effort among more than 40 tribes and prepare reports. It is recommended by the Chairman of the HASC.

² Including local governments.

MONTANA DEPARTMENT OF FISH, WILDLIFE & PARKS

PROCEDURE FOR CLASSIFYING MONTANA STREAMS

SPRING 1980

GENERAL

Six value classes were established:

<u>Value Class</u>	<u>Class Definition</u>
1	Highest-value fishery resource
2	High priority fishery resource
3	Substantial fishery resource
4	Moderate fishery resource
5	Limited fishery resource
6	Not yet classified

Each stream reach was placed in a value class for each of the two criteria below. The final classification, the fishery resource value, was the higher class given for criterion 1 or 2. In accomplishing this, data for each stream reach were entered in a computer file and a computer program used to check the attributes and assign the class for each reach.

Criterion 1 - Habitat and Species Value of Stream Reach

The class of each reach was determined by a point system in which most points were awarded for important habitats of fishes of special concern (native fishes found in limited numbers and/or limited waters). Fewer points were awarded to less important habitats of fishes of special concern and for the occurrence of widespread species found in substantial numbers. Least points were awarded for occurrence of non-indigenous species considered of minimal value. Additional consideration was given streams that are important sources of trout recruitment. Points were also given for spring streams; esthetics (natural beauty); and for local community value where a stream, being one of few or the only one in the immediate area, is important to a community for scientific study, nature study, and/or recreation.

Criterion 2 - Sport Fishery Potential of Stream Reach

The class of each reach was based on a point system in which points were awarded for (1) fish abundance as indicated by biomass or numbers and sizes of game or sport fish, (2) ingress (legal rights of the public to fish the reach or willingness of landowner to permit fishing), (3) esthetics and (4) use by fishermen (fishing pressure).

A listing naming each stream reach, describing its upper and lower boundaries, and giving its classification is available, as is a detailed account of how each reach met the requirements of its class.

DETAILED PROCEDURE FOR ASSIGNING VALUE CLASSES

A. Procedure for Criterion 1 Habitat and Species Value of Stream Reach

I. Standards and Associated Points

<u>Points</u>	<u>1/</u>	<u>Standard</u>
15	I	Highest-valued habitat ^{2/} for a class A fish of special concern ^{3/}
10	II	High priority habitat for a class A fish of special concern OR Highest-valued habitat for a class B fish of special concern.
5	III	Substantial habitat for a class A fish of special concern. OR High priority habitat for a class B fish of special concern. OR Highest-valued habitat for a class C fish of special concern.
3	IVA	Substantial habitat for a class B fish of special concern. OR High priority habitat for a class C fish of special concern.
1.5	IVB	Substantial habitat for a class C fish of special concern.
.4	V	Limited habitat for any fish of special concern. OR Abundant ^{4/} population of: (1) native not fish of special concern ^{5/} or (2) non-native game or sport species ^{3/} .
.3	VIA	Common abundance of: (1) native not fish of special concern OR (2) non-native game or sport species.
.2	VIB	Same as VIA only abundance rating is uncommon or unknown.
.1	VII	Same as VIA only abundance is rated as rare, M (species absent might be present if habitat problem corrected) or E (species expected but not verified). OR Presence of any non-native non-sport species.
3	VIII	Esthetics rating is C or higher on a scale of A highest to E lowest ^{6/}
3	IX	Stream is one of few streams or only one in the immediate area and is important to community for scientific study, nature study and/or recreation.
3	X	Stream is a spring stream or spring creek.

^{1/} Points are awarded for each species meeting a standard.

^{2/} Habitat designations: highest-valued, high priority, substantial and limited are based on judgment decisions of fisheries biologists.

^{3/} See list of fishes of special concern in Appendix.

^{4/} See "Fish Abundance Ratings" in Appendix.

^{5/} See list of Montana fish species in Appendix.

^{6/} See explanations of esthetics ratings in Appendix.

II. Assignment of class

<u>Points</u>	<u>Habitat and Species Value Class</u>
15 or more	1
10 to less than 15	2
5 to less than 10	3
.3 to less than 5	4
Greater than zero to less than .3	5
0	6

Important streams for trout recruitment, including passage, are advanced one class but not higher than class 3.

NOTE: Unless fish are known to be present the stream reach is automatically in class 6.

B. Procedure for Criterion 2 - Sport Fishery Potential of Stream Reach

Component I. Fish Abundance - Award of Points and Assignment of Grade

a. Points for abundance of all trout species combined ^{1/}

<u>Biomass (Kg) per 300 m</u>	<u>Points</u>
70 and over	9
12 to less than 70	6.5
5 to less than 12	4
3.5 to less than 5	2
Greater than 0 to less than 3.5	1

If trout present but biomass unknown:

Each species with abundance A,B,C or D ^{2/} is assigned 1 point
 Each species with abundance U,V or Z is assigned .5 points

b. Points for abundance, class A non-trout game and sport fish for streams. ^{1/}

<u>Abundance Rating ^{2/}</u>	<u>Points</u>
A	2
B	3
C	1
D	2
U, V and Z	.5

NOTE: Maximum for mountain whitefish is 2 points.

c. Assignment of abundance grade

<u>Points (sum of points from a and b above)</u>	<u>Grade</u>
9 and over	4
6 to less than 9	3
3 to less than 6	2
Greater than 1 to less than 3	1
1 or less	0

Component II. Assignment of ingress grade

<u>Ingress rating ^{2/}</u>	<u>Grade</u>
1	4
2	3
3	3
4	2
5	1
6 and 7	0

^{1/} For species designations see list of Montana fishes in Appendix.
^{2/} See explanation or ratings in Appendix.

Component III. Assignment of Esthetics Grade

<u>Esthetics rating</u> ^{1/}	<u>Grade</u>
A	4
B	3
C	2
D	1
E	0

Component IV. Assignment of Use (Fishing Pressure) Grade

<u>Fisherman-days/10 km</u>	<u>Grade</u>
1250 and over	4
310 to less than 1250	3
65 to less than 310	2
Greater than 0 to less than 65	1
0 (none or unknown)	0

Computation of Sport Fishery Potential Score and Assignment of Class.

A. Score = Sum of (grade for each component x multiplier ^{2/}).

B. Assignment of Class

<u>Score</u>	<u>Conditions</u>	<u>Sport Fishery potential class</u>
1. 17 and over	Fish production based on natural reproduction. Trout with abundance B or D (large-sized) ^{3/} or paddlefish must be present. <u>and</u> ingress rating of 1, 2 or 3 <u>and</u> esthetics rating of A, B or C <u>and</u> overall use of 5000 or more ^{4/}	1
2. 17 and over	Ingress rating of 1, 2 or 3 and at least one condition in 1 above not met.	2
3. 17 and 18	Ingress rating of 4 to 7	3
4. 15 to less than 17	Ingress rating of 1, 2 or 3	2
5. 15 to less than 17	Ingress rating of 4 to 7	3
6. Greater than 11 to less than 15		3
7. Greater than 4 to 11		4
8. Greater than 0 to 4		5
9. 0		6

Note: If no fish are present stream reach is automatically in class 6.

^{1/} See explanation of ratings in Appendix.

^{2/} Multiplier for fish abundance is 2; for other components (ingress, esthetic and use) the multiplier is 1.

^{3/} See explanation of abundance ratings in Appendix.

^{4/} For the purpose of meeting the 5000 fisherman days (FMD) requirement, the stream segment may be a composite of adjoining reaches that meet all other conditions for class 1, provided each reach with less than 5000 FMD's is less than 6 km. long.

C. Assignment of Fishery Resource Value Class

The fishery resource value class is simply the higher class given for criterion 1 or 2 above.

APPENDIX

INGRESS RATING. As used here, ingress means the legal right to enter.

Code

- 1 - Stream section bordered almost entirely by public lands which insure ingress by anglers (exclude state school sections).
- 2 - A stream section bordered by a mix of private and public land where the public land is distributed in such a way that no significant portion of the stream is unavailable by vehicle and/or walking. Floating may also be a major means of access.
- 3 - A stream section bordered by mostly private land where ingress is uncontrolled or readily available by permission. This portion may be available by floating or through navigability laws. Also includes corporate lands - these are currently open but could go to individual ownership in the future or company policy regarding ingress could change.
- 4 - A stream section bordered mostly by private land where ingress is limited but some fishing is allowed. May include minor portions where public land or road crossing may provide limited ingress. The portion through private land may be available by floating or through navigability laws.
- 5 - A stream section bordered entirely by private land where public fishing is available for a fee or where a small group has leased exclusive rights. Legality may be in question on some streams but this category identifies the current "fee" or "lease" fishing areas.
- 6 - A stream section bordered mostly by private land where little or no ingress by permission is allowed. Floating precluded by stream size or other physical limitation (no road or public land to reach stream).
- 7 - A stream or stream segment bordered by public land that is unavailable because of posting on private land or locked gates on private roads.

FISH ABUNDANCE RATINGS. Abundance of fish refers only to adult fish, or in case game and sport fish to keeper size (7" minimum for trout; exception 6" minimum for trout populations which spawn when shorter than 7"). By nature abundance ratings are subjective. Since trout command the most interest of Montana fishes, the abundance ratings for all fishes were geared to trout. The abundance graph (Figure 1) is a guide to numbers associated with abundant, common, uncommon and rare. The ratings reflect the peak abundance during the year, e.g., when migratory spawners are present.

- A = Abundant
- B = Abundant with proportional number of large-sized fish (see appendix)
- C = Common
- D = Common with proportional number of large-sized fish (see appendix)
- U = Uncommon
- V = Uncommon with proportional number of large-sized fish (see appendix)
- R = Rare
- E = Presence not verified but expected
- H = Species absent but could be present if habitat problems corrected
- N = Not present
- P = Species absent, but might be present if introduced
(e.g. potential habitat in a barren stream)
- Z = Abundance unknown

Special codes entered in abundance column to indicate habitat value of reach for species of special concern.

G = Highest-valued

H = High priority

S = Substantial value

L = Limited value

CODES FOR FISHES' USE OF REACH

Codes indicating single use or dominant use:

L = Resident throughout life cycle

A = Spawning elsewhere (includes hatchery fish) -- spends part or most of life in reach

H = Spawning and hatching -- young promptly move downstream

J = Spawning and nursery to subadult

C = Passing through -- species uses reach as a corridor to migrate upstream and return downstream

F = Feeding run

N = No use (in connection with abundance codes M, H and p)

Z = Use undetermined

Codes that are combinations of the above codes to indicate more than one population of a species.

R = L plus A, H or J

P = C plus L, A, H or J

S = H and J combined

Any other combination: Code entered for dominant use.

ESTHETICS RATINGS. Esthetics were rated A (high) through E (low). Features that detract from esthetics include: pollution, dewatering, channelization, riprap (particularly car bodies and discarded building materials), mine tailings, a busy highway along stream and severe land abuse. As a guide:

A - A water of outstanding natural beauty in a pristine setting.

B - A water comparable to A except that it may lack pristine characteristics. Presence of human development such as roads, farms, etc., usually comprise the difference between B and A.

C - A water with natural beauty but of a more common type than listed under A and B. A clean stream in an attractive setting.

D - A stream and area with fair esthetics.

E - A stream with low esthetics.

MONTANA FISHES IN FAMILY SEQUENCE (Also see fishes of special concern list)

MT FW&P Code	MT FW&P Code
+ 27 - Sturgeon*	140 - Silvery minnow
+ 90 - White sturgeon	141 - Plains minnow
+ 91 - Pallid sturgeon	142 - Finescale dace
+ 92 - Shovelnose sturgeon	143 - Northern redbelly dace
+ 28 - Paddlefish	31 - Sucker*
38 - Shortnose gar	40 - Buffalo
34 - Goldeye	55 - River carsucker
* 01 ♀ Rainbow trout* (See 122)	56 - Longnose sucker
* 02 - Cutthroat trout*	57 - White sucker
* 03 ♀ Brook trout	58 - Largescale sucker
* 04 ♀ Brown trout	59 - Blue sucker
* 05 - Dolly Varden	60 - Bigmouth buffalo
* 06 - Lake trout	61 - Smallmouth buffalo
* 07 ♀ Golden trout	62 - Shorthead redhorse
+ 08 ♀ Kokanee	63 - Mountain sucker
* 09 ♀ Coho salmon	+24 - Channel catfish
+ 10 - Arctic grayling	25 ♀ Bullhead*
* 11 ♀ Rainbow x cutthroat trout hybrid	64 - Stonecat
* 12 - Westslope cutthroat trout (pure)	65 ♀ Black bullhead
* 13 - Yellowstone cutthroat trout (pure)	66 ♀ Yellow bullhead
14 - Whitefish*	100 - Trout-perch
15 ♀ Lake whitefish (May be native in St. Mary's Lake)	+26 - Burbot
+ 85 - Mountain whitefish	103 - Plains killifish (Probably native)
86 - Pygmy whitefish	106 - Mosquitofish
87 ♀ Chinook salmon	109 - Shortfin molly
88 ♀ Splake	112 - Variable platyfish
+ 89 ♀ Salmon*	115 - Green swordtail
118 Trout	71 - Brook stickleback
119 Trout/Salmon*	72 ♀ White bass
*120 ♀ Rainbow trout x golden trout hybrid	17 ♀ Largemouth bass
121 - Upper Missouri cutthroat trout (pure)	18 ♀ Bass
122 - Native rainbow trout	19 ♀ Sunfish
99 ♀ Rainbow smelt	21 ♀ Crappie*
23 ♀ Northern pike (native only in Saskatchewan River Drainage)	+73 ♀ Smallmouth bass
29 - Peamouth	74 ♀ Bluegill
30 - Goldfish	75 ♀ Pumpkinseed
32 - Carp	76 ♀ Green sunfish
33 - Northern squawfish	77 ♀ Black crappie
35 - Utah chub	78 ♀ White crappie
37 - Minnow*	79 ♀ Rock bass
39 - Longnose dace	20 ♀ Yellow perch
41 - Northern redbelly/Finescale dace*	+22 Sauger/Walleye*
42 - Brassy minnow	+81 - Sauger
43 - Silvery/Plains minnow*	+82 ♀ Walleye
44 - Flathead chub	83 - Iowa darter
45 - Lake chub	36 - Freshwater drum
46 - Sturgeon chub	16 - Sculpin*
47 - Emerald shiner	130 - Mottled sculpin
48 - Sand shiner	131 - Slimy sculpin
49 - Redside shiner	132 - Torrent sculpin
50 - Creek chub	133 - Shorthead sculpin
51 - Pearl dace	134 - Spoonhead sculpin
52 - Fathead minnow	
53 - Golden shiner (May be native in eastern Montana)	
54 - Sicklefin chub	

Codes:

- * Trout species
- ♀ Non-native game or sport fish
- + Class A non-trout game or sport fish for streams
- Native fish, i.e. indigenous
- . Non-native non-sport fish
- * Undesignated as to species or strain

MONTANA FISHES OF SPECIAL CONCERN *

Class A--limited numbers and/or limited habitats both in Montana and elsewhere in North America; elimination from Montana would be a significant loss to the gene pool of the species or subspecies.

White sturgeon (Acipenser transmontanus)
Pallid sturgeon (Scaphirhynchus albus)
Paddlefish (Polyodon spathula)
Yellowstone cutthroat trout (Salmo clarki bouvieri)
Arctic grayling (Thymallus arcticus)

Class B--intermediate between classes A and C. Limited numbers and/or limited habitats in Montana; fairly widespread and fair numbers in North America as a whole. Elimination from Montana would be at least a moderate loss to the gene pool of the species or subspecies.

Westslope cutthroat trout (Salmo clarki lewisi)
--includes upper Missouri cutthroat trout
Native rainbow trout (Salmo gairdneri)
Sturgeon chub (Hybopsis gelida)
Sicklefin chub (Hybopsis moeki)
Shorthead sculpin (Cottus confusus)

Class C--limited numbers and/or limited habitats in Montana; widespread and numerous in North America as a whole. Elimination from Montana would be only a minor loss to the gene pool of the species or subspecies.

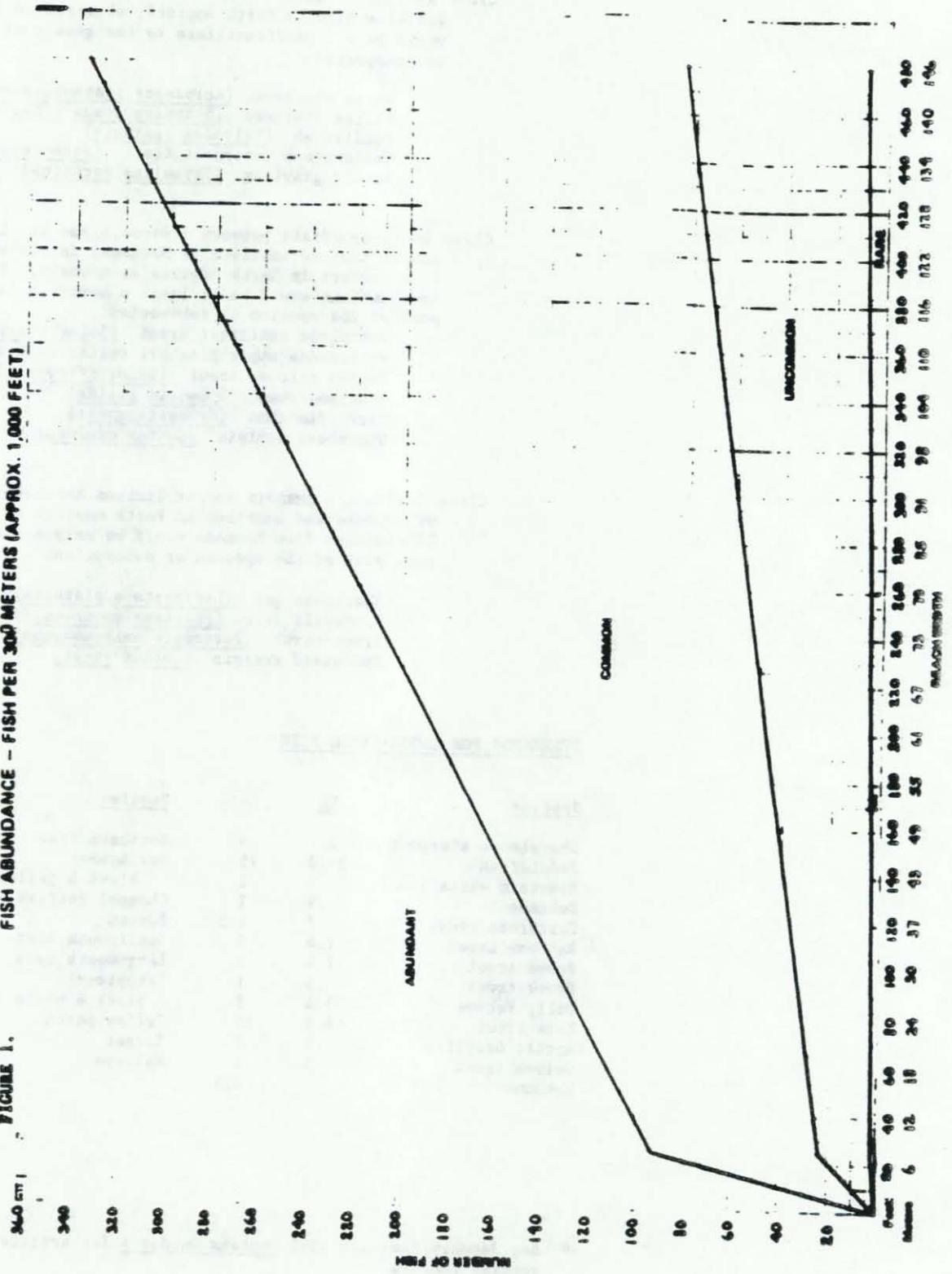
Shortnose gar (Lepisosteus platostomus)
Finescale dace (Phoxinus neogaeus)
Trout-perch (Percopsis omiscomaycus)
Spoonhead sculpin (Cottus ricei)

STANDARDS FOR LARGE-SIZED FISH

<u>Species</u>	<u>Kg</u>	<u>Lbs.</u>	<u>Species</u>	<u>Kg</u>	<u>Lbs.</u>
Shovelnose sturgeon	2.7	6	Northern Pike	6.8	15
Paddlefish	34.0	75	Bullhead--		
Mountain whitefish	.9	2	black & yellow	.3	.7
Kokanee	.9	2	Channel catfish	3.6	8
Cutthroat trout	.7	1.5	Burbot	2.7	6
Rainbow trout	1.4	3	Smallmouth bass	.9	2
Brown trout	1.4	3	Largemouth bass	1.8	4
Brook trout	.5	1	Crappie--		
Dolly Varden	3.6	8	black & white	.5	1
Lake trout	6.8	15	Yellow perch	.5	1
Arctic Grayling	.9	2	Sauger	.9	2
Golden trout	.5	1	Walleye	1.8	4
Kokanee		2.5			

* See January/February 1980 Montana Outdoors for article on fishes of special concern.

FIGURE 1. FISH ABUNDANCE - FISH PER 300 METERS (APPROX. 1,000 FEET)



TABLE

DEPTH METERS	NUMBER OF FISH
10	10
20	15
30	20
40	25
50	30
60	35
70	37
80	37
90	37
100	340
110	200
120	190
130	140
140	160

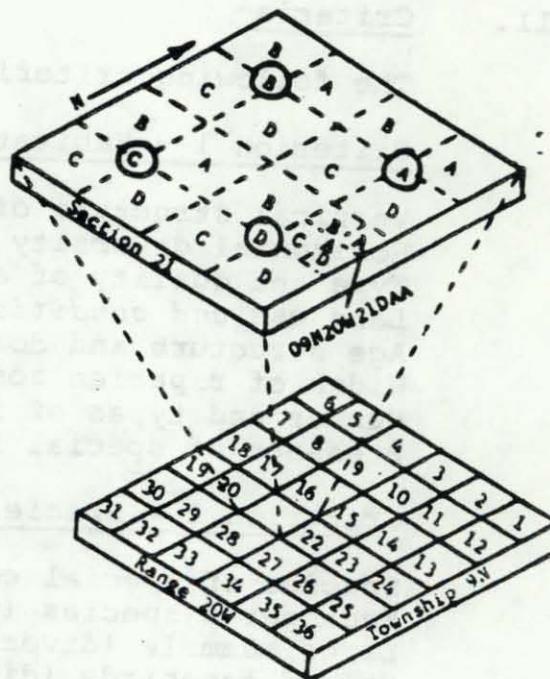
Land Description: Township - Range - Section - Subsection

Explanation of letters (A, B, C and D) designating subsections

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Townships are located by a numbered grid system consisting of Range and Township lines. The Township lines run east and west of a principal meridian. The Range lines run north and south of an established base line. Thus, a Township is described as a number N or S of the base line, and a number E or W of the principal meridian.

A desirable modification of the usual method of describing a location on a map is the one used by several agencies, including the USGS. A location is specified by using 12 characters - the first three give the Township; the next three the Range; the next two the Section number within the Township; and the next four the location within the quarter section (160 A), the quarter-quarter section (40 A), the quarter-quarter-quarter section (10A) and the quarter-quarter-quarter-quarter section (2½ A). The subdivisions of the 640 A section are designated as A, B, C and D in a counterclockwise direction, beginning in the northeast quadrant. For example, if a lake is located in Township 9N, Range 20W, Section 21 the description would be 09N20W21DAA. The letters DAA indicate the lake is in the NE¼ of the NE¼ of the SE¼. As indicated above, a still further breakdown to a 2½ acre area is possible using a fourth letter (A, B, C, or D).



APPLICATION OF WILDLIFE VALUES TO MONTANA'S STREAM CLASSIFICATION SYSTEM

I. Value Class System

The value class system used for fisheries values must also be used for wildlife to make the combined system compatible. This presents no problem and can easily be adopted. It would be as follows:

<u>Class</u>	<u>Description</u>
1	Highest value wildlife resource
2	High priority wildlife resource
3	Substantial wildlife resource
4	Moderate wildlife resource
5	Limited wildlife resource
6	Not yet classified

II. Criteria

The following criteria will be used to determine value classes:

Criterion 1 - Habitat Component

Vertical structure of vegetation
Horizontal diversity of vegetation types
Type and quality of adjacent habitat
Land use and condition of riparian habitat
Age structure and dominant vegetation
Width of riparian zone
Number and types of islands present
Presence of special features or habitat components

Criterion 2 - Species Component

Species of special concern (presence and abundance)
Endangered species (presence and abundance)
Large mammals (diversity and abundance)
Upland gamebirds (diversity and abundance)
Waterfowl (diversity and abundance)
Furbearers (diversity and abundance)
Raptors (diversity and abundance)
Small mammals and other birds (diversity and abundance)
Grizzly bear within designated ecosystem (abundance)

Criterion 3 - Recreation Component

Access (relative degree)
Hunting potential
Floating potential/wildlife viewing
Local community importance
Aesthetics

III. Assignment of Class

The following steps need to be completed before stream and associated riparian habitat can be assigned to the designated classes:

1. Define criteria components
2. Establish quantitative means where possible for assigning point values to criteria components
3. Establish qualitative criteria where quantitative not possible (i.e., aesthetics)
4. Determine the scale of points to be allocated to all three criteria
5. Determine cutoff point values for assigning classes

Discussion

It is generally felt that Criterion 1 (habitat) should have proportionately higher point values assigned to each component than the other two Criteria. It should also be noted that there will be an inherent bonus allowed for certain components such as good lands use, special features, endangered and other special species, and grizzly bear. This is intentional and will assure protection of key habitats and species. *This could also be handled by adjusting assigned point values.*

Resource Values

For wildlife there has been four key components identified that will automatically trigger Class 1 assignment. *These are grizzly bear spring use within designated Ecosystems, bald eagle roost sites, winter feeding areas, nest sites, wolf denning or foraging areas and peregrine falcon nesting or foraging areas.*

IV. Application

For each stream rated, point scores will be calculated for each of the three *criteria* and added before assignment. Highest point totals would be included in Class 1 according to point cutoff levels previously determined. This will result in identifying Class 1 streams (and other classes) for wildlife values. These streams will then be compared to those identified under the fisheries value system. If the rankings are different, the highest ranking will be selected for a combined classification and ranking. For example a stream rated Class 1 for wildlife and Class 2 for fisheries would receive a Class 1 ranking for combined wildlife/fisheries values.

Assignment of Class

The following assignment of class is suggested for the various types of work which are assigned to the various classes.

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DRAFT:

**PROPOSED CRITERIA TO BE USED
FOR RANKING HYDROELECTRIC SITES**

Category I. Sites at which the construction and operation of hydro-power facilities will have insignificant adverse effects on fish and wildlife population and habitat.

A. Sites upstream of existing unsladdered storage projects with no potential for future fish passage facilities and no existing migratory fisheries and not causing adverse impacts to areas previously designated as contributing to mitigation for other existing hydroelectric projects.

B. Undeveloped sites outside the migration limits of anadromous and resident fish where development will not jeopardize the continued use of fish or wildlife at or downstream from the site.

C. Projects which would utilize an existing water conveyance (pipeline, canal, flume, etc.) and be developed as an in-line conduit project without changing the period of operation associated with the primary use, periodicity or volume of flows in the affected stream or water quality of the affected stream.

D. New powerhouses at existing storage dams which have no fish passage facilities and no potential for fish passage facilities and where operation of the project will have no adverse impact on downstream fish and wildlife.

Category IIA. Sites at which the construction and operation of hydro-power facilities will have significant adverse effects on fish and wildlife

populations and habitat but which may be reduced to an insignificant level by development and implementation of proven mitigation techniques.

A. Projects which have been reviewed by the appropriate fish and wildlife agencies and where all such agencies certify in writing that the conditions of development found at Section 1201(a) and (b) of the Columbia River Basin Fish and Wildlife Program and Appendix E of the Regional Conservation and Electric Power Plan have or can be met by the proposed project and that no cumulative impacts are expected from project construction or operation.

B. Projects that would provide significant anadromous fish, resident fish or wildlife enhancement which outweighs losses and which are consistent with the management objectives of the fish and wildlife agencies and tribes. Potential cumulative impacts must be identified and mitigatable, with the responsible parties and the role of each identified.

Category IIB. Projects for which site specific or cumulative impacts are not clearly determinable now. Additional information will be required to determine which of these projects would be reclassified as Category I or Category III projects.

Category III. Sites at which the construction and operation of hydro-power facilities will have significant adverse effects on fish and wildlife populations and habitat which cannot be reduced satisfactorily because of the critical nature of the habitat or populations affected, the lack of proven mitigation techniques, expense and delay, or any other reason.

A. Projects which would impact threatened or endangered species of fish and wildlife or their critical habitat.

B. Projects that would block anadromous fish or a significant migratory resident fish routes or inundate spawning or rearing areas.

C. Run-of-the-river projects that divert flow volumes that are too large to screen so as to provide full protection to juvenile fish.

D. Projects for which fish passage is infeasible.

E. Projects that divert water from stream channels without allowing adequate flows for fish production, fish passage, or a fishery.

F. Projects with reservoirs which cause stored water to warm excessively, create adverse temperature changes downstream, degrade desirable fish habitat through the gradual accumulation of sediment, make desirable fish habitat unuseable by unacceptably reducing river velocities or provide habitat suited to undesirable fish species.

G. Projects which would inundate wildlife fawning, rearing, nesting, and wintering ranges or migration routes which are necessary to sustain local and migratory populations.

H. Any project which proposes to use off-site mitigation to compensate for fish and wildlife losses resulting from project construction or operation.

I. Any project which proposes to use stocking or planting of hatchery-reared fish to mitigate losses to anadromous or resident fish populations or habitat resulting from project construction or operation.

J. Any project that does not satisfy all the conditions of development found in Section 1201(a) and (b) of the Columbia River Basin Fish and Wildlife Program and Appendix E of the Regional Conservation and Electric Energy Plan.

