PACIFIC NORTHWEST RIVERS STUDY

ASSESSMENT GUIDELINES

MONTANA

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INTRODUCTION

OVERVIEW

This document presents the process that participants followed to complete the Pacific Northwest Rivers Study. It identifies assessment guidelines for each river resource category and provides reporting formats for data collection and presentation.

The Rivers Study was designed to produce a consistent and verifiable river resource data base. While this information may prove useful for a variety of applications, the specific purpose of the project was to identify resource considerations which might affect hydropower development. The objective is to use this information to identify areas where minimal impact can be anticipated and thus where development might be appropriate. The study responds to the expressed need for resource information for the following:

1. Energy Supply Forecasting - Bonneville Power Adminstration (BPA) and Northwest Power Planning Council (Council).

2. Protected Areas - Council: 1984 Columbia River Basin Fish and Wildlife Program §1204(c)(1).

3. Site Ranking - Council: Northwest Conservation and Electric Power Plan §14.2.

In order to effectively respond to existing policies and programs as well as to reflect differences in river character, data availability, and public concerns, the project was organized into four state level studies.

In Montana the project was coordinted by the Montana Department of Fish, Wildlife, and Parks with active participation from federal land management agencies, Indian tribes, and other state agencies.

It was not the intent of the study to circumvent the existing management responsibilities of any participating agency. The study was undertaken as a cooperative planning effort which will benefit all participants. Results do not constitute official policy and by themselves imply no specific action by any participant.

The Rivers Study was an 18-month effort by the four northwest states, federal agencies, and Indian tribes. Funding of approximately 1.0 million dollars was provided by the Bonneville Power Adminstration. Concurrently, the Northwest Power Planning Council provided $540,000 to evaluate anadromous fish resources and Indian cultural/archeological values. Rivers Study activities and goals, budgets, and time schedules are listed in the September 1984 Pacific Northwest Rivers Study Plan available from BPA. The actual assessment was conducted between May and December of 1985. Review of preliminary findings was completed by May 1986 and information entered into a computerized information system by October 1986.

ASSESSMENT PROCESS

The goal of the project was to evaluate and document the significance of individual river segments and systems for a variety of natural resource values. Comparative assessment was a major feature of this process. The process did not, however, result in rivers being ranked in numerical order. Rather, each stream reach was given one of four significance ratings for each of five resource categories.

Field survey was kept to a minimum. The study relied on currently available information and evaluation by recognized resource experts. Study conclusions are the responsibility of these resource specialists. The states, Indian tribes, and federal agencies were represented in the evaluation process commensurate with their legal authorities and management duties.

The following is a summary description of the assessment process:

Step 1: Identification of River Resource Categories

Categories were chosen to:

(1) reflect the overall value of rivers and streams as natural resources;
(2) reflect the interest of public agencies and private interest groups;
(3) acknowledge the resource management responsibilities of the Tribes, states, and federal agencies; and
(4) reflect the priorities of the Pacific Northwest Electric Power Planning and Conservation Act [(Regional Act) P.L. 96-501].

The categories selected included resident fish, wildlife, natural features, recreation, cultural features, and institutional constraints. Anadromous fish and Tribal cultural and archeological values were included through a separate Council contract.

A senior resource expert and cooperating experts were designated in each state to oversee activities related to each resource category. Cooperating experts provided input into the assessment through the senior resource expert.

Step 2: Inventory of Information and Identification of Experts

Each state task force inventoried the availability of expertise and information in each of the resource categories. Agencies, groups, individuals, or other sources that had or could provide useful data within the study period were identified.

Step 3: Criteria and Standards Development

For each river resource category, evaluation criteria and standards were identified. An effort was made to standardize criteria for all state level studies in order to ensure regionwide consistency. Criteria were, however, refined at the state level to meet the specific circumstances of each state. The development of criteria and standards was the responsibility of regional and state project staff. Input and review was received from participating federal agencies and Indian tribes as well as the interested public. The following chapters describe in detail the criteria and standards used in Montana.

In order to standardize the assessment process among the various resource categories a list was developed of all river segments that would be included in the assessment. The list included all major rivers and significant tributaries. In Montana approximately 2,000 individual stream reaches were included. This list of stream reaches was computerized and provided to all study participants.

Step 4: Individual Resource Category Evaluation

An independent inventory of river resources was undertaken for each resource value category. Under the direction of designated senior resource experts, rivers and streams meeting minimum threshold standards were assessed by field level specialists using the identified standards and assessment procedures.

Resource experts assigned a value class to each river segment on maps and data forms. The terms "outstanding", "substantial", "moderate", "limited", and "unclassified or unknown" were used to denote relative significance. In addition, areas with no resource value were identified. River segment descriptions and rules governing treatment of tributaries were determined by the state level project management staff. The relative number of river segments to be included in each value class was determined by resource experts. No regionwide guidelines were given.

Results were compared for consistency, and river segments were grouped according to overall significance. The final result of the resource assessment was the identification of all river areas which possess a particular fish, wildlife, natural, recreation, or cultural value and the relative significance of each area.

The product of the institutional constraint assessment was an identification or rivers and streams where existing legal designation or administrative programs might constrain the development of new hydropower facilities.

Step 5: Display and Review of Resource Category Findings

For each resource category a set of data forms identified both the final significance ratings given to individual river segments and the documentation used to substantiate these ratings. Final ratings were also depicted on color coded 1:100,000-scale maps. Information from the data forms was also entered into a computerized data base.

Findings were then reviewed by designated senior resource experts and agency and Tribal participants. Results were revised as appropriate by the senior resource experts in consultation with regional project management. An opportunity to review results and provide comments was also given to private interest groups and the public.

A special effort was made to document the significance of reaches and streams found to have high and/or unique resource values, as well as those reaches reflecting the priorities of the Regional Act.

Step 6: Information Synthesis

Information from resource categories was combined in order to display all resource values of a given stream segment. This synthesis was achieved by means of a computerized data management system. Using this system a matrix can be created which lists all river segments in a given basin and depicts all final resource ratings associated with each segment.

Step 7: Presentation and Documentation

An information packet was prepared which summarized findings for all resource categories. This information, as well as printouts from the study's computerized information system, were made available to interested persons. Computer drawn maps were also made available.

In the future, technical information will be distributed by means of information system printouts and/or machine readible discs. A system users guide will also be made available. General information will be made available through a final report describing findings from the Montana portion of the study.

GUIDELINES

In order to standardize the assessment process and the resulting products, a number of regionwide production guidelines were established. Included were the following:

1. Factors to be Evaluated

- Resident Fish
  - cold water game and nongame fish
  - warm water game and nongame fish
  - spawning, rearing, and migration areas
  - sport fisheries
  - threatened and endangered species
  - species of special concern

- Wildlife
  - migratory birds
  - resident birds
  - big game
  - fur bearers
  - small mammals
  - endangered and threatened species
  - species of special concern

- Natural Features
  - endangered and threatened plants
  - unique plant communities and other recognized natural areas
  - undeveloped and free flowing segments
  - sensitive riparian wetlands
  - gorges, waterfalls, rapids, miscellaneous geologic features

- Cultural Features
  - historic trails and sites
  - archeological sites
  - river related architectural sites

- Recreation
  - white water boating
  - flat water boating
  - river camping
  - river related shoreline activities
  - public use sites

- Institutional Constraints

  Federal, including:
  - wild and scenic rivers
  - wilderness areas
  - research natural areas
  - national parks
  - roadless areas
  - national fish hatcheries
  - national wildlife refuges

  State, as applicable

  Local, as applicable

Each river resource category was evaluated separately without reference to other resource values. For example, river reaches were evaluated for recreational boating without reference to their value for wildlife or historic features.

2. Geographic Scope

As a guide, participants were asked to evaluate rivers and streams which appear on 1:100,000-scale maps. In practice, any river segment with a significant resource value could be included. Stream segments not evaluated included:

a. intermittent streams,
b. small tributaries, and
c. federal institutional constraints (e.g., National Parks, etc.).

In addition, a corridor width of 1,000 feet was recommended for those resource categories associated with shoreline areas.

3. River Reach Determination

A standardized list of river reaches was designated for use within the State of Montana. This system was based on hydrologic configuration though some physical and/or social landmarks were used. While a given resource category could deviate from this reach system every effort was made to adhere to this system. The state reach system was also cross-referenced to the EPA/USGS river reach system in order to standardize at the regional level.

4. Value Classes

Value class refers to the resource significance rating assigned to each river segment for a given resource category. All resource category findings were reported using the same value class system as follows:

1	Unique or Outstanding Resources
2	Substantial Resources
3	Moderate Resources
4	Limited Resources
U	Unknown or Unclassified
N	Resource Not Present

Note: In the case of resident fish, value class 1 was subdivided into two groupings: "outstanding" and "high value".

5. Data Presentation

° Data Entry Forms

In order to facilitate the assessment process as well as to document findings, rating forms were prepared for each resource category. In most instances forms followed a matrix format with river reaches arrayed along one axis and evaluation criteria arrayed along the other. Using these forms individual river segments could be evaluated for each specific criterion and a final rating determined based upon the sum of individual criterion ratings. As appropriate additional descriptive information could also be displayed. Sample forms are included with this document.

° Maps

Maps were used to graphically display river values. Sets of 1:100,000-scale maps and a supply of 1:500,000-scale hydrologic unit maps were provided by BPA. Labels were supplied for each map to be used as legends. Colored pens also were supplied.

One set of 1:100,000-scale maps was used to depict findings for fish, recreation, natural features, and cultural features. 1:500,000-scale maps were used for depicting wildlife findings. Findings were recorded in colored pen using the following color scheme:

- Outstanding or Unique - Red
- Substantial - Orange
- Moderate - Gray
- Limited - Green
- Unclassified or Unknown - No mark
- Resource Not Present - Brown

The unknown or unclassified designations predominated on any one map. Participants did not color stream segments in this category. Uncolored segments can be assumed to be either unknown or unclassified.

To decrease production time, an arrow at the upstream terminus of a colored section was used to signify that all segments above that point are of consistent value. Upstream exceptions were noted in the appropriate color.

Resident Fish

PACIFIC NORTHWEST RIVERS STUDY

Method for Assessing the Significance of River Segments and Systems for Fisheries Resources in Montana
Revised June 1986

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INTRODUCTION

The Pacific Northwest Rivers Study was initiated to assess the significance of river segments and systems for a variety of fish, wildlife, natural, recreational, and cultural resource values. The Montana Department of Fish, Wildlife and Parks has been designated to take the lead in assessing the value of streams for fisheries in the state of Montana.

This report summarizes the methods which were used in this study, and which will be used in an on-going assessment of Montana stream fisheries. It identifies the value classes to which stream reaches are assigned, the criteria used to determine the value class of each reach, and the standards used to apply these criteria. It includes study methods and a project evaluation.

CATEGORY DESCRIPTIONS

Each stream reach is placed in a value class (see below) for each of the following two categories. The final classification, the fishery resource value, is the higher class given for category 1 or 2.

CATEGORY 1 - HABITAT AND SPECIES VALUE OF STREAM REACH

The class of each reach is determined by a point system in which most points are awarded for important habitats of fishes of special concern (native fishes found in limited numbers and/or limited number of waters). Fewer points are awarded for less important habitats of fishes of special concern and for the occurrence of widespread species found in substantial numbers. Least points are awarded for occurrence of non-indigenous species considered of minimal value. Additional consideration is given stream reaches with especially important spawning habitat. Points are also given 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. Spring streams are given special recognition.

CATEGORY 2 - SPORT FISHERY VALUE OF STREAM REACH

The class of each reach is based on an evaluation employing the following criteria: (1) fish abundance as indicated by biomass, or by numbers and sizes of game or sport fish, (2) ingress (legal right of the public to fish the reach or willingness of landowner to permit fishing), (3) esthetics and (4) use by fishermen (fishing pressure).

VALUE CLASSES

Value Class	Class Definition
1	Outstanding fisheries resource
2	High-value fishery resource
3	Substantial fisheries resource
4	Moderate fisheries resource
5	Limited fisheries resource
6	Insufficient information

DETAILED PROCEDURE FOR ASSESSING STREAMS - CRITERIA AND STANDARDS

PROCEDURE FOR CATEGORY 1 - HABITAT AND SPECIES VALUE OF STREAM REACH

Standards and Associated Points

Standard	Description	Genetic Value [1]	Points
I	Best habitat [2] for:		
	(1) Cutthroat trout [3]	A	
	(2) Other Class A FSC [4]	A, B, or I	
	Substantial habitat for:		
	(1) Cutthroat trout	A	
	Moderate habitat for:		
	(1) Cutthroat trout	A	18.0
II	Best habitat for:		
	(1) Cutthroat trout	B, C, D, or I	
	(2) Other Class A FSC	C or D	
	(3) Class B FSC	A, B, or I	
	Substantial habitat for:		
	(1) Cutthroat trout	B or I	
	(2) Other Class A FSC	A, B, or I	10.0
III	Best habitat for:		
	(1) Class B FSC	C or D	
	(2) Class C FSC	A, B, or I	
	Substantial habitat for:		
	(1) Class A FSC	C or D	
	(2) Class B FSC	A, B, or I	
	Moderate habitat for:		
	(1) Cutthroat trout	B or I	

Standard	Description	Genetic Value	Points
	(2) Other Class A FSC	A, B, or I	
	Limited habitat for:		
	(1) Cutthroat trout	A	5.0
IV	Best habitat for:		
	(1) Class C FSC	C or D	
	Substantial habitat for:		
	(1) Class B FSC	C or D	
	(2) Class C FSC	A, B, or I	
	Moderate habitat for:		
	(1) Class A FSC	C or D	
	(2) Class B FSC	A, B, or I	
	Limited habitat for:		
	(1) Cutthroat trout	B or I	3.0
V	Substantial habitat for:		
	(1) Class C FSC	C or D	
	Moderate habitat for:		
	(1) Class B FSC	C or D	
	(2) Class C FSC	A, B, or I	1.5
VI	Moderate habitat for:		
	(1) Class C FSC	C or D	
	Limited habitat for:		
	(1) Cutthroat trout	C or D	
	(2) Other Class A FSC	A, B, C, D, or I	
	(3) Class B FSC	A, B, C, D, or I	
	(4) Class C FSC	A, B, C, D, or I	.6
VII	Abundant or common [5] population of: (1) native fish not included above [6], (2) non-native class A game or sport fish for streams or (3) non-native trout.		.6

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[1] See Genetic Value Ratings for Fish in Attachment.

[2] The habitat value for a fish of special concern reflects biological values, such as competing species, as well as physical attributes and is a judgement decision by a fisheries biologist.

[3] Cutthroat trout in Standards I to VI are those listed as class A Montana fishes of special concern in Attachment.

[4] FSC = Montana fishes of special concern, see list in Attachment. Note: bull trout must be large (see Criteria for Large-size Fishes in Attachment) to be considered with other Class B FSC.

[5] See Fish Abundance Ratings in Attachment.

[6] See list of Montana fishes in Attachment.

Standard	Description	Points
VIII	Same as VII only abundance is uncommon.	.4
IX	Same as VII only abundance is unknown or immature fish only.	.2
X	Presence (including presence expected) of any species not listed above.	.1
XI	Stream is one of few streams or the only one in the immediate area and is important to community for scientific study, nature study, and/or recreation.	3.0
XII	Stream is a spring stream of:	Upgrade to:
	outstanding value 7/	Class 1
	high value	Class 2
	substantial value	Class 3

Assignment of Class

Points	Habitat and Species Value Class
18.0 or more	1
9.0 to 17.9	2
5.0 to 8.9	3
0.4 to 4.9	4
0.0 to 0.3	5

A tributary stream reach with especially valuable spawning habitat for a receiving stream that has a Class 1 or 2 sport fishery value, is upgraded respectively to Class 1 or 2 habitat and species value.

Other important streams for game fish recruitment, including passage, are advanced one class but not higher than class 3.

PROCEDURE FOR CATEGORY 2 - SPORT FISHERY VALUE OF STREAM REACH

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

a. Points for abundance of all trout species combined

Biomass (kg/300 m)	Points
70.0 or more	9.0
15.0 to 69.9	6.5
5.0 to 14.9	4.0
3.5 to 4.9	2.0
1.0 to 3.4	1.0
0.0 to 0.9	0.0

b. Points for abundance of trout with unrecorded biomass and class A game and sport fish for streams.

7/ The value is a judgement decision by a fishery biologist.

Abundance Rating [8]	Points
A	2.0
B	3.0
C	1.0
D	2.0
E, U, V and Z	.5

NOTE: Maximum for mountain whitefish is 2.0 points.

c. Assignment of abundance grade

Points (sum of points from a and b above)	Grade
9.0 or more	4
6.0 to 8.9	3
3.0 to 5.9	2
1.0 to 2.9	1
0.0 to 0.9	0

Criterion II. Ingress - Assignment of Grade

Ingress rating [9]	Grade
1	4
2 and 3	3
4	2
5	1
6 and 7	0

Criterion III. Esthetics - Assignment of Grade

Esthetics rating [10]	Grade
A	3
B	2
C	1
D	0
E	0
F	4

Criterion IV. Use (Fishing Pressure) - Assignment of Grade

Fisherman-days/year/10 km	Grade
1250 or more	4
310 to 1249	3
65 to 309	2
25 to 64	1
0 to 24, or unknown	0

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[8] See Fish Abundance Ratings in Attachment.
[9] See Ingress Ratings in Attachment.
[10] See Esthetics Ratings in Attachment.

Computation of Sport Fishery Value Score and Assignment of Class.

a. Score = Sum of (grade for each criterion x multiplier [11]).

b. Assignment of Class

Standards	Score	Conditions	Sport Fishery Value Class
1.	17 or more	Fish production based on natural reproduction. Trout with abundance B, D or V (large-size) or paddlefish with abundance B must be present [8] and ingress rating of 1, 2 or 3 and esthetics rating of A, B, C or F and overall use of 5,000 or more fisherman-days [12]	1
2.	14 or more	Ingress rating of 1, 2 or 3 and overall use of 2000 or more fisherman-days [12]	2
3.	11 or more		3
4.	4 to 10	Game or sport fish present [13]	4
5.	0 to 10		5

ASSIGNMENT OF FISHERY RESOURCE VALUE CLASS

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

STUDY METHODS

The long-established Montana interagency stream fishery database was the central feature of the present study. New stream reaches were added and information on reaches already in the database was updated by field fisheries biologists of Montana Department of Fish, Wildlife, and Parks; US Forest Service; and US Bureau of Reclamation. The habitat values of spring streams were assigned by Janet Decker-Hess, who at the time of this assessment was inventorying spring

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11/ Multiplier for fish abundance is 2; multiplier for other criteria (ingress, esthetics and use) is 1.

12/ For the purpose of meeting the fisherman days requirement, the stream segment may be a composite of adjoining reaches that meet all other conditions for the class.

13/ See list of Montana fishes in Attachment. To qualify the fish must be a trout or "class A game or sport fish for streams" with abundance greater than rare.

streams in the state. The procedure for evaluating reaches has evolved from the procedure employed in the 1980 stream fishery classification funded by the US Fish and Wildlife Service. A preliminary stream rating assessment, based on the updated procedure, was completed in November 1985 and details sent to participants (see below) for review. Their recommendations were incorporated when feasible.

PROJECT EVALUATION

1. The procedure used in the river assessment is the most objective that could be devised with the data available.

2. As might be expected, the main deficiency is the lack of accurate information on the fish population and fishing pressure for many stream reaches.

3. In the future, when the database contains acceptable data for every reach entered at that time, the standards and criteria for class 4 can be made more stringent. Presently they are somewhat relaxed to insure no stream reach is inadvertently placed in class 5 when it should be at least in class 4.

4. In the present assessment the habitat value for fishes of special concern and the habitat value of spring creeks are based on biologists' judgment. As these weigh heavily in the assignment of the habitat and species value class, objective criteria should be developed.

5. Although most of the important streams are represented, a considerable number of those of lesser importance are not. Additional streams should be added to the database as information is obtained.

6. In the assessment, a tributary stream with essential spawning habitat for a receiving stream that has a class 1 or 2 sport fishing value, is upgraded respectively to class 1 or 2 habitat and species value. This is the only portion of the fishery assessment that is not automated. The assessment computer program should be enlarged to include this operation.

7. From its beginning the stream fishery database has been handled on the Montana Department of Administration mainframe computer in Helena. This has been effective but time consuming. Biologists enter data onto forms for keypunching and have to correct edit reports before data are accepted. The MDFWP is now equipping its field offices with personal computers. Programs should be written to allow database information to be entered directly onto these microcomputers. Editing features would have to be incorporated. A substantial programming effort will be required but this will greatly facilitate data entry and use.

USE CONSIDERATIONS

The value classes assigned are a valid basis for determining the comparative worth of streams fisheries.

PARTICIPANTS

Numerous fisheries biologists of Montana Department of Fish, Wildlife, and Parks; US Forest Service; and US Bureau of Land Management provided information for the current stream assessment. As mentioned, the habitat value of spring

streams was provided by Janet Decker-Hess. The preliminary stream assessment was sent for comment to the Cooperating Resource Experts listed on page 1 and to the following. Each will receive an updated assessment in 1986.

John Lloyd, Kootenai National Forest, Libby
Jim Lloyd, Gallatin National Forest, Bozeman
Hank Dawson, Flathead National Forest, Kalispell
Mike Enk, Swan Lake Ranger District, Bigfork
Len Walch, Helena National Forest, Helena
Greg Munther, Lolo National Forest, Missoula
Larry Eichhorn, Bureau of Land Management, Lewistown
Mark Gorges, Bureau of Land Management, Miles City
Jack Jones, Bureau of Land Management, Butte
Lewis Myers, Bureau of Land Management, Dillon
Dave McCleerey, Bureau of Land Management, Missoula
Brad Shepard, MT Dept. Fish, Wildlife, & Parks, Dillon
Wayne Hadley, MT Dept. Fish, Wildlife, & Parks, Deer Lodge
Mark Lere, MT Dept. Fish, Wildlife, & Parks, Helena
Bruce Rehwinkel, MT Dept. Fish, Wildlife, & Parks, Townsend
Chris Clancy, MT Dept. Fish, Wildlife, & Parks, Livingston
Dick Oswald, MT Dept. Fish, Wildlife, & Parks, Dillon
Bill Hill, MT Dept. Fish, Wildlife, & Parks, Choteau
Mike Poore, MT Dept. Fish, Wildlife, & Parks, Lewistown
Steve Swedberg, MT Dept. Fish, Wildlife, & Parks, Columbus
Kent Gilge, MT Dept. Fish, Wildlife, & Parks, Chinook
Regional Fish Managers, MT Dept. Fish, Wildlife, & Parks (7)

ATTACHMENT

INGRESS RATINGS. As used here, ingress means the legal right to enter. Judgement is used in assigning codes to ingress situations not described below.

Code

1 - A stream section bordered almost entirely by public lands which insure ingress by anglers (excluding 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 stream access laws. Also includes corporate lands that 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. Includes minor portions where public land or road crossing provides limited ingress. The portion through private land may be available by floating or through stream access 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 is precluded by stream size or other physical limitation (no road or public land 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.

ESTHETICS RATINGS. Esthetics are 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 stream of outstanding natural beauty in a pristine setting.

B A stream 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 stream 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.

F A stream of national renown.

FISH ABUNDANCE RATINGS. Abundance of fish refers only to adult fish, or in the case of 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 are 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-size fish (see criteria for large-size fish)
C = Common
D = Common with proportional number of large-size fish (see criteria for large-size fish)
U = Uncommon
V = Uncommon with proportional number of large-size fish (see criteria for large-size fish)
R = Rare
E = Presence not verified but expected
I = Immature fish only; adults never in reach
M = Species absent but might be present if habitat problems corrected
N = Not present
P = Species absent, but could be present if introduced (e.g., potential habitat in a barren stream)
Z = Abundance unknown

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)
Westslope cutthroat trout (Salmo clarki lewisi)
--includes upper Missouri cutthroat trout
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.

Native rainbow trout (Salmo gairdneri)
Bull trout (Salvelinus confluentus)
Sturgeon chub (Hybopsis gelida)
Sicklefin chub (Hybopsis meeki)

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)
Pearl dace (Semotilus margarita)
Northern redbelly dace (Phoxinus eos) x finescale dace (P. neogaeus)
Trout-perch (Percopsis omiscomaycus)
Shorthead sculpin (Cottus confusus)
Spoonhead sculpin (Cottus ricei)

GENETIC VALUE RATINGS FOR FISH

Rating	Description[1/]
A	A genetically pure population as determined by electrophoresis that is isolated from contaminating species.
B	A potentially pure population where there is no record of contaminating species in areas where spawning occurs (not applicable to native rainbow trout as their purity can be determined only by electrophorosis)
C	A potentially pure population where no contaminating species exist, but records indicate that a contaminating species (which could cause hybridization) has been planted in the drainage or is present elsewhere in the drainage and could invade.
D	An especially valuable genetically pure cutthroat trout population (determined by electrophoresis) or especially valuable bull trout population where there are also contaminating species in the reach or drainage. Introgression or hybridization may be static or receding due to reproductive isolation. This rating may also apply to sympatric populations of native and non-native rainbow trout.
E	A potentially pure population where contaminating species are known to exist.
G	A genetically pure population could exist but is not present.
H	A hybridized or introgressed population known to exist based on electrophoresis.
I	A genetically pure population, determined by electrophoresis, where contaminating species could invade. Sometimes used instead of genetics rating D for bull trout in order to upgrade an especially important spawning stream.

1/ (a) Contaminating species for native rainbow trout are: golden trout, cutthroat trout and any hybrid Salmo except hybrid brown trout.

(b) Contaminating species for westslope or Yellowstone cutthroat trout are: rainbow, golden, other strains of cutthroat trout, and any hybrid Salmo except hybrid brown trout.

(c) Contaminating species for bull trout is brook trout.

CRITERIA FOR LARGE-SIZE FISHES

Species	Kg	Lbs	Species	Kg	Lbs
Shovelnose sturgeon	2.7	6.0	Northern pike	6.8	15.0
Paddlefish	34.0	75.0	Bullhead--		
Mountain whitefish	.9	2.0	black & yellow	.3	.7
Kokanee	.9	2.0	Channel catfish	3.6	8.0
Cutthroat trout	.7	1.5	Burbot	2.7	6.0
Rainbow trout	1.4	3.0	Smallmouth bass	.9	2.0
Brown trout	1.4	3.0	Largemouth bass	1.8	4.0
Brook trout	.5	1.0	Crappie--		
Bull trout	2.7	6.0	black & white	.5	1.0
Lake trout	6.8	15.0	Yellow perch	.5	1.0
Arctic grayling	.9	2.0	Sauger	.9	2.0
Golden trout	.5	1.0	Walleye	1.8	4.0
Kokanee	1.1	2.5			

MONTANA FISHES IN FAMILY SEQUENCE

	Code		Code
+	027 Sturgeon*	$	049 Redside shiner
+	090 White sturgeon	$	045 Lake chub
+	091 Pallid sturgeon	@	035 Utah chub
+	092 Shovelnose sturgeon	$	044 Flathead chub
		$	054 Sicklefin chub
+	028 Paddlefish	$	046 Sturgeon chub
		$	050 Creek chub
	038 Shortnose gar	$	051 Pearl dace
		$	041 Northern redbelly/finescale dace*
	034 Goldeye	$	142 Finescale dace [6]
		$	143 Northern redbelly dace
	014 Whitefish*	$	147 N. redbelly - finescale dace hybrid
	125 Cisco	$	039 Longnose dace
	015 Lake whitefish [1]	$	033 Northern squawfish
+	085 Mountain whitefish	$	029 Peamouth
	086 Pygmy whitefish	$	144 Peamouth - n. squawfish hybrid
+	089 Salmon*	$	146 Peamouth - redside shiner hybrid
+	008 Kokanee	@	032 Common carp
+	087 Chinook salmon	@	030 Goldfish
	009 Coho salmon [2]		
	126 Atlantic Salmon [2]	$	031 Sucker*
	119 Trout/salmon*	$	056 Longnose sucker
°	118 Trout*	$	057 White sucker
°	001 Rainbow trout*	$	058 Largescale sucker
°	122 Native rainbow trout	$	063 Mountain sucker
°	002 Cutthroat trout*	$	062 Shorthead redhorse
°	012 Westslope cutthroat trout (pure)	$	055 River carpsucker
°	121 Upper Missouri cutthroat trout (pure) [3]	$	059 Blue sucker
°	013 Yellowstone cutthroat trout (pure)	$	040 Buffalo*
°	007 Golden trout	$	060 Bigmouth buffalo
°	011 Rainbow trout - cutthroat trout hybrid	$	061 Smallmouth buffalo
°	120 Rainbow trout - golden trout hybrid		
°	123 Cutthroat trout - golden trout hybrid	#	025 Bullhead*
°	005 Bull trout	#	065 Black bullhead
°	006 Lake trout	#	066 Yellow bullhead
°	003 Brook trout	$ +	024 Channel catfish
°	124 Brook trout - bull trout hybrid	$	064 Stonecat
°	088 Splake		
°	004 Brown trout	$	100 Trout-perch
+	010 Arctic grayling		
		$ +	026 Burbot
	099 Rainbow smelt		
		$	103 Plains killifish [7]
+	023 Northern pike [4]		
		@	106 Mosquitofish
	037 Minnow*	@	108 Sailfin molly [6]
	043 W. silvery/plains minnow*	@	109 Shortfin molly
	140 Western silvery minnow	@	112 Variable platyfish
	141 Plains minnow	@	115 Green swordtail
	042 Brassy minnow		
	052 Fathead minnow [5]	$	071 Brook stickleback
	053 Golden shiner		
	047 Emerald shiner	#	072 White bass
	145 Spottail shiner		
	048 Sand shiner	#	079 Rock bass

```
#    019 Sunfish*
#    074 Bluegill
#    075 Pumpkinseed
#    076 Green sunfish
#    018 Bass*
#    017 Largemouth bass
# +  073 Smallmouth bass
#    021 Crappie*
#    077 Black crappie
#    078 White crappie

#    020 Yellow perch
   +  022 Sauger/walleye*
$  +  081 Sauger
#  +  082 Walleye
$    083 Iowa darter

$    036 Freshwater drum

$    016 Sculpin*
$    130 Mottled sculpin
$    131 Slimy sculpin
$    132 Torrent sculpin
$    133 Shorthead sculpin
$    134 Spoonhead sculpin
```

Codes:

° Trout species or hybrid
Nonnative game or sport fish
+ Class A game or sport fish for streams
$ Native fish, i.e. indigenous
@ Nonnative nonsport fish
* Undesignated as to species or strain

Footnotes:

1/ May be native in St. Mary's Lake
2/ Present when planted
3/ A variety of westslope cutthroat trout
4/ Native only in Saskatchewan River drainage
5/ May be native in eastern Montana
6/ Presence not verified
7/ Probably native

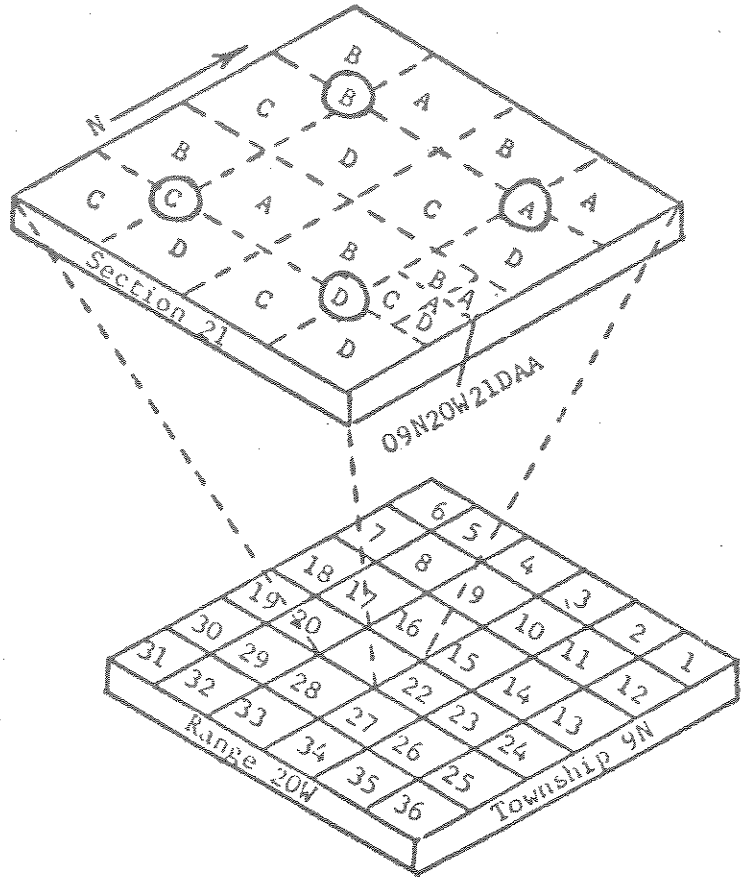
300/19.1

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

Section Numbers

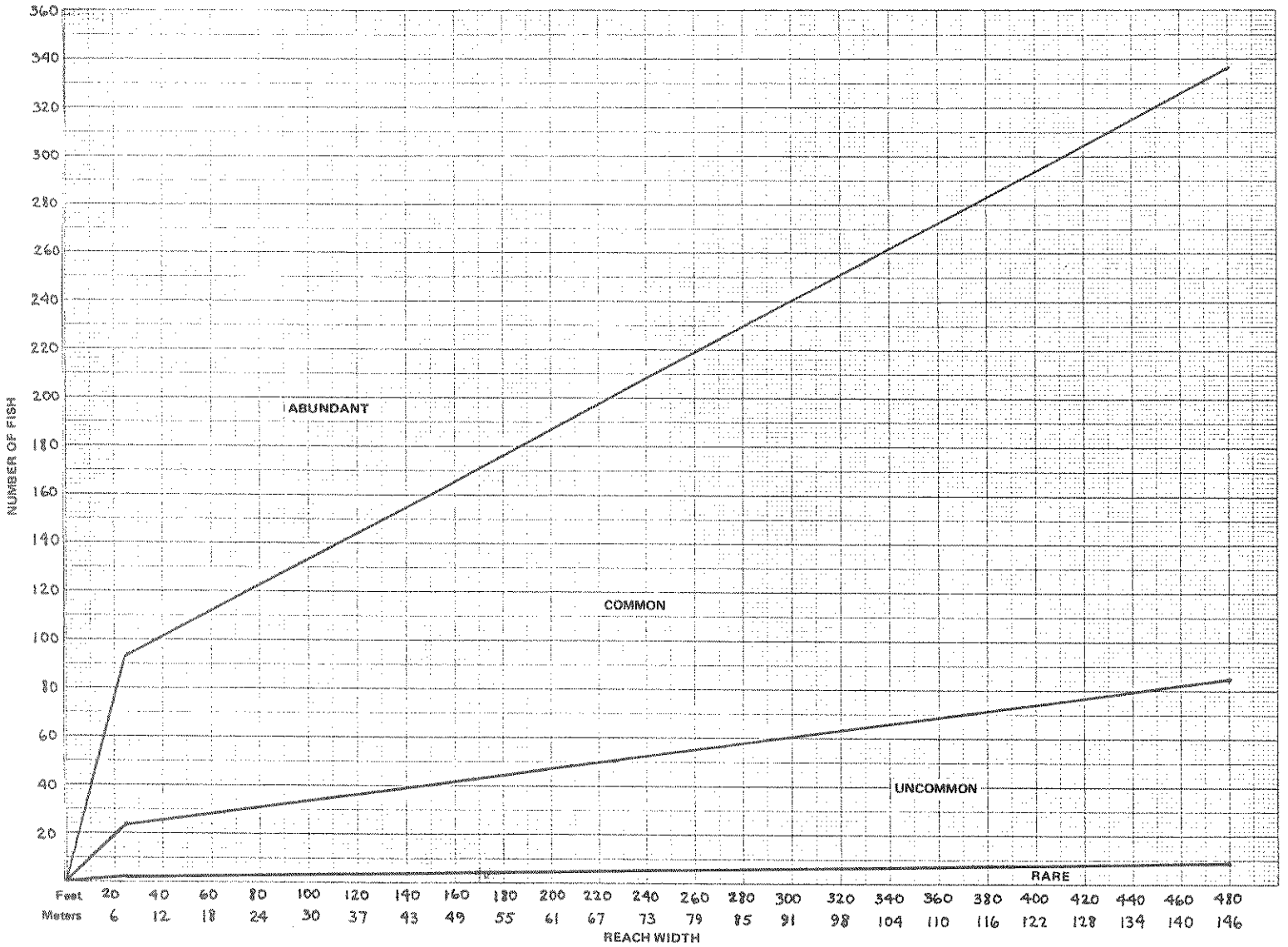
Townships are located by a numbered grid system consisting of Township and Range lines. The Township lines run east and west of a principal meridian. The Range lines run north and south of an established base line. Thus, a Township is described as a number N or S of the base line, and a number E or W 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 give 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 (10 A) 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 might be 09N20W21DAA. The letters DAA indicate the lake is in the NE ¼ of the NE ¼ of the SE ¼ of Section 21. As indicated above, a still further breakdown to a 2½ acre area is possible using a fourth letter (A, B, C, or D).



300/19.1

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



Wildlife

PACIFIC NORTHWEST RIVERS STUDY

Method for Assessing the Significance of River Segments and Systems for Wildlife Resources in Montana

LEAD AGENCY

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INTRODUCTION

The Pacific Northwest Rivers Study was initiated in February 1985 to assess the significance of river segments and drainage basins for a variety of fish, wildlife, natural, recreational and cultural resource values. The Montana Department of Fish, Wildlife and Parks (MDFWP) was designated to take the lead in assessing the value of rivers for wildlife in the state of Montana.

This report will summarize the method used to assess the wildlife resources in Montana. It describes how river assessment units were developed and identifies the value classes to which these units were assigned; the criteria used to determine the value of the units; the standards used to apply the criteria; and the methods used to collect, analyze, and review the necessary data. Evaluation of the assessment process will be discussed as well as use considerations of the wildlife database.

The assessment guidelines have changed considerably from those outlined by Graham (1985). The original approach to the wildlife assessment involved either

wildlife habitats and species exclusively associated with riparian areas or regionally important big game species. As the assessment process evolved, the approach shifted from a riparian dominant species and habitat assessment to a more inclusive, diversified wildlife database. Although riparian zone species and habitat continued to play a primary role in the analysis, species diversity and overall habitat condition played an equally important role.

CATEGORY DESCRIPTION

Wildlife values were measured by assigning points to each resource assessment unit based on three criteria: species, habitat, and recreational characteristics. Habitat values included specialized wildlife land designation and habitat quality. The species criterion considered threatened and endangered species, overall game and furbearer species diversity and density, species of special concern, and wetland species. Recreation value measured consumptive and nonconsumptive values including hunting, scientific/educational value, and aesthetics. Evaluation of recreation provided an opportunity to include social information in the inventory, identify river segments and drainage basins noted for their recreation value, and integrate the species and habitat values with the recreation values.

VALUE CLASSES

Each river assessment unit in Montana was assigned to one of the following five value classes to denote its value for wildlife:

I - Outstanding wildlife resource
II - Substantial wildlife resource
III - Moderate wildlife resource
IV - Limited wildlife resource
V - Unclassified wildlife resource

CRITERIA

HABITAT VALUE

The criteria used to evaluate habitat value for each river assessment unit were designed to recognize specialized land uses and evaluate habitat quality. Specialized land uses included tracts of land established by federal, state, or private agencies for the

purpose of wildlife habitat protection, enhancement and/or recreation. Specific designations included proposed Wilderness, Wild and Scenic Rivers, National Wildlife Refuges, National Fish Hatcheries, State Wildlife Management Areas, Waterfowl Production Areas, Nature Conservancy Preserves, Conservation Easements and USFS and BLM Research Natural Areas.

Habitat quality referred to both the integrity and condition of the riparian zone and the presence of valuable wildlife/habitat characteristics. Habitat quality was evaluated on five characteristics: condition of the riparian zone including retention of its natural vegetation characteristics and wildlife values, the amount of forested, wetland and island habitat, and vegetative structure and diversity.

SPECIES VALUE

The species quality scores were developed using three types of species data: presence of threatened and endangered species habitat or potential habitat; game and furbearer species density and diversity; and specialized wildlife areas.

The presence of habitat or potentially important habitat for the recovery of federal or state listed threatened and endangered species played a major role in determining the species value. Species included the rocky mountain timber wolf, grizzly bear, bald eagle, whooping crane, peregrine falcon, and mountain caribou. Although caribou are not currently a listed species in Montana, areas potentially important for their recovery were identified in case of its inclusion in the future.

Game and furbearer species were evaluated on their densities and relative diversities for each unit. Game species previously mapped by the MDFWP were evaluated using both species density and seasonality. Game species evaluated included deer, elk, bighorn sheep, mountain goat, black bear, moose, antelope, and upland game birds. Importance values were determined for each mapped species including an evaluation of population densities and the importance of the unit to that species. Use type was determined on a seasonal basis and could include any combination of seasonal use.

Evaluated furbearer and game species not previously mapped by the MDFWP included river otter, beaver, lynx, bobcat, marten, turkey, ruffed grouse, pheasant, and Canada goose. A habitat suitability rating was determined for each species based on the quality of the habitat and population density.

Use of an area by specialized wildlife species was evaluated separately because of the species' or habitats' uniqueness. State listed species of special concern and nongame and game wetland species were evaluated in this category (Flath 1984). Only vertebrate species of special concern dependent on riparian areas were included. These included:

a) Waterfowl staging areas, low level feeding flight paths, "prime wetlands" as described by USFWS or MDFWP;
b) Warm/hot springs open in winter and used by winter/migrating waterfowl species;
c) High gradient streams supporting breeding harlequin ducks or amphibians of special concern (Pacific giant salamander, Coeur d'Alene salamander, Rough skinned newt, tailed frog);
d) Sloughs, backwater areas supporting reptiles of special concern (spiny softshell, snapping turtle);
e) Riparian areas supporting colonies (>5 pairs) of double-crested cormorants, great blue herons, American white pelican;
f) Large nesting osprey population area (>1 active nest per river mile; minimum 5 river miles);
g) Cliffs occupied by or suitable for nesting golden eagles;

RECREATION VALUE

The recreation criterion considered both consumptive and nonconsumptive uses within a unit. Consumptive value was determined by the hunting of big game, small game, and waterfowl species; value was based on hunting pressure and success.

Three nonconsumptive recreation values based on wildlife attributes and land characteristics were evaluated: wildlife and habitat oriented uses; scientific and educational value; and aesthetics. Wildlife and habitat oriented uses included, but were not limited to, bird watching; roadside wildlife watching; collecting/identifying wildflowers, reptiles, amphibians, and insects; wildlife/nature photography, and artistry. The scientific/education value rated the unit based on the uniqueness of plant and animal communities present and the amount and regional significance of public use. Aesthetics of an area was the third nonconsumptive value evaluated. The system established by the MDFWP Fisheries Division was employed, assigning an aesthetics value to each unit.

STANDARDS

Standards established to rate each criterion were based on a point system. Points were accumulated for each criteria and subtotalled separately. Determination of Class I, II, III, or IV for each criteria were based on frequency distribution of total points and a subjective analysis. The final classification, the wildlife resource value, was obtained by averaging the three criteria ratings. If the habitat and species values fell in the same value class, that became the final wildlife resource value. However, if a unit received different species and habitat ratings, the recreation value was considered. If a unit had a Class I habitat rating and a Class 2 species rating, and the recreation rating was a 2, 3, or 4, the unit would receive a final classification of a 2; if the recreation rating was a 1, the final resource value would also be a 1.

HABITAT VALUE

Specialized Land Use

Points awarded for specialized land uses were based on the protection afforded by a designation, the reasons for land designation, and the size of the designated area. Designated lands protected solely for their wildlife or riparian attributes through federal law were given the highest points (Table 1). These included Wild & Scenic Rivers, National Wildlife Refuges, Waterfowl Protection Areas and Nature Conservancy Preserves. Fewer points were given to State Wildlife Management Areas, USFS and BLM Research Natural Areas, National Fish Hatcheries, proposed Wilderness, and conservation easements.

Table 1. Specialized land designation evaluated in the river assessment process and assigned weight for each.

Land Use	Assigned Weight
• Proposed Wilderness	10
• Wild and Scenic Rivers	25
• National Wildlife Refuge	25
• National Fish Hatchery	10
• Wildlife Management Areas	20
• Waterfowl Production Areas	25
• Nature Conservency Areas	25
• Conservation Easements	10
• Research Natural Areas	20
• Other (variable)	15

Habitat Quality

Points were awarded for five habitat attributes that contributed to overall habitat quality for all species of wildlife. For each of these habitat characteristics, a rating of high (3 points), moderate (2 points) or low (1 point) was determined by the participating biologists:

1. Condition of riparian zone:
   - High - Riparian zone is in excellent condition, minimally impacted by land uses such as roads, agriculture grazing, subdivisions. Riparian zone retains nearly all of its natural vegetation characteristics and wildlife values;
   - Moderate - Riparian zone is moderately affected by land uses (as described above) but retains significant amount of inherent natural vegetation characteristics and wildlife values; impacted areas have potential to be rehabilitated;
   - Low - Riparian zone is highly affected by land uses; only remnant patches or blocks of natural vegetation exist and only limited opportunity for vegetative rehabilitation.

2. Forested:
   - High - Numerous large tracts (>150 ac) or continuous bordering (>30 ft. wide) of mature deciduous or coniferous forest (e.g. gallery forests);
   - Moderate - occasional large tracts (<150 ac) or intermittent bordering (<30 ft.) of mature deciduous or coniferous forest;
   - Low - Little or no forest development along riparian zone.

3. Wetlands:
   - High - Oxbow lakes, sloughs, backwater areas or other significant wetland types common along water course (characteristic of large meandering rivers);
   - Moderate - Occasional oxbow lakes, ponds, sloughs, backwater areas, or seeps;
   - Low - Few to no significant wetland areas associated with water course(s).

4. Islands:
   - High - Many (characteristic of braided rivers/ streams);
   - Moderate - Occasional to several islands;
   - Low - Few to no islands.

5. Vegetative Structure/Diversity:
   High - Riparian zone vegetation well-developed and characterized by a wide variety of vegetation types and structural types appropriate for its size and configuration;
   Moderate - Riparian zone less well-developed due to land uses or natural characteristics; has moderate variety of vegetation and structural types;
   Low - Riparian zone dominated by few to one major vegetation type (e.g. crops, pasture, range) or is unvegetated (urban, industrial situations).

Each rating was multiplied by a value of 5 with two exceptions: rivers with condition in excellent habitat were multiplied by 5 and awarded 10 additional points; and mature forests received less weight in western Montana, where forests are more common than in eastern Montana.

Habitat Value Calculation

Specialized land use points and habitat quality point totals were combined to determine a final habitat rating. Total cumulative points for Class I habitat rating ranged from 79 to 179, Class II 55 to 78, Class III 39 to 54, and Class IV 23 to 38.

Following a review of the results, it was apparent that the specialized land use designations were the driving force in determining the habitat rating. Without an official land designation within a unit, a Class I habitat value was essentially impossible based on habitat quality alone. To alleviate what was felt to be an inaccuracy in the calculation of habitat value, a system based on habitat quality alone was incorporated into the analysis. The system established a series of "bonus" points to be awarded for habitat quality regardless of any formal land use designation. Habitat quality points greater than 52, 41, and 32 were used to change a unit's habitat rating from a II, III and a IV to a Class I, II and III, respectively. As a result of this change, an additional 32 units were awarded a Class I habitat value. Only 2 units, however, were elevated to a final Class I resource value as a result of this change alone. Nearly 60% of the changes to a Class I habitat value occurred in eastern MDFWP regions. Apparently, wildlife habitat is in good to excellent condition in many of these drainages but has not received official agency protection or designation.

SPECIES VALUE

Threatened and Endangered Species

The presence (rating of 1) or absence (rating of 0) of potential or existing habitat for the threatened or endangered mountain timber wolf, whooping crane, peregrine falcon, and mountain caribou was determined. A two-level rating system of species' use was utilized for the bald eagle and grizzly bear. A rating of 2 for the bald eagle represented critical wintering (high densities), key migrating, and existing and potential nesting areas. A rating of 1 represented other areas where relatively low densities of bald eagles either wintered or migrated. Because of their national significance, an additional 20 points were awarded if a rating of 2 was determined for the bald eagle. For the grizzly bear, a rating of 2 represented management areas 1 and 2 as established by the respective National Forests for the Yellowstone and Northern Continental Divide ecosystems. For the Cabinet-Yaak ecosystem, the area delineated in the MDFWP Grizzly Bear EIS was used to determine a 2 rating (Dood et al. 1986). A rating of 1 represented other management situations or fringe areas felt to be important for grizzly bear recovery. Final points for each species was determined by multiplying the rating by 15. A total for all threatened and endangered species was then calculated.

Game and Furbearer Species

Seasonal use, importance value, and habitat suitability were collected for game and furbearer species. Because the importance value also evaluated seasonal use, the seasonal use evaluation was dropped as a standard. Ratings of 1-3 were given for each mapped game species present. A rating of 3 indicated the unit supported large populations and/or contained highly critical habitat (e.g. winter range) for a significant population of animals. A rating of 2 indicated a unit contained habitats of moderate importance to the species and/or supported moderate populations of animals. A rating of 1 indicated a unit had some value to the species on a seasonal basis and/or it supported low or occasional populations of the species.

For furbearer species and unmapped game species, the ratings were defined by habitat suitability. A rating of 3 indicated a unit had excellent habitat quality and was able to support a high density relative to other habitats. A rating of 2 indicated a unit

supported a moderate density of this species. A rating of 1 indicated a unit supported a low density of this species or habitat was patchy or marginal.

Each of the game and furbearer species was assigned a weighting from 2-4 depending on the level of concern determined in the original criteria and standards (Appendix A in Graham 1985). High concern species--white-tail deer, elk, bighorn sheep, moose, black bear, river otter and turkey--received a weighting of 4 (Table 2). These species were included as a species of high concern because of their regional game significance or their dependence on riparian habitat. Species of intermediate concern included all other game and furbearer species that were dependent seasonally on riparian habitats and/or species of high concern not associated with river bottoms. These species were given a weighting of 3. All other game and furbearer species were given a weighting of 2. The weighted value was multiplied by the importance value or habitat suitability rating to determine points for each species. Points for each species were then added to determine a unit's species diversity and importance.

Specialized Wildlife Areas

Points were awarded to a unit for each specialized wildlife use. Areas used by species of special concern --the harlequin duck, amphibians, and reptiles--were given 12 points. All other uses by wetland species or raptors were given 9 points.

Species Value Calculation

Points were accumulated for each type of species value: threatened and endangered species; game and furbearer use and densities; and specialized wildlife areas. The points were totalled to determine the final species value. Point ranges for Class I, II, III, and IV were 101 to 164, 67 to 100, 51 to 66 and 15 to 50 points, respectively.

Because of the constraint posed by threatened and endangered species on hydrodevelopment and other land use changes, considerable points were awarded where these species and/or potential recovery habitat existed (a maximum of 50 points for bald eagle). All other species, including species of high and special concern, received a maximum of 12 points. A unit with a diversity of species in high densities could not accumulate sufficient points to reach a Class I rating without the presence of endangered or threatened

Table 2. Game and furbearer species evaluated in the river assessment process. Weights for each species are also included.

Species	Weight	Species	Weight
White-tail	4	River Otter	4
Mule deer	3	Beaver	3
Elk	4	Bobcat	3
Antelope	2	Lynx	2
Bighorn sheep	4	Marten	2
Moose	4	Turkey	4
Black bear	4	Ruffed grouse	2
Mountain lion	2	Pheasant	2
Sharp-tail	2	Canada goose	3
Sage grouse	2	Wolverine	3
Mountain goat	3	Other	2

species. To alleviate this flaw in the determination of the species value, a unit accumulating 70 or more points from game and furbearer species and species of special concern, regardless of the presence or absence of endangered species, was automatically given a Class I species value. To accumulate 70 points, it was necessary for a diversity of species in relatively high densities to be present. As a result of this change, 43 additional units were awarded a Class I for species value. Only two units, however, had their final resource value changed to a Class I based on this change alone.

RECREATION VALUE

Consumptive Use

The four major big game species--deer, elk, antelope and black bear--received points determined by a computer analysis which used hunting district information (see Methods). Three hunting values--pressure, success, and percent non-resident pressure--were used in the evaluation. A maximum of 25 points could be accumulated for each species. For all other game species not included in the computer analysis, the relative ranking assigned by the participating biologists was used. A maximum of 24 points could be awarded to each of these species. A maximum of three species could be included in the final consumptive recreation calculation. Total points accumulated for each species were combined to obtain a final consumptive recreation value.

Nonconsumptive Use

Points were given for wildlife/habitat oriented use, scientific/educational value, and aesthetics. The points system for wildlife/habitat oriented use was:

4 - Area attracts users or visitors from all over the country relatively high level of use; species or habitats accessible or visible and/or relatively uncommon on national basis.
3 - Area attracts visitors statewide; moderate level of use.
2 - Area attracts visitors from region, or multi-county area. May be significantly used.
1 - Area attracts primarily local people.

The value of the wildlife resource for scientific research and educational purposes was based on the following point system:

4 - Areas containing relict or disjunct plant or animal communities (e.g. bogs) or pristine natural vegetation types or species that are rare or threatened. Plants and/or animals associated with area are highly unusual - not typically found in state. Has highest scientific/education value - nationally significant.
3 - Type localities for other plant or animal species, for forest or range habitat types; near pristine vegetation sites.
2 - Other areas with important education value including areas frequently visited by school groups.
1 - Study areas for longterm biological or ecological value.

Aesthetics were rated from high (5) to low (1), following the guidelines established in the fisheries river assessment (Graham 1985). Features that were considered in the aesthetics rating included land use, pollution, roaded accessibility, and litter and waste:

5 - A water of outstanding natural beauty in a pristine setting.
4 - A water comparable to the above except that it may lack pristine characteristics. Presence of human development such as roads, farms, etc., usually comprise the difference between the top two ratings.
3 - A water with natural beauty but of a more common type than listed above. A clean stream in an attractive setting.
2 - A stream and area with fair aesthetic qualities.
1 - A stream with low aesthetic qualities.

Recreation Value Calculation

Points received for each nonconsumptive use were multiplied by 5 and a cumulative total was calculated. An additional 25 points was added if a unit received a rating of 4 for wildlife and habitat oriented use because of the national significance such a rating indicated. The minimum point total for nonconsumptive recreation was 15; the maximum was 100. Nonconsumptive and consumptive points were totalled for the recreation value. Final ranges of points for Class I, II, III,

and IV recreation value were 101 to 164, 67 to 100, 51 to 66 and 15 to 50, respectively.

METHODS

DATA COLLECTION

Montana selected a questionnaire and interview approach for obtaining the river assessment information. The questionnaire provided a standardized system to evaluate wildlife values associated with rivers and a means to document response (Appendix A). The questionnaire also lent some objectivity to the assessment process and facilitated computerization of the information collected.

A meeting of wildlife biologists from the appropriate National Forests, the Bureau of Land Management, and the MDFWP was held in each of the seven MDFWP regions. At each meeting, the biologists answered a questionnaire for each river assessment unit concerning location and habitat, species, and recreation values. Answers were recorded on a data form. Biologists from different agencies generally worked in small groups on rivers in their management area. Although state wildlife maps, BLM maps, and USFS maps and documents were utilized during the assessment process, many ratings were subjective. Questions were answered using a presence or absence determination or a rating from 1 to 3 in all criteria, instead of population estimates or quantitative habitat measurements.

Prior to the meetings, MDFWP biologists were contacted to determine the boundaries of the wildlife assessment units. River mile indices listing all the waterways in the appropriate regions were used to determine unit size and boundaries. Units usually were limited to one drainage and its tributaries and did not combine drainages with similar habitat and species use. In some cases, the initial boundaries were used in the assessment process. In most cases, however, new boundaries were established after biologists reviewed the questionnaires and considered the time and repetition required for each assessment. Because wildlife use is not restricted by the presence of water, strict river and stream reaches were too narrow in their definition to describe a river assessment unit. Therefore, units were defined as a main stem, a stream or river basin (including its tributaries) or the tributaries to a main stem. The hydrologic unit, rather than river mile, became the primary geographic reference point.

Information requested on the questionnaire included a verbal description of the river assessment unit and its location by hydrologic unit, MDFWP region, state drainage number, water code, and the unit type (main stem, basin or tributaries). Location of the lower and upper boundaries were described verbally, legally, and by river mile. Additional location description included the drainage the unit was a tributary to, the river mile and legal description of its confluence, and its location by county. To insure accuracy and completeness, the coding of the location description was completed by the river assessment staff.

Additional information beyond the questionnaire was necessary to evaluate consumptive recreation use. MDFWP conducts telephone surveys annually to collect hunter information. The information is coded by big game hunting district. Harvest information including effort and success from the 1983 hunting season was used to develop the following consumptive recreational data by hunting district:

1. Hunter pressure - hunter days per square mile;
2. Relative success - average number of hunter days per harvested animal;
3. National significance of resource - percent of total hunter days by non-resident hunters.

These data were entered into a computer database for the four major big game species--deer, elk, black bear, and antelope--and ranked by hunting district. Because of the size of hunting districts and relative use, western Montana (MDFWP Regions 1,2,3, and 4) was ranked separately from eastern Montana (MDFWP Regions 5,6, and 7).

These hunting district data were integrated into the assessment process through data collected on the questionnaire. The percentage of a hunting district (H.D.) which fell within a river assessment unit was determined (i.e., for unit JK3 below, 40% of the unit was in H.D. 102, 20% in H.D. 110 and 40% in H.D. 120). These percentages were multiplied by the pressure, success and non-resident pressure rankings and a total was calculated. For example:

River Assessment Unit JK3

	H.D. #	% H.D.	Pressure	Success	% Non-resident
Deer	102	40	10	6	0
	110	20	5	4	0
	120	40	5	4	0

Deer Recreation Points = [(.4x10) + (.4x6) + (.4x0)] + [(.2x5) + (.2x4) + (.2x0)] + [(.4x5) + (.4x4) + (.4x0)]

A qualitative relative ranking was collected for each species listed on the questionnaire. This ranking reflected the overall hunting effort that occurred within a unit compared to the rest of the hunting district in which the unit was located. These rankings were used to evaluate all other game species not included in the computer analysis.

DATA ANALYSIS

All data from the questionnaire were entered and analyzed using the MDFWP Region 1 Action Discovery Computer System with DataStar and ReportStar software. DataStar was used to enter the data gathered by the questionnaire, including the unit description and the habitat, species, and recreation information. Data collected from the questionnaire and the computer analyses of the four big game species were integrated using ReportStar. Data were weighted and given points, points within a criteria were totalled, and final resource values based on the total points were determined. ReportStar allowed weights and points of specific standards to be altered as necessary.

REVIEW

Review of the assessment process occurred throughout the study. The Wildlife Task F reviewed the original assessment guidelines, the questionnaire, the determination of the value classes, and the final resource values. Participating biologists were given the opportunity to review a summary of the final ratings, the ratings and points for each criteria, and the complete database by region.

PROJECT EVALUATION

The wildlife river assessment underwent a considerable evolution following its conception, so the project was evaluated throughout the process. What started out as an assessment of Montana's riparian wildlife habitat and species developed into the beginnings of a statewide wildlife database. The original criteria for species value included a Class I designation if a unit contained any threatened or endangered species or any species of special or "high" concern. As a result of the extensiveness of this list, virtually all units would have received a Class I species value. In the final guidelines, wildlife diversity in a unit became the emphasis. Following the shift to a more diversified approach, the overall quality of the standards determining the species and habitat values was considered good.

The interagency approach to developing the original assessment units and completing the database questionnaire was a major success of the project. This approach allowed all agencies involved in wildlife species and habitat management to participate in the process. Conversion of the wildlife river assessment database to allow statewide accessibility is currently being undertaken. Once this task is accomplished, a series of instructional workshops to familiarize participating state and federal biologists with the database, the river assessment rankings and the values involved in determining those rankings should occur. This familiarization should encourage use, determine inaccuracies in the entered data and lead to the development of a more complete statewide database.

Although agency maps and documents were available during the questionnaire meetings the data contributed to the assessment was generally subjective. The reliability of the species value could be greatly enhanced with the addition of quantitative population estimates. The standardization of methodologies across the state and the determination of statewide data gaps could be the end product of these population estimate inclusions. In calculating the habitat value, analysis of the riparian zone was accomplished through a subjective high to low ranking for riparian condition, diversity and structure. While the basic standards in determining riparian habitat value are in place, the need to quantify these values through a statewide riparian zone inventory using aerial photos, field analysis, more specific interviews and other methods is a priority. A data quality rating system similar to that used in the fisheries portion of the river

assessment process should be incorporated into the wildlife database.

The variation in unit size and the habitat variability within a unit lead to inconsistencies in the final resource value determination. In Region 2, for example, the entire length of several drainages were lumped into one unit. Because of habitat variation from the mouth of a stream to its headwaters, a single unit accumulated considerable points based soley on the habitat variety, rather than habitat and species quality. Region 2 had the lowest number of river assessment units (30 units), the highest percentage of Class I final resource values (32 percent), and no units with a Class IV designation. Region 1, in northwestern Montana and a region only slightly larger than Region 2, had 87 river assessment units with unit boundaries occurring along natural habitat changes. Habitat condition and species values were rated over a more narrow range of diversity. A lower overall rating occurred as a result. Only 17 percent of Region 1 units were class I with 6% being Class IV. The Region 1 breakdown more accurately reflected the state averages.

The recreation value criteria and standards continue to be the major breakdown in the present river assessment system. In the consumptive recreation evaluation, only hunting was included. The consumptive recreation value was based on one year of mail survey hunting information, with the evaluation of three factors; pressure, success and non-resident use. With the annual fluctuations in big game populations and changes in hunting regulations, the potential bias from one year of data are obvious. The nonconsumptive value became the driving force behind the final recreation value. To improve the recreation assessment, standards added to the consumptive recreation value could include an average of 5-10 years of mail survey data, a subjective analysis of the quality of the hunting experience and the determination of public access and distance from a population center.

Originally, the recreation value was considered secondary to the species and habitat values and was to be used only as a tie breaker in determining the final resource value. In evaluating its use and effect on the final classification, however, the recreation value was used in determining 41 percent of the final values. In 75 percent of those cases, it lowered the final resource value. From this evaluation, it is obvious the role of recreation went beyond a secondary value and its structure needs to be reassessed.

USE CONSIDERATIONS

The potential uses of the wildlife river assessment database are limited only by the wildlife biologists, resource planners, and wildlife and land managers who could benefit from the system. Their use of the system as a planning tool and their involvement in updating and expanding the database will determine its future use. Although the database and the final resource values can be used in the planning process, it should not be considered suitable for the siting of facilities or solely determine major changes in land use. It can, however, serve as a valuable tool for assessing overall quality of species diversity and densities and overall habitat considerations on a relative scale. The database could be used in providing information on wildlife species use when determining timber sales and other land management decisions. The planning process for any project could be greatly reduced with the use of the database.

The database could also aid in determining habitat protection and land acquisition. Units with habitat ratings of Class I could be included in a potential list of lands needing formal land protection.

Wildlife resource values can now be compared across the state. Locations of potential habitat for threatened and endangered species and species of special concern, relative species densities, critical habitat for a particular species, or important recreational use areas can be accessed through the database. With the wildlife database, collected data will now endure personnel changes and file rearrangement.

The use of the database will continue to expand and become more reliable as more quantitative data are entered, unit size between regions becomes more consistent and habitat variability within a single unit is reduced.

PARTICIPANTS

Two levels of participation occurred in the wildlife river assessment project. The Wildlife Task Group Force consisted of cooperating wildlife experts from federal and state agencies to oversee assessment activities and provide their input to the senior resource expert and staff. Specifically, these individuals reviewed the Rivers Study Manual and proposed value classes, criteria, and standards; were invited to

participate in all progress meetings; and provided input into the determination of the final classification system. Participants on the Wildlife River Assessment Task Force were:

Larry Thompson, (formerly Montana Department of Natural Resources and Conservation, Helena) currently Director of Natural Resource Information System, Helena;
Ray Hoem, Bureau of Land Management, Billings;
Don Bartschi, Fish and Wildlife Coordinator, U.S. Forest Service, Region 1, Missoula;
Alex Hoar, U.S. Fish and Wildlife Service;
Carol Taylor, U.S. Fish and Wildlife Service.

The other level of participation occurred by the biologists from MDFWP, US Forest Service, and Bureau of Land Management involved in providing the data for the wildlife assessment. These individuals were sent the preliminary final resource values for each unit in their area with the opportunity for review. Participants are listed by their agency affiliation and meeting locations are in parentheses.

Region 1
(Kalispell, Libby)

Kootenai National Forest
- Al Christensen
- Reed Kuennen
- Don Godtel
- Bill Pomeroy
- Alan Bratkovich
- Gary Altman
- Bruce Haflich
- Ron Williams
- Eric Heinz

Lolo National Forest
- Jerry Diebert

Montana Dept. of FW&P
- Jim Cross
- Jerry Brown
- Shawn Riley
- Bruce Campbell
- Dan Casey
- Marilyn Wood

Flathead National Forest
- Bob Hensler
- Tom Holland
- Tom Wittinger
- Bruce Hird
- Vernon LaFontain

Region 2
(Missoula)

Bitteroot National Forest
- John Ormiston
- Dale Hoth

Lolo National Forest
- Mike Hillis
- Jerry Deibert

Deerlodge National Forest
- Mike Paterne
- Karen Wilson

Montana Dept. of FW&P
- John Firebaugh
- Kurt Alt
- Bob Henderson
- Lyn Nielsen

Bureau of Land Management
- David McCleerey
- John Prange

Region 3
(Wall Creek Game Range)

Deerlodge National Forest
- Tina Crump

Gallatin National Forest
- Jerry Light (attended R-5)
- Keith Giezentanner
- Tom Puchlerz
- Terri Grotzinger

Beaverland National Forest
- Mike Rath
- Jerald Berry

Montana Dept. of FW & P
- Joel Petersen
- Howard Chrest
- Mike Frisina
- Jeff Herbert
- Graham Taylor
- Jon Swenson

Bureau of Land Management
- Jack Jones
- Ted Wenzel
- Lewis Myers

Helena National Forest
- Carl Frounfelker

Region 4
(Great Falls)

Lewis and Clark National Forest
- Roger Evans
- Louis Young

Bureau of Land Management
- Tad Day
- Larry Eichhorn

Montana Dept. FW & P
- Jim Mitchell
- Dick Bucsis
- Kerry Constan
- Frank Feist
- John McCarthy
- Gary Olson
- Bob Watts

Region 5
(Billings)

Gallatin National Forest
- Jerry Light

Lewis and Clark National Forest
- Wayne Butz

Custer National Forest
- John Edwards

Montana Dept. FW & P
- Charlie Eustace
- Shawn Stewart
- Claire Simmone
- Tom Butts

Bureau of Land Management
- Steve Seth

Region 6
(Malta)

Bureau of Land Management
- Mike Fisher
- Chris Hoff
- Dwain Prellwitz
- John Grensten

Montana Dept. of FW & P
- Harold Wentland
- Al Rosgaard
- Harvey Nyberg
- Ron Stoneberg

Region 7
(Miles City)

Custer National Forest
- John Edwards

Bureau of Land Management
- Mark Gorges
- Gerry Gill
- Dan Bricco

Montana Dept. of FW & P
- Neil Martin
- Bernie Hildebrand
- Gary Hammond
- Steve Knapp
- Heidi Youmans

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Graham, P.J. 1985. Pacific Northwest Rivers Study Assessment Guidelines, Montana. MT. Dept. Fish, Wildlife and Parks, Helena, MT.

APPENDIX A

COVER SHEET INSTRUCTIONS

1) Hydrologic Unit Code: see map or number in River Mile Index.
2) Give MDFWP Region #.
3) Drainage Code.
4) I.D. (serial #) is assigned.
5) River/Basin Name
6) Unit Type (B=Basin,T=Tribs only, M=Mainstem)
7) Unit Lower Boundary(use creek name whenever possible)
8) Unit Upper Boundary(use creek name whenever possible)
9) Water Code if basin or mainstem.

Tributary to and description of confluence:
10) Give the Name of the river/stream into which the above stream flows
11) Drainage Code of above.
12) River Mile at Confluence.
13) Township, Range, and Section at Confluence.

Main stem or Basin Location:
14) Lower River Mile.
15) Upper River Mile.
16) Lower Boundary Legal Description.
17) Upper Boundary Legal Description.
18) Counties(use 3 digit code system); lower to upper.

Tributary Locations (if tribs only unit) between:
19) Lower River Mile.
20) Upper River Mile.
21) Lower Legal Description.
22) Upper Legal Description.
23) Evaluator(s) Last Name and First Initial.
24) Evaluator's Agency.
25) Month and Year of Evaluation.

Tributaries (for Tribs Only Units).
26) Tributary Name.
27) Tributary Water Code.
28) Tributary river mile at Confluence.

QUESTIONNAIRE

Put all answers on the Answer Sheet. River assessment units will be assigned a final resource value based on points accumulated in the Habitat, Species and Recreation Criteria.

I. **HABITAT VALUE:**

A. Specialized Land Use: If river or basin contains any of the following designations, please circle the appropriate land protection. Circle letter(s) on Answer Sheet.

a. Proposed Wilderness Areas (As listed in USFS or BLM recommendations or Alternative "W" by conservation organizations.
b. Wild and Scenic River Corridors
c. National Wildlife Refuges
d. National Fish Hatcheries
e. Wildlife Management Areas
f. Waterfowl Production Areas
g. Nature Conservancy Areas
h. Conservation Easements for habitat/wildlife protection purpose
i. Outstanding Natural Areas (BLM,USFS Research Natural Areas)

B. Habitat Quality:
The term quality refers to both the integrity and condition of the riparian zone (regardless of water course size) and the presence of valuable wildlife/habitat characteristics described below.Select the best answer for each characteristic:

1. Conditions of riparian zone:
   a. High - Riparian zone is in excellent condition; minimally impacted by land uses such as roads, agriculture grazing, subdivisions; riparian zone retains nearly all of its natural vegetation characteristics and wildlife values.
   b. Moderate - Riparian zone has been moderately impacted by land uses (as above) but retains significant amount of inherent natural vegetation characteristics and wildlife values; impacted areas have potential to be rehabilitated;
   c. Low - Riparian zone highly impacted by land uses such that only remnant patches or blocks of natural vegetation exist; only limited oppor-

tunity exists for vegetative rehabilitation.

2. Forested:
   a. High - Numerous large tracts (>150 ac) or continuous bordering (>30 ft wide) of mature deciduous or coniferous forest (e.g. gallery forests);
   b. Moderate - Occasional large tracts (>150 ac) or intermittent bordering (>30 ft) of mature deciduous or coniferous forest;
   c. Low - Little or no forest development along riparian zone.

3. Wetlands:
   a. Oxbow lakes, sloughs, backwater areas or other significant wetland types common along water course (characteristic of large meandering rivers or smaller rivers with an abundance of emergent plants wet meadows,channels,etc.)
   b. Occasional oxbow lakes, ponds, sloughs, backwater areas, or seeps.
   c. Few to no significant wetland areas associated with water course(s).

4. Islands:
   a. Many (characteristic of braided rivers/ streams);
   b. Occasional to several islands;
   c. Few to no islands.

5. Vegetative Structure/Diversity:
   a. Riparian zone vegetation well-developed and characterized by a wide variety of vegetation types and structural types appropriate for its size and configuration;
   b. Riparian zone less well-developed due to land uses or natural characteristics; has moderate variety of vegetation and structural types;
   c. Riparian zone dominated by few to one major vegetation type (e.g. crops, pasture, range) or is unvegetated (urban, industrial situations).

II. **SPECIES VALUE**

A. Threatened or Endangered Species: Does the river segment or basin contain habitats potentially important for the recovery of any of the following threatened or endangered species?

1. Grizzly bear
   a. Fringe management areas
   b. Management areas 1,2

2. Wolf (Potential recovery areas)

3. Bald Eagle
   a. Occasional wintering and migration areas
   b. Existing and potential nesting, wintering, roosting, key migration corridors

4. Whooping Crane

5. Peregrine Falcon (historic,potential nesting)

B. Game and Furbearer Species

1. Type Range - Indicate the seasonal use of each species on chart on answer sheet (spring, summer, winter or fall or combination.)

2. Importance Values - For any designated and mapped wildlife seasonal concentration areas (by MDFWP, BLM, USFS, USFWS) which occur along the river or basin, indicate type of use and Importance Value (I.V.) using definitions below.

   3 = Critical - used during most severe winters; high concentrations of animals; highly important or essential for large populations;
   2 = Species uses area during moderate winters; relatively important for large population; area of moderate animal concentrations;
   1 = Has some value to species on seasonal basis, but is not essential;

C. Habitat Suitability

Rank the overall habitat suitability (H.S.) on the data form for the river assessment unit for the species listed on the chart using definitions below:

3= Excellent - river or basin has potential to support high density or numbers of the particular species relative to other habitats in Montana; classic habitat for this species in Montana;
2= Moderate - river or basin supports moderate density or numbers of this species, but better habitat can be found elsewhere in Montana;
1= Low - river or basin supports low density or number of this species; habitat may be patchy or marginal;
0 or blank = No suitable habitat exists for this species along river or in basin.

D. Specialized Wildlife Use Area:
Does river segment or basin contain any of the following specialized wildlife use areas? Circle letter on Answer Sheet.

a) Waterfowl staging areas, low level feeding flight paths, "prime wetlands" as described by USFWS or MDFWP.
b) Warm/hot springs open in winter and used by winter/migrating waterfowl species;
c) High gradient streams supporting breeding harlequin ducks or amphibians of special concern (Pacific giant salamander, Coeur d'Alene salamander, Rough skinned newt, tailed frog);
d) Sloughs, backwater areas supporting reptiles of special concern (spiny softshell, snapping turtle);
e) Riparian areas supporting colonies (>5 pairs) of double-crested cormorants, great blue herons, American white pelican;
f) Large nesting osprey population area (>1 active nest per river mile long minimum 5 river miles);
g) Cliffs occupied or suitable for nesting golden eagles;
h) High density raptor populations;
j) Other (write in on data form):

III. **RECREATIONAL VALUE:** The recreational value considers both consumptive (hunting/trapping) uses and nonconsumptive (bird watching, photog. etc) uses of the wildlife/habitat resource.

A. Consumptive Recreation:

Column 1. For the river assessment unit, select the top species (no more than 3) that are probably most sought after. Consider the habitat and general harvest characteristics for the hunting district(s) as a whole. Put species abbreviation (Appendix A) in column 1.

Column 2 and 3. Write in the hunting district(s)(H.D.)(maximum of 3) or county(s) appropriate for the unit and the species selected. For a unit in more than 1 H.D., estimate the % of the river assessment unit in each hunting district (50% in H.D.101, 50% in H.D.102) and put in column 3 next to the H.D. #.

Column 4. Give a relative rating (High,Medium, Low) for the overall hunting effort that occurs in the unit relative to the rest of the H.D. or county in which the unit lies.

B. Nonconsumptive Recreation - Enter the appropriate rating on the answer sheet for each nonconsumptive use.

1. Wildlife/habitat-oriented uses
Rate the type and level of wildlife/habitat-oriented uses which occur in unit using criteria below. Wildlife/habitat-oriented uses include but are not limited to: bird watching; roadside wildlife watching; collecting/identifying wildflowers, reptiles, amphibians, insects; wildlife/nature photography, artistry, etc.

4 - Area attracts users or visitors from all over the country; relatively high level of use; species or habitats accessible or visible and/or relatively uncommon on national basis;
3 - Area attracts visitors statewide; moderate level of use;
2 - Area attracts visitors from region, or multi-county area. May be significantly used;
1 - Area attracts primarily local people.

2. Scientific/Educational Value
Rate the value of the wildlife/habitat resources for scientific, research and educational values using criteria below:

4 - Area contains relict or disjunct plant or animal communities (e.g. bogs) or pristine natural vegetation types or species that are rare or threatened. Plants and/or animals associated with area are highly unusual - not typically found in state. Has highest scientific/educational value - nationally significant;
3 - type localities for other plant or animal species, for forest or range habitat types; near pristine vegetation sites;
2 - other areas with important educational value including areas frequently visited by school groups;
1 - study areas for longterm biological or ecological value.

3. Aesthetics
5 - A unit of outstanding natural beauty in a pristine setting;
4 - a unit 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;
3 - a unit with natural beauty but of a more common type than listed under A and B. A clean stream in an attractive setting;
2 - a unit with fair aesthetic qualities;
1 - a unit with low aesthetic qualities.

Recreation

PACIFIC NORTHWEST RIVERS STUDY

Method for Assessing the Significance of River Segments and Systems for Recreational Resources in Montana

June 1986

LEAD AGENCY

Montana Department of Fish, Wildlife, and Parks
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INTRODUCTION

The Pacific Northwest Rivers Study was initiated to assess the significance of river segments and systems for a variety of fish, wildlife, natural, recreational, and cultural resource values. The Montana Department of Fish, Wildlife, and Parks was designated to take the lead in assessing the value of rivers for Recreational Resources in the state of Montana.

This report describes the methods used to complete the assessment. The Category Description section provides background on the rationale for Montana's inventory method. The Value Class section describes the end product of this portion of the study--the classes into which river segments were grouped. The Criteria section explains the nine criteria Montana used to inventory river segments. The Standards section explains how the criteria and professional judgment were used to assign rivers to value classes.

The Study Methods section explains the mechanics of the procedure--the specific tasks completed to conduct the inventory. The reader may wish to scan this section first to see how the study elements fit together.

The Project Evaluation section discusses the entire process, suggesting possible refinements and updating procedures. The section on Use Considerations then suggests appropriate and inappropriate uses of the results. This is followed by a list of project participants and their agency affiliations.

Finally, the Appendices include supporting material such as copies of important study correspondence, sample worksheets, and instructions to study participants.

CATEGORY DESCRIPTION

Many physical, biological, social, and managerial characteristics contribute to the recreational value of rivers. The type and ease of public access, use levels, river length, type of scenery, rapids, the presence of game fish and wildlife, level of development, onsite management, and other aspects of the river corridor help to determine the level and type of recreation opportunity the river provides.

Public tastes regarding these and other river attributes may vary, so recreation managers recognize the importance of providing a wide variety of different river recreation opportunities. It is therefore not desirable to assign value to specific river characteristics.

For example, high use levels indicate a river's popularity--but not necessarily the level of recreational quality. Rivers receiving high use may simply be located closer to population centers, or have easier access than other streams. Less-popular river segments may provide better opportunities for solitude, or river camping, which are also needed opportunities.

The point is that many types of rivers can be valuable for recreation; rivers with high use or easy access do not necessarily have more intrinsic value, and the same is true for other recreational characteristics of rivers.

River segments were therefore categorized by several recreational attributes, but value was not assigned strictly based on them; categorization and valuation were distinct steps. No point system was used to determine value classes; instead, managers and river users suggested value classes based on their judgement.

VALUE CLASSES

Following are the value classes (and corresponding map colors) to which recreational river reaches were assigned:

1 Outstanding recreational resources (Red)

2 Substantial value recreational resources (Orange)

3 Moderate value recreational resources (Grey)

4 Limited value recreational resources (Green)

U Unclassified or unknown recreational resources (Brown)

If a river segment was not included in one of these classes, the resource value was presumed not present or did not meet the minimum standards to be included in the study. However, hydroelectric development on segments not included could still adversely affect recreational resources. The inventory is concluding only that segments inventoried are more likely to have recreational resources that could pose constraints to development.

There are likely many Montana rivers providing recreational opportunities that are not included in the study; these will be sought out when the data base is updated.

Value classes had verbal descriptions of the type of river segment that would fall into each class, to insure consistency of class definitions. These are provided in the section on Standards.

CRITERIA

Eight criteria--resource attributes or use characteristics that help to give rivers recreational value--were used to describe the river segments included in the study; each segment was rated on all criteria. Following is a description of each.

1. Opportunities for boating.

River segments were categorized by water surface characteristics, which also implied the type of boating possible on that part of the river. Five categories were used:

- Segment is exclusively flat water or smooth enough to permit motorboats.

- Segment contains minor rapids and riffles (Class I or II) suitable for canoes, dories, and other crafts.

- Segment contains moderate rapids (Class II to III) more suitable for whitewater canoeing, rafting and kayaking.

- Segment contains large rapids (Class III to V) most suited to advanced whitewater rafting and kayaking.

- Water not boated (reason will be provided).

2. Opportunities for water-based recreational activities.

These were the developed and dispersed uses that currently took place on or along the river segment. Activities included kayaking, rafting, canoeing, innertubing, fishing from bank or shore, swimming, motorboating, and other activities as needed. Each activity present along a segment was rated as either primary (one of the main reasons people visited the segment) or secondary (an activity that currently took place, but was not one of the most important segment uses).

3. Land-based recreation activities.

These were the developed and dispersed uses that currently took place along the river segment. Activities included tent camping, car camping, motorized and non-motorized trail use, scenic viewing, picnicking, and other activities as needed. Activities were designated as primary or secondary.

4. Current use levels.

If quantitative measures or estimates were available (in visits, visitor-days or other form) they were used (note: in this case, river segment use levels also were rated the following way). If quantitative figures or estimate were not available, use was estimated using the following three categories:

- Heavy or concentrated recreational use; on a typical weekend day during the summer, people will commonly be seen at sites on shore and on the river (if boatable).

- Moderate or dispersed recreational use; on a typical weekend day during the summer, people will sometimes be seen on or along the river.

- Limited or highly dispersed use; on a typical weekend day during the summer, few or no people will likely be seen on or along the river.

5. Access.

This criterion was defined as ease of reaching the river from adjacent land areas (that is, access to, not within, the river corridor). Five classes of access were possible:

- Abundant access existed if the segment is parallelled by public land much of its length and paved or car-suitable roads parallel or frequently meet the river. Access to the river shoreline should also be abundant. For boatable stretches, access may be restricted along the river, but paved roads should permit easy put-in and take-out of boats.

- Moderate access existed if the segment is parallelled or intersected occasionally by good quality roads. Access to the shoreline may be restricted in places by ownership or topography. Access to put-ins or take-outs is not as easy.

- Limited access existed if the segment is rarely parallelled or intersected by roads; the main access may be by poor roads or trails. Shoreline access may be difficult for much of the segment's length.

- Restricted access exists if the segment is not accessible by road and the shoreline is difficult to reach from adjacent lands.

- Other access conditions may have been used if none of the four conditions adequately described access to the river segment.

6. Recreation Opportunity Setting class.

The ROS system used by the U.S. Forest Service was adapted to better describe river corridors. River segments were assigned to one of five classes:

PRIMITIVE. The river corridor is an essentially unmodified natural environment with access along the segment by trail only. Nonrecreational resource uses are either not present or are very compatible with river recreation. Recreational users are likely dispersed, with abundant opportunities for solitude. Recreational development is minimal or not present. River may flow through a designated Wilderness Area.

SEMI-PRIMITIVE. The river corridor is a predominantly unmodified natural environment. Access along the segment may be possible by paved road, but the road does not intrude on the setting's natural qualities. Nonrecreational resource uses may be present but are compatible with river recreation. Other users may be present, but opportunities for solitude exist. Limited recreational development may be found in the river corridor, but primarily for protection of resource

values and user safety.

TRANSITION. The river corridor may alternate between predominantly natural and rural in character. A paved road may parallel the river for some distance, but does not provide abundant access to the water. Nonrecreational resource uses may be present, and may occasionally supplant recreational uses. Recreation visitors may be concentrated at informal or developed sites along the segment.

RURAL. The river corridor remains largely natural, but with moderate evidence of the sights and sounds of civilization. Evidence of other recreation users is abundant. Roads, powerlines, and other manmade features, as well as nonrecreational resource uses, may be present along part or most of the segment. Recreational development, if present, is designed for larger numbers of users.

URBAN. The river corridor is substantially modified, with the natural landscape subordinate to other resource uses. The segment may be closely parallelled for nearly its entire length by highways, transmission lines, or buildings and settlements. Opportunities for solitude are likely very few or nonexistant.

7. Scenic quality.

This criterion categorized river segments on the basis of the memorability, harmony, and uniqueness of their visual settings. The diversity of views and the presence and effect of cultural modifications was also considered. Four categories were used:

- Outstanding scenic quality. For these segments, landforms, vegetation patterns, and water features combine to create unique, highly memorable, and harmonious visual settings. Views along the river and away from the river to surrounding scenery are highly diverse, providing river users with scenery that is spectacular and/or not common on other rivers in the region. If buildings, roads, and other cultural modifications are present, they either add favorably to or do not intrude on visual quality for river users.

- High scenic quality. For these segments, landforms, vegetation patterns, and water features combine to create a highly memorable and visually pleasing setting, although one that may be more common to the region. Views along and away from the river are highly diverse and cultural modifications, if present, either add to or do not detract from the visual setting.

- Moderate scenic quality. For these segments, landforms, vegetation patterns, and water features along the river combine to create harmonious but common visual settings. Views along and away from the river are somewhat varied, but lack a high degree of contrast and diversity. Encroachment of cultural modifications may be evident, and either adds little to or detracts from visual quality.

- Low scenic quality. For these segments, landforms, vegetation patterns, and water features combine to create visual settings lacking in variety and contrast. Views along and away from the river are monotonous and common. Cultural modifications may dominate and detract from visual quality.

8. Developed recreation sites along segment.

The names and types of public and private outdoor recreation facilities located along the river were listed.

STANDARDS

Standards are technically the means by which the river segments should be assigned to one of the value classes. As noted in the introduction, however, the criteria did not have specific values, numerical ratings, or points attached to them. Instead, raters were asked to study the set of criteria for a given segment and combine that data (and other appropriate information) with their professional judgment to assign a value class.

The raters were told they could consider perceived quality of the recreation experience opportunity, local or regional supply of and demand for similar opportunities, volume or seasonality of flow, and other factors. The specific reasons a segment was assigned to a value class were recorded. This allowed flexibility in value class assignment, yet gave raters a common basis for their assessment and allows the process to be understood by others.

Because the raters could consider local and regional importance as one of the contributors to value class assignment, a river having a set of attributes that are highly-valued in one part of the state might not be as highly-valued in another region. However, a river segment was not devalued just because several high-value rivers were located close to each other.

As stated in the Introduction, the Value Classes had descriptions anchored to them, to help raters reach a concensus on value class

assignment and maintain consistency from region to region:

I. OUTSTANDING recreational resources are exceptionally fine, popular or well-known recreational settings that nearly everyone would agree are "Blue Ribbon" resources. They are unique within a region or provide very high-quality recreational opportunities. These segments would likely have many attributes (criteria) that are highly-valued within the region, and most raters should recognize that the river belongs in this class. Recreational users should be willing to travel long distances or endure difficult access to use these resources. Use of this class should be reserved. For example, in the state's stream evaluation system for fisheries, only about 10 percent of the river reaches are in the highest-value class.

II. SUBSTANTIAL recreational resources are highly valued, but not quite as much as segments in Class I. These segments would likely contain about five or more criteria ratings judged to be desirable within the region. Very important recreational settings, among the finer in the state or region and capable of providing top-quality recreational experiences.

III. MODERATE recreational resources have a considerable degree of recreational value, but not as much (or as many types of) value as Class II segments. They would likely have received two to five criteria ratings judged to be desirable within the region. These resources are likely available elsewhere in the region.

IV. LIMITED recreational resources have some definite recreational value, but not as much (or as many types of) value as Class III segments. These should contain at least one criterion rating judged to be important within the region. Recreational values could be limited by restricted access, polluted water, disturbed shorelines, or similar intrusions.

V. UNCLASSIFIED recreational resources likely have some current or potential recreational value, but the level or type of value is unknown. All rivers in the state having a flow of about 5 cfs or higher during recreational use periods are assumed to be in this class, until they are either rated higher during the inventory or dropped from the study.

STUDY METHODS

The recreation study had two stages: identification of river reaches having recreational value; and an inventory and evaluation of those reaches. Two main groups participated in the study: state and federal recreation managers in Montana; and private and commercial river users. The process can be most easily explained by reviewing each task completed. Those familiar with the Assessment Guidelines published in June, 1985, will recognize that the study closely followed initial plans.

Work on the project began in December, 1984, when an independent contractor was hired to inventory the availability of expertise and information on river recreation in Montana. The contractor, whose title was River Recreation Research Coordinator, developed study methods and prepared worksheets for data collection. In February, another contractor was hired as a Research Assistant to implement the project. These two contractors constituted the DFWP project staff.

Staff work plans and completed work were reviewed at each step by the Senior Resource Expert and the Cooperating Resource Experts from the U.S. Forest Service, Bureau of Land Management, and University of Montana.

In March, 1985, DFWP project staff wrote to recreation managers employed by the U.S. Forest Service, Bureau of Land Management, and Montana Department of Fish, Wildlife and Parks. More than 20 managers and staff members participated in the study (see List of Participants).

After introducing the purpose and goals of the Rivers Study, the letter asked managers to identify river reaches having recreational values. A set of guidelines and sample map (see Appendix A) were included to help the managers, who used 1:100,000 BLM maps provided to clearly identify recreational river reaches in their regions. Followup telephone calls were made to each manager, to make sure the study goals and methods were understood.

Once all the maps had been returned, project staff compared and adjusted the designated river reaches to create a final map version. Considerable overlap existed among the state and federal agencies' jurisdictions, so this step was necessary to standardize the maps. The resulting maps were cross-checked against recreational river reaches identified in the existing Montana Stream Database to assure inclusion of any additional reaches. A complete set of the working maps is at the DFWP Parks Division in Helena.

In April, 1985, the adjusted working maps were returned to the managers with a worksheet to complete for each river reach with which they were familiar. The worksheet (Appendix B) contained items on water character and boating suitability, water and land

based recreation activities taking place on or along the river reach, use levels, access, recreation opportunity spectrum (ROS) class, scenic quality, and the number and type of developed recreation sites along the reach. Managers also indicated what Value Class they would assign to each river reach, writing explanations in their own words.

A set of instructions was included to give all managers a common basis for providing the worksheet information (Appendix C). Each manager was again called by project staff during this phase of the study.

Once worksheets were returned, project staff reviewed and compiled the managers' ratings onto a single worksheet for each river reach. In many cases, only one agency completed a worksheet for a given reach. However, when more than one agency rated the same reach, their ratings were pooled to reach a "concensus." If two managers rated the same reach differently on a criterion, a new category was created. For example, if a river reach was rated as having abundant access by one manager and as moderate by another, a coding number midway between the two was assigned. Rules for developing final value class assignments are provided in Appendix D. Although some averaging was done in this step, if any manager rated a reach as Class I (Oustanding Value), that was the final value class, regardless of any other ratings received.

At this point, the other participant group--river users--should be reintroduced. In the initial mailing, the managers also had been asked to provide the names and addresses of river recreationists, clubs, commercial river outfitters, and others who would have an interest in the study; project staff identified additional river users. On April 11, about 300 river users identified from throughout Montana (list available from DFWP Parks Division, Helena) were mailed a letter introducing the study and asking for river reaches and proposed value class assignments.

About ten percent of the river users responded, nominating one or more river reaches for inclusion in the inventory. From this information, project staff prepared a master list of reaches and value classes and compared this to the list generated by the managers.

Few new reaches were identified, as user comments tended to emphasize more popular and well-known reaches already included. Managers and users rarely were more than one value class apart; the higher of the two was used as the final value class assignment unless more than one manager had agreed on a different class.

After combining information received from managers and users, in October, 1985, project staff mailed a draft printout of the data to each manager for review and correction. A cover letter explaining this procedure was sent with the printout.

Project staff called each manager to make sure the process was clear.

At the same time, a letter was sent to river users who had participated in the study. The users were sent a stamped, addressed postcard and asked to indicate which regional list(s) of river reaches they would like to review. All who responded were sent the same printout mailed to the managers. In November, 1985, project staff compiled all of the additions and corections made by managers and users onto a master file. This data file, the current version of the Montana recreation inventory, was sent to Bonneville Power Administration and the Northwest Power Planning Council in May, 1986.

The 779 river reaches identified were mapped on a second set of BLM 1:100,000 maps and assigned segment codes from the Montana Stream Database. These codes consisted of a one-digit DFWP region code (seven in Montana), a two-digit drainage code (22 in Montana), a four-digit code unique to each river, and a three-digit reach code, used only when a river was divided into more than one reach. Map colors used were described in the section on Value Classes.

The working and final maps, worksheets, all study correspondence, and an alphabetical list of the river reaches identified are available from DFWP.

PROJECT EVALUATION AND USE CONSIDERATIONS

This was the first comprehensive study of the recreational rivers in Montana. The scope of this study was limited because the time and budget constraints did not permit the complete field inventory commonly used to conduct inventories of recreational resources. While suitable for use as a planning document in the initial stages of hydropower planning, this inventory is not suitable for actually siting facilities.

The initial inventory and assessment of recreational rivers is better suited for broad regional planning activities than for providing detailed, specific information on individual reaches. However, the data provide an overall look at the relative availability of river-related recreation opportunities in Montana.

The data base's utility will increase as it is expanded and updated, a crucial component of the river recreaion inventory. A number of tasks could be completed in the next phase of the recreation portion of the Pacific Northwest Rivers Study.

Following is a preliminary list of these tasks, which do not include activities related to restructuring or manipulating the existing data base.

1. Update the data base, with emphasis on identifying possible reach additions and reviewing existing data. This could be accomplished by inviting recreation managers and river users to attend regional meetings around the state. An added benefit would be getting these groups together to discuss river recreation and management in the region. Another objective would be to agree on value class assignments for reaches that are currently unclassified. A working paper outlining the updating and revision process should be developed and then approved by the Cooperating Resource Experts.

2. Prepare 1:500,000 maps of the river reaches so study results could be viewed easily. The existing set of 100 maps make presentation nearly impossible. If BPA is not planning his capability in the next few months, this should be done on contract.

3. Assess the need for additional inventory criteria to be included, and develop a list of possible additions. Many river characteristics such as flow levels, water quality, and use patterns contribute to recreational value but were not inventoried but would complement existing data well. This should be done before manager and user updates of the data.

4. Make DFWP and federal recreation managers more familiar with the data base so they can use it easily. If the data base is not institutionalized now, its value may never be realized. Recreation managers in each DFWP region should be trained in data base use.

5. Develop a method to update the data base every three years. Recreational use patterns of rivers have changed drastically over the past two decades. Rivers once considered not boatable are being floated regularly, and the 1985 Montana Stream Access Bill may change use patterns on a wide variety of rivers and streams. The data base should be updated once every three years to reflect changes in use patterns, new data, and evolving values.

LIST OF AGENCY PARTICIPANTS

Following is a list of the recreation managers who participated (along with their staffs) in the study. A list of the 300 private and commercial river users contacted is available from DFWP.

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

Region 1: Mike Baker, Kalispell

Region 2: Tom Greenwood, Missoula

Region 3: Dick Ellis, Bozeman

Region 4: Dave Todd, Great Falls

Region 5: Jerry Walker, Billings

Region 6: Bob Stordahl, Glasgow

Region 7: Doug Monger, Miles City

BUREAU OF LAND MANAGEMENT

District A: Darrell McDaniel, Butte

District B: Clark Whitehead, Lewistown

District C: Keith Mosbaugh, Billings

U.S. FOREST SERVICE

Beaverhead NF: Dick Owenby

Bitterroot NF: Chuck Troxel

Custer NF: Wayne Smetanka

Deerlodge NF: Bo Nelson

Flathead NF: Pat Thomas

Gallatin NF: Susan Marsh

Helena NF: Gordon Gray

Kootenai NF: Gary Hathaway

Lewis & CLark NF: Jerry Reese

Lolo NF: Jerry Covault

APPENDICES

Recreation
Segment Designation
Guidelines

Segments are rivers, sections of rivers, or groups of tributaries (such as the upper drainage or headwater tributaries of a major river) that have relatively homogeneous recreational use patterns and values.

On the 1:100,000 maps provided, use a red pencil to mark the boundaries of each river segment you feel is significant to recreation. You should consider every stream or river in your management region. It is not expected, however, that every stream or river will be significant to river recreation and no designation is needed in these cases. Lakes and reservoirs are not to be considered. For each segment considered significant, bracket its upper and lower end points >< on the map in red pencil and label each end point with a river mile, physical feature, or other means of identifying the endpoint...see attached example.

River Segments will not have an average length; they can be very short (such as the Mad Mile whitewater section of the Swan River) or fairly long (such as the Smith River between Camp baker and Eden Bridge, a popular 59-mile float). When in doubt, however, define the segments to be longer than shorter. It is more desirable to have several longer segments, than to have short, choppy segments every time the river changes slightly.

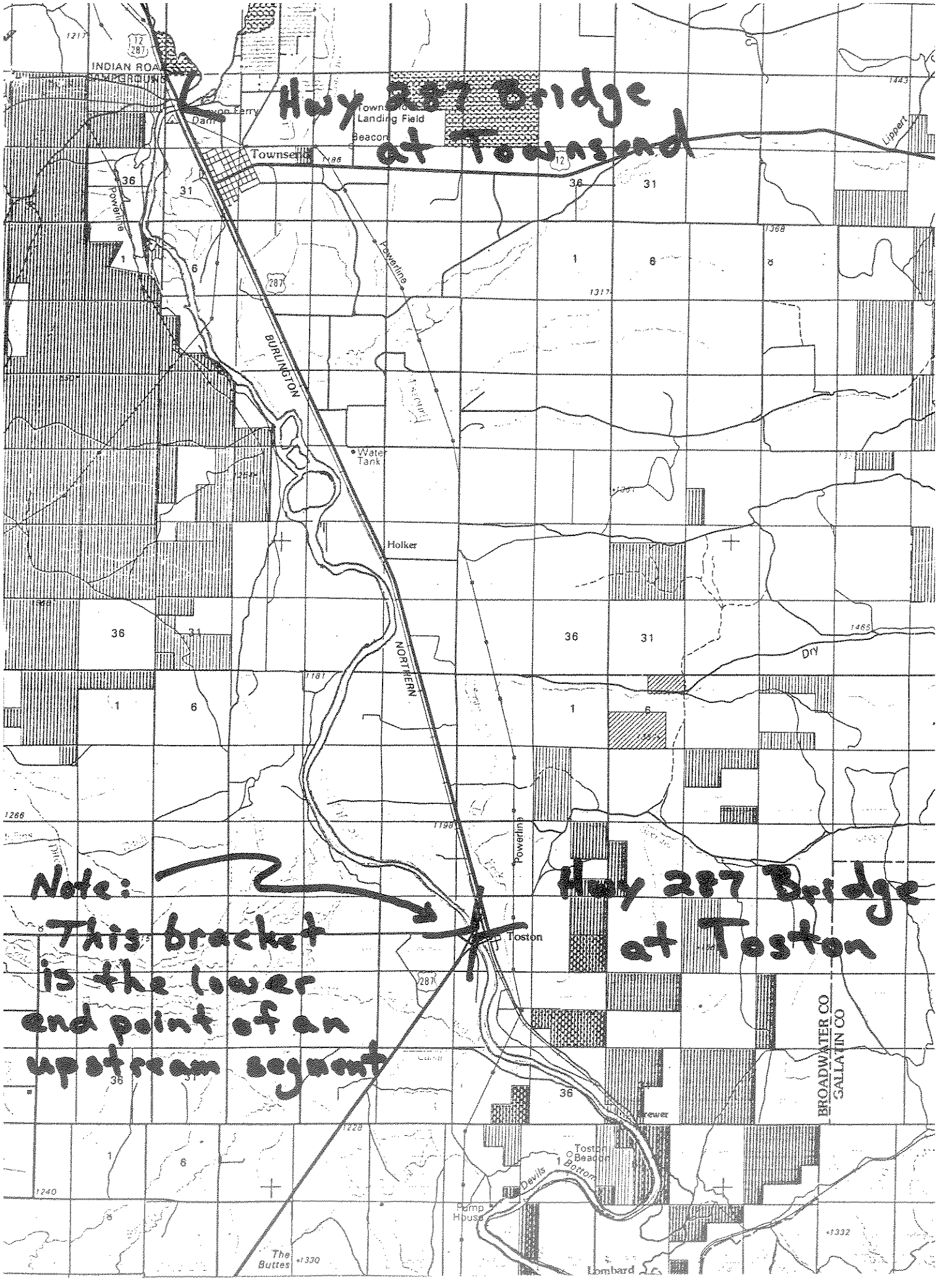
If you feel a river segment logically extends outside your management jurisdiction, that is fine; place the end point wherever you feel it belongs.

Headwaters areas of rivers or sub-drainages can be defined as a single "segment." It may make sense to do this for headwater or drainage regions which have some consistent level of recreational value, but for which detailed information on every small tributary in the area is not available. To designate such a segment, circle the entire area of significance.

When defining segments, think about how each will rate on the following criteria. If a potential segment would change substantially on one or more of the criteria, then the segment could be divided into two or more separate ones. The criteria are:

1) boating:
2) fishing;
3) other recreational activities such as camping, hiking, and swimming;
4) scenic quality;
5) Recreation Opportunity Setting Class (from Urban to Primitive);
6) access to the river corridor; and
7) use levels;

The segments you and other state and federal managers identify will be combined and adjusted by rivers study project staff to develop a set of uniform segments. By a second mailing, you will be asked to evaluate each river segment in regard to the above criteria.


Hwy 287 Bridge at Townsend
Townsend
Landing Field
Beacon
Dam
INDIAN ROA
CAMPGROUN
Powerline
BURLINGTON
NORTHERN
Water Tank
Holker
Dry
Lippert
Note: This bracket is the lower end point of an upstream segment
Hwy 287 Bridge at Toston
Toston
Toston Beacon
Devils Bottom
Pump House
The Buttes
Ibmbard
BROADWATER CO
GALLATIN CO
Brewer

GUIDELINES FOR COMPLETING INVENTORY WORKSHEET

1. Fill in name of river.

2. Provide a name if the segment has one, or give a brief description (examples are "Alberton Gorge" or "Yankee Jim Canyon")

3. Describe the lower (downstream) endpoint of the segment, by physical feature, river mile, or other distinguishing characteristic.

4. Describe the upper (upstream) endpoint of the segment.

5. Fill in the approximate length of the segment, in miles.

6. The segment number will be completed later by rivers study staff.

Criteria

Criteria are the resource attributes or use patterns that help to give river segments their recreational value. Rating each segment on the nine criteria will give managers a common basis for value class assignment and provide inventory data on recreational rivers in Montana. Pick the criteria discriptor that best fits the river segment.

7. Check the box that best describes the segment's water character and boating suitability. If the stretch is not boatable, please explain why. Segments described as containing rapids may also (and will likely) contain stretches of flat water. Because this criterion changes with water volume, base your rating on average flows during the recreational use season.

Please also indicate the average length of boating season (in months) if segment is boatable.

8&9. Indicate which of the activities listed currently take place on or along the segment. Place a 1 in the box if the activity is one of the primary recreational uses of the segment. Place a 2 in the box if the activity occurs, but mostly as a secondary recreational use. Add activities to the list as appropriate, and if the activity does not occur or use is minimal, leave the box blank.

10. If quantitative measures or estimates are available (in visits, visitor-days or other form) they should be used. Also rate the river segment by checking one of the boxes provided according to the following three categories:

- Heavy or Concentrated Recreational Use; on a typical weekend day during the summer, people will commonly be seen at sites on shore and on the river (if boatable).

- Moderate or Dispersed Recreational Use; on a typical weekend day during the summer, people will sometimes be seen along the river.

- Low or Highly Dispersed Use; on a typical weekend day during the summer, few or no people will likely be seen on or along the river.

11. This criterion is access to the river corridor, not access within the river corridor. It is more a measure of ease of access, rather than a legal right to enter.

Use the following definitions to rate the river segment:

- Abundant Access exists if the segment is parallelled by public land much of its length and /or paved or passenger car-suitable roads parallel or frequently intersect the river. Access to the river shoreline should also be abundant. For boating stretches, access may be restricted along the river but should be by paved road to the put-in and take-out.

- Moderate Access exists if the segment is intersected or parallelled only occasionally by good quality roads. Access to the shoreline may in some places be restricted by ownership or topography.

- Limited Access exists if the segment is rarely parallelled or intersected by roads, and the main access may be by trail or poor roads. Shoreline access may be difficult for much of the segment's length.

- Restricted Access exists if the segment is not accessible by road, and the shoreline is difficult to reach from adjacent land areas. Heavy or exclusively private ownership is possible.

Space is provided to describe access conditions not well-described by these four categories.

12. River segments should be assigned to one of five classes:

A. PRIMITIVE. The river corridor is an essentially unmodified natural environment with access along the segment by trail only. Nonrecreational resource uses are either not present or are very compatible with river recreation. Recreational users are dispersed, with abundant opportunities for solitude. Recreational development is minimal or not present.

B. SEMI-PRIMITIVE. The river corridor is a predominantly unmodified natural environment. Access along the segment may be possible by paved road, but the road does not intrude on the setting's natural qualities. Nonrecreational resource uses may be present but are compatible with river recreation. Other users may be present, but opportunities for solitude exist. Limited recreational development may be found in the river corridor, but primarily for protection of resource values and user safety.

C. TRANSITION. The river corridor may alternate between predominantly natural and rural in character. A paved road may parallel the river for some distance, but does not provide abundant access to the water. Nonrecreational resource uses may be present, and may occasionally supplant recreational uses. Recreational use may be concentrated intermittantly along the segment.

D. RURAL. The river corridor remains largely natural, but with moderate evidence of the sights and sounds of civilization. Evidence of other recreation users is abundant. Roads, powerlines, and other manmade features, as well as nonrecreational resource uses, may be present along part or most of the segment. Recreational development, if present, is designed for larger numbers of users.

E. URBAN. The river corridor is substantially modified, with the natural landscape subordinate to other resource uses. The segment may be closely paralleled for nearly its entire length by highways, transmission lines, or buildings and settlements. Opportunities for solitude are likely very few or nonexistent.

13. Judgement should be made on the general scenic quality along the segment. Scenic quality can vary from spot to spot along the segment; the rating should be based on the overall impression a recreational user would likely retain after visiting the segment. Use the following definitions:

- Outstanding Scenic Quality. For these segments, landforms, vegetation patterns, and water features combine to create unique, highly memorable, and harmonious visual settings. Views along the river and away from the river to surrounding scenery are highly diverse, providing river users with scenery that is spectacular and/or not common on other rivers in the region. If buildings, roads, and other cultural modifications are present, they either add favorably to or do not intrude on visual quality for river users.

- Substantial Scenic Quality. For these segments, landforms, vegetation patterns, and water features combine to create a highly memorable and visually pleasing setting, although one that may be more common to the region. Views along and away from the river are highly diverse and cultural modifications, if present, either add to or do not detract from the visual setting.

- Moderate Scenic Quality. For these segments, landforms, vegetation patterns, and water features along the river combine to create harmonious but common visual settings. Views along and away from the river are somewhat varied, but lack a high degree of contrast and diversity. Encroachment of cultural modifications may be evident, and either adds little to or detracts from visual quality.

- Limited or Low Scenic Quality. For these segments, landforms, vegetation patterns, and water features combine to create visual settings lacking in variety and contrast. Views along and away from the river are monotonous and common. Cultural modifications may dominate and detract from visual quality.

14. The current sportfishery value for the segment will be completed by project staff based on the Montana Stream Rating System.

15. List any developed recreation sites, either public or significant private areas, located along the segment.

16. Value classes are the categories to which each river segment will be assigned to denote its recreational value or significance.

On the worksheet, place each segment into one of the value classes, and use the space marked "Explanation" to briefly list the primary reason(s) for the value class assignment.

Read the definitions attached to the five value classes carefully, and use your intuition to match the segment to a value class. The quality of the recreation experiences that take place along the segment should play a large role in value class assignment. Quality can be defined in a number of ways, but managers should have an idea of what is perceived as a high-quality experience along a given segment.

The outstanding category should be reserved only for the best of the best. These river segments should represent the pinnacle of recreational opportunities in Montana. Class II segments are still extremely important recreational resources that may have potential to provide top-quality recreational experiences. The study will have little credibility or utility if all segments were rated as outstanding, so a range of value classes should be identified.

Value class assignment should be based on existing recreational values and uses, not on nebulous future or potential values. However, if planned development, designation, or other imminent changes are scheduled to occur, they may be considered in the rating.

A good technique would be to assign rivers in your region to the value classes and then study the list to see if the clusters of rivers make sense intuitively. Each class would ideally have different types of rivers in it. Class I, for example, should not contain only whitewater segments, or primitive segments. It is important to remember that a high-value or lower-value river segment will not have a stereotype; many different types of rivers having vastly different characters could all be in the same value class.

I. Outstanding recreational resources are exceptionally fine, popular or well-known recreational settings that nearly everyone would agree are "Blue Ribbon" resources. They are unique within a region or provide very high-quality recreational opportunities. These segments would likely have many attributes (criteria) that are highly-valued within the region, and agreement that the river belongs in this class should be unanimous among the raters. Recreational users may be willing to travel long distances or endure difficult access to use these resources. Use of this class should be reserved. For example, in the state's stream evaluation system for fisheries, only about 10 percent of the river reaches are in the highest-value class.

II. Substantial recreational resources are highly valued, but not quite as much as segments in Class I. These segments would likely contain about five or more criteria ratings judged to be desirable within the region. Very important recreational settings (among the finer in the state or region), capable of providing top-quality recreational experiences.

III. Moderate recreational resources have a considerable degree of recreational value, but not as much (or as many types of) value as Class II segments. They would likely have received two to five criteria ratings judged to be desirable within the region. These recreation opportunities are likely available elsewhere in the region.

IV. Limited recreational resources have some definite recreational value, but not as much (or as many types of) value as Class III segments. These should contain at least one criterion rating judged to be important within the region. Recreational values could be limited because of restricted access, polluted water, disturbed shorelines, or similar potential intrusions.

V. Unclassified recreational resources likely have some current or potential recreational value, but the level or type of value is unknown. All rivers in the state having a flow of about 5 cfs or higher during recreational use periods are assumed to be in this class, until they are either rated higher during the inventory or dropped from the study.

17. List your main reasons for assigning the segment to a particular value class.

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PACIFIC NORTHWEST RIVER STUDY
RECREATION RESOURCES - MONTANA
1985

Name of rater: _____
Agency: _____
Date: _____
Notes: _____

1. River Name: _____

2. Segment name or description: _____

3. Upper endpoint: _____

4. Lower endpoint: _____

5. Approximate length: _____

6. Segment number: _____

Criteria

7. Water character and boating suitability:

___ Flat water
___ Minor rapids (class I-II)
___ Moderate rapids (class II-III)
___ Major rapids (class III-IV & up)
___ Not boatable (explain) _____

Average length of boating season: _____ months

8. Water-based recreation activities: 1 = Primary activity
2 = Secondary activity
not checked = little or no use

___ motorized boating
___ canoeing
___ kayaking
___ rafting
___ innertubing
___ swimming
___ fishing (from boat)
___ fishing (from shore)
___ other: _____
___ other: _____

9. Land-based recreation activities: (same instructions as #8)

___ tent camping
___ car camping
___ non-motorized trail use
___ motorized trail use
___ pleasure driving (paved roads)
___ scenic viewing
___ picnicking
___ other: _____
___ other: _____

10. Overall use level: number and unit: _____

___ heavy
___ moderate
___ low

11. Access:

___ abundant
___ moderate
___ limited
___ restricted
___ other: _____

12. Recreation opportunity spectrum (ROS) class.

___ primitive
___ semi-primitive
___ transition
___ rural
___ urban

13. Scenic quality:

___ outstanding
___ substantial
___ moderate
___ limited

14. Sport fishing value class: _____

15. Developed recreation sites along segment:

Name of site(s)	Type of site(s)

---

16. Proposed value class assignment:

___ outstanding
___ substantial
___ moderate
___ limited
___ unclassified

17. Explanation for value class assignment:

HOW PROPOSED FINAL VALUE CLASS ASSIGNMENTS WERE MADE FROM AGENCY RATINGS

Rules:

1. If any agency rated the segment as I (Outstanding), that was the proposed final value class.

2. If only one agency rated the segment, that was the final class; if more than one agency agreed (no dissents), their class was proposed as the final.

3. If two agencies differed by one class, the higher class was chosen. If two agencies were more than one class apart, the class between them was chosen.

   Example: DFWP Value Class: 2
   BLM Value Class: 3
   Proposed Value class: 2

   BLM Value Class: 2
   FS Value Class: 4
   Proposed Value Class: 3

4. If three agencies disagreed and two differed from the third by more than one class, a class in between was chosen. If two differed from the third by one class, the final class was whichever was chosen by the two agencies that agreed. If all three disagreed, the middle class was chosen.

   Example: DFWP Value Class: 2
   BLM Value Class: 4
   FS Value Class: 2
   Proposed Value Class: 3

   DFWP Value Class: 4
   BLM Value Class: 4
   FS Value Class: 3
   Proposed Value Class: 4

   DFWP Value Class: 2
   BLM Value Class: 3
   FS Value Class: 4
   Proposed Value Class: 3

5. Unclassified ratings (5) did not count in ties or splits.

   Example: DFWP Value Class: 3
   BLM Value Class: 5
   Proposed Value Class: 3

DFWP Value Class: 2
BLM Value Class: 3
FS Value Class: 5
Proposed Value Class: 2

6. If no agency rated the segment, Proposed Value Class was 9 (Missing data code).

7. User group comments were used to break ties or resolve splits where appropriate. First, user scores were condensed by the same rules as agency ratings. The Propsed Value Class was the higher of the two ratings (manager or user).

8. If during the review the managers cannot agree on a final value class, the individual agency views will be reported along with the proposed final value class.

Value Class

I. Outstanding recreational resources are exceptionally fine, popular or well-known recreational settings that nearly everyone would agree are "Blue Ribbon" resources. They are unique within a region or provide very high-quality recreational opportunities. These segments would likely have many attributes that are highly-valued within the region. Recreational users should be willing to travel long distances or endure difficult access to use these resources. Use of this class should be reserved. For example, in the state's stream evaluation system for fisheries, only about 10 percent of the river reaches are in the highest-value class.

II. Substantial recreational resources are highly valued, but not quite as much as segments in Class I. They are very important recreational settings, among the finer in the state or region and capable of providing top-quality recreational experiences.

III. Moderate recreational resources have a considerable degree of recreational value, but not as much (or as many types of) value as Class II segments. These resources are likely available elsewhere in the region.

IV. Limited recreational resources have some definite recreational value, but not as much (or as many types of) value as Class III segments. Recreational values could be limited by restricted access, polluted water, disturbed shorelines, or similar intrusions.

V. Unclassified recreational resources likely have some current or potential recreational value, but the level or type of value is unknown. All rivers in the state having a flow of about 5 cfs or higher during recreational use periods are assumed to be in this class, until they are either rated higher during the inventory or dropped from the study.

Natural Features

PACIFIC NORTHWEST RIVERS STUDY

Results of Assessing the Significance of River Segments and Systems for Natural Features in Montana

LEAD AGENCY

Montana Department of Natural Resources and Conservation

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INTRODUCTION

The Pacific Northwest Rivers Study was initiated in 1984 to assess the significance of river segments and systems for a variety of fish, wildlife, natural, cultural, and recreational resource values. The Montana Department of Natural Resources and Conservation was designated to take the lead in assessing the value of rivers for natural features in the state of Montana. Work on botanical features was conducted by the Nature Conservancy under contract to DNRC; other work was done by DNRC staff.

This report summarizes the methods used in and the results of the natural features assessment. It identifies the value classes to which natural features were assigned, the criteria used to determine the value of natural features, the standards used to apply these criteria, and the process by which decisions were made.

The approach followed in this assessment relied heavily on the compilation of existing data. Very few new data were generated, although much unpublished information was brought together for the first time. No field investigations were conducted. The products of the study are a set of 1:100,000 maps of Montana on which known natural features are plotted, together with accompanying documentation and suggested value class ratings for each feature and for selected river reaches The documentation and value class ratings are contained in a computerized data base.

CATEGORY DESCRIPTION

Natural features include: (a) endangered and threatened plants; (b) rare or unique plant communities; (c) river-related geologic and hydrologic features, and (d) previously designated natural areas or features. Specific elements addressed are listed in Table 1.

VALUE CLASSES

Each natural feature was assigned to one of the following value classes to denote its relative significance. The criteria and standards discussed below were used to assign features to these value classes.

Value Class	Definition
1	Outstanding or unique natural feature (of national or regional significance)
2	Substantial value natural feature (of statewide significance)
3	Moderate value natural feature (significant over a multi-county area)
4	Limited value natural feature (of local significance)
U	Natural feature of unknown significance

CRITERIA

The following criteria were used to determine the value class of each individual natural feature:

A. Scarcity
B. Designation or listing by federal, state, local, or private agencies
C. Public and recreational use
D. Scientific or educational value

Each site identified was rated separately based on these four criteria. The final value class assigned to a site was equal to the highest rating received in any of the four criteria.

STANDARDS

Criterion A: Scarcity. The value class for criterion A was based on the overall rarity of the feature, as follows:

1. Very Rare (only a few examples worldwide, nationwide, or regionally)
2. Rare (only a few examples in Montana)
3. Scarce (several examples present in Montana but limited to a few counties)
4. Uncommon (examples present in several Montana counties)
U. Abundance unknown

Criterion B: Previous designation. Natural features which have been designated or proposed for designation by governmental or private entities were given higher value classes within this criterion than those which have not. The higher the level of official recognition, the higher the value class, as outlined below:

Table 1. Elements to be mapped.

A. Botanical Features

Stands of proposed threatened plants (table 2)
Stands of proposed endangered plants (table 2)
Stands of rare plants (Lesica et al. 1984)
Stands of Montana endemic plants (table 2)
Stands of USFWS category 2 or 3C plants (table 2)
Exemplary stands of rare or unique plant communities (including relict or disjunct communities, sphagnum bogs)
Type localities of plant species
Pristine or near-pristine communities (Ross et al. 1973)
Stands of candidate recommended endangered plants (table 2)

B. Geologic and Hydrologic Features

Waterfalls
Gorges, chutes, canyons
Rapids and whitewater reaches
Cliffs
Caves
Glacial features (including moraines, eskers, drumlins, delta kames, kame complexes, kettle ponds, ice-marginal drainages)
Oversize stream channels
Stream capture sites
Active meander complexes with large islands or island complexes, oxbow sloughs, and good representation of all stages of riparian cottonwood forest succession
Hot or warm springs
Badlands or capped sandstone formations (hoodoos)
Type localities of geological formations, soil types, fossils
Exceptional display of bedrock structural features
Paleontological sites or fossil-bearing rocks
Index fossil sites

C. Free-flowing Segments, Drainage Basins

(NOTE: this will rely on a separate map showing the locations of major river impoundments)

D. Designated Natural Features

International Biosphere Reserves (UNESCO)
Research Natural Areas (BLM, USFS)
National Natural Landmarks (existing and proposed) (NPS)
Areas of Critical Environmental Concern (BLM)
Special Interest Areas (USFS)
Research Botanical Areas (USFS, BLM)
Outstanding Natural Areas (BLM)
State and national parks and monuments
The Nature Conservancy preserves
The Nature Conservancy easements
The Nature Conservancy registered sites
The Nature Conservancy covenants
Montana Land Reliance easements

1. Nationally significant designation. This category includes natural features designated as national monuments, national natural landmarks, BLM or USFS natural areas, areas of critical environmental concern, research natural areas, or outstanding natural areas. It also includes known stands of federally-listed threatened or endangered plant species (no plant species are currently listed for Montana), those listed as Category 1 or 2 by USFWS (Federal Register, May 22, 1984), or those proposed for endangered status by the Montana Rare Plant Project (Lesica et al. 1984) (see Table 2). Proposed national natural landmarks with priority 1 status are also included.

2. Designation significant statewide. This category includes natural features designated as state parks, monuments, recreation areas, or natural areas; known stands of plant species proposed for threatened status by the Montana Rare Plant Project; and Nature Conservancy natural area preserves and proposed national natural landmarks of priority 2.

3. Locally significant designation. Included in this category are natural features designated as county or municipal monuments, parks, recreation areas, or natural areas; known stands of rare plants listed by the Montana Rare Plant Project; and proposed national natural landmarks of priority 3.

4. Not designated. This category includes only proposed national natural landmarks of priority 4 or lower.

U. Unknown designation.

Criterion C. Public and Recreational Use. Sites were subjectively rated based on the existing type and level of public and recreational use, as follows:

1. National Attraction. Features of this type attract visitors nationwide, have a very high use, and are shown on most state highway maps.

2. Statewide Attraction. These features primarily attract visitors statewide with a high overall use.

3. Multi-county Attraction. This type of feature would attract visitors from a multi-county regional area with moderate use.

4. Local Attraction. Features with this rating primarily attract visitors living within the county or a few adjacent counties.

U. Unknown level of use.

Criterion D. Scientific reference or educational value. Sites were rated on the basis of their value for scientific reference or study or for educational purposes, as follows:

1. Exemplary scientific or educational value. This category includes "textbook" examples of rare or unusual plant communities, disjunct or relict communities, pristine natural vegetation types that are rare or threatened, geological formations or features, or fossil assemblages; type localities for rare, threatened or endangered plants as listed by USFWS or the Montana Rare Plant Project (Table 2), type localities for geological formations or fossils.

Table 2. Montana plant species proposed for threatened or endangered status

Species	USFWS category[1]	Lesica et al.[2]
Allium fibrillum	-	T
Amorpha canescens	-	T
Arabis fecunda	-	M
Astragalus convallarius	-	E
Astragalus plattensis	-	T
Astragalus scaphoides	-	T
Botrychium crenulatum	-	E
Botrychium montanum	-	M
Botrychium paradoxum	2	-
Calamagrostis tweedyi	2	R
Carex crawei	-	T
Carex gravida var. gravida	-	T
Carex lenticularis var. dolia (=C. plectocarpa =C. eleusinoides)	2	-
Ceanothus herbaceus var. pubescens	-	T
Cirsium longistylum	-	M
Claytonia lanceolata var. flava	2	T
Comandra livida	-	T
Cypripedium fasciculatum	-	T
Draba daviesiea	-	M
Epipactis gigantea	-	E(candidate)
Erigeron flagellaris	-	T
Erigeron lackschewitzii	-	M
Eupatorium maculatum var. bruneri	-	T
Euphorbia geyeri	-	T
Euphrasia arctica var. disjuncta	-	T
Grindelia howellii	2	E
Halenia deflexa var. deflexa	-	T
Howellia aquatilis	2	E
Lesquerella humilis	-	M
Lesquerella klausii	-	M
Mertensia bella	-	T
Ophioglossum vulgatum	-	T
Orchis rotundifolia	-	T
Oxytropis campestris var. columbiana	-	T
Panicum oligosanthes	-	T
Penstemon lemhiensis	2	T
Phlox missoulensis	-	M
Saussurea weberi	3C	T
Saxifraga tempestiva	-	M
Shoshonea pulvinata	-	E(candidate)
Silene spaldingii	2	T
Synthris canbyi	-	M
Tiarella trifoliata var. trifoliata	-	T

[1]Federal Register, November 28, 1983
[2]E = endangered, T = threatened, R = rare, M = strict Montana endemic

2. Important scientific or educational value. This category includes type localities for other plant species, for forest habitat types, or near-pristine vegetation sites (Ross et al. 1973); other areas with important educational value, including areas frequently visited by school groups; study areas for long-term botanical or hydrological studies

3. Moderate scientific or educational value. This study was limited at this phase to identify sites with only exemplary or important scientific or educational value.

4. Limited scientific or educational value

U. Unknown scientific or educational value

STUDY METHODS

Approach

This study was designed to produce: (a) a map showing the location of identified natural features or river segment nearest these features; (b) a tabular summary of the features identified, by river basin; and (c) documentation of the value classes assigned to each feature. Unlike some of the other resource inventories conducted as part of the Montana Rivers Study (e.g., fisheries), this study did not initially attempt to assign a value class to a long reach or segment of river. Individual sites were plotted on the map and assigned to a value class, so that the occurrence of sites within any arbitrarily designated river reach or segment may be determined. Individual sites were plotted on working maps. The final maps show the location of river segments nearest a site or show the extent of a large site encompassing several stream segments. A value class is assigned to the site or stream segment adjacent to the site on the final maps.

The study relied almost entirely on data and expertise available within the cooperating agencies. Existing data bases were searched (see bibliography) and acknowledged experts were interviewed. No field inspection of sites was conducted.

For purposes of this study, a river or stream was defined as any flowing water shown on the BLM 1:100,000 maps. A "major river" is defined as any stream shown on the "Official Montana 1983-84 Highway Map" published by the Montana Department of Highways.

Inventory effort was concentrated on sites meeting the criteria for value classes 1 and 2. Study participants attempted to catalogue 90-100 percent of these features. The study probably identified less than half of the value class 3 and 10 percent or less of the value class 4 features.

An advisory committee was assembled to guide the study. Members and affiliations are listed in the section of this report entitled "Participants."

As the study progressed, the criteria and standards were refined somewhat.

Data Entry Methods

For each site identified during the inventory, the Data Entry Form shown in Table 3 was completed insofar as existing data allowed. Some of the categories of information were not uniformly collected for each site; these include Hydrologic Unit Code, Quadrangle Maps Where Shown, Latitude, and Longitude. Table 4 explains the types of data gathered and presents the specific guidelines used to enter data.

Review of Existing Published Sources

Existing literature was an important source of records for this study; titles used are listed in the bibliography of this report (see also Appendices B, C, D, and J). Some of the most important sources are described below.

National Natural Landmark Theme Studies. These six reports (Cringman and Dix 1975; Hyndman and Alt 1982; Johnson and Pfister 1981, 1982; Rigby 1981, Trimble 1972) together provided detailed information on 152 geological and 62 botanical sites. All sites listed in these reports were included in the data base.

National Cartographic Information Center (NCIC). The NCIC place names index was searched for certain key feature types as follows.

Badlands and Craters - all 7 sites listed in the NCIC index were included in this study.
Waterfalls - all 32 sites listed were included in this study.
Rapids - all 13 sites listed were included in this study.
Swamps - all 29 sites listed were included in this study.
Guts - all 15 sites listed were included in this study.
Cliffs - only 10 sites within 1000 feet of major rivers were included.
Caves - 30 sites listed were included in this study.

Geological Type Localities Listing. All sites listed by Balster (1971) for Montana that could be precisely located on a map were included in the data base, except that beyond page 136, the press of time prevented inclusion of sites within wilderness areas, national parks, or Indian reservations.

Geothermal Map. Warm springs included in the data base were those listed in Sonderegger (1981) as having a temperature over 86 degrees F, a flow of at least 50 gpm, lying within 2500 feet of a stream (flowing wells were excluded), and not located within wilderness areas, national parks, or Indian reservations.

Caves of Montana. Details of sites listed in the geographic name index were provided by Campbell (1978).

Interviews

Interviews with acknowledged experts were one of the principal sources of information for this study. These interviews were especially important in that they documented sites that have not been previously documented in any publication. Interviews followed a set of guidelines, presented in Appendix E, and many were tape-recorded.

Table 3. Data Form for Site Inventory

Site Name

Site Number

Type of Feature (as listed in Table 1)

Special Status or Institutional Constraint (if any)

County

Hydrologic Unit Code

MDFWP River Code No.

River Mile

Quadrangle Maps where shown

Township, Range, Section

Latitude, longitude

Description

How Accurately located? _____1/4 section _____section _____township _____county

Sources of Data

Assignment of Value Classes:

- Criterion A--Uniqueness
- Criterion B--Designation or listing
- Criterion C--Public and Recreational Use
- Criterion D--Scientific reference value

Final Value Class Assigned

Table 4. Guidelines for Use of Data Form
Natural Features Inventory - Montana Rivers Study

General Guidelines

(1) Write neatly and legibly.
(2) USE PENCIL ONLY.
(3) Try to use only as many characters (including letters, numerals, punctuation marks, and spaces between words) as indicated. This will allow keypunching of the data entries. Abbreviate where necessary to stay within the alloted number of characters.

Site Name. Use name as published in source document or on quadrangle map; if no published name, make one up (maximum 45 characters).

Site Number. Prefix "G" for geological features, "B" for botanical features, "N" for other designated natural features. Each will have a separate consecutive numbering scheme.

Type of Feature. Use designations in Table 1 of scope of work if appropriate; use other terms not in Table 1 if necessary. (Maximum of three types, 20 characters per type.)

Special Status or Institutional Constraints. Identify any formal designation, including proposed status (maximum 40 characters).

County. List all counties which contain portions of the area if the area overlaps county boundaries.

Hydrologic Unit Code. THIS ITEM WILL BE LEFT BLANK FOR NOW. In case we do decide to include it at a later time, we will use the 8-digit numbers from the USGS hydrologic unit map.

MDFWP River Code No. List only for sites which lie within 1000 feet of a river shown on the Montana Highway Map. Use 6 digits (2-digit drainage code, 4-digit water code, separated by a dash).

River Mile. List only for sites which lie within 1000 feet of a river shown on the Montana Highway Map. Include river or tributary name, and for sites occurring along more than 0.5 river miles, both upper and lower river mile designations.

Quadrangle Maps where shown. List all quads on which include parts of the area. Include year and scale, as follows:

Ringling (1971) 7.5'
Comb Butte (1959) 7.5'
Garrison (1953) 15'.

Also list names and numbers of all BLM 1:100,000 maps which include parts of the area, as follows:

Ekalaka (BLM #25)
Baker (BLM #3)

Township, Range and Section.

(1) For sites which are located entirely within a section or fraction of a section, designate location as precisely as possible up to 1/4 1/4 section, e.g.:

NW 1/4 SE 1/4 S 8, T 1 N R 43 E
NW 1/4 S 32 T 12 N R 17 E
S 1/2 S 24 T 4 S R 23 E

(2) For sites which are located within two or more sections within the same township, list the individual sections or parts of sections, e.g.:

S 6, 8-9, NW 1/4 15, 22-25, T 21 N R 15 E

(3) For sites which are located within two townships, list the individual sections or parts of sections, e.g.:

S 24, SE 1/4 25, N 1/2 31, T 12 N R 4 E; S 2, 3, 10, T 12 N R 5 E.

(4) For sites which are located within more than two townships, list the individual sections for each township if convenient; if not, identify only the townships.

Latitude, longitude.

(1) For sites 1/4 mile or less in diameter, list latitude and longitude coordinates (to the nearest five seconds) for the center of the site.

(2) For sites larger than 1/4 mile in diameter, list the range of latitude and longitude within which the site is contained, e.g.:

47° 23' 15" to 47° 25' 40"; 115° 55' 35" to 117° 4' 20"

Be sure to list the lowest number first, the highest number second.

Description.

If the site is described in a published source, include only the citation here using the author-date-page number method. If the sites are given an identifying number in the published report (as is done with most of the proposed National Natural Landmark sites), include the number with the citation, e.g., "Hyndman and Alt (1982), pp. 118-119, #23." If the source is not among those listed in the literature cited section of the study plan, please prepare a 3" X 5" index card using the following format:

Smith, W. C. 1934.

Field observations at Seven-room Cave,
Liberty County, Montana.

J. Range Management 23:45-47.

If the source you cite contains a list of additional citations, there is no need to repeat them here. However, if there are additional citations not listed by your primary published source, list them here too.

If there is no published description of the site, or if you have additional information that's not included in your citations, include a brief narrative description here. (Maximum 350 characters.)

How Accurately Located?

This refers to the degree of accuracy with which the site is located on the 1:100,000 BLM maps. Most sites taken from quad maps or other published sources are accurately located to within a fraction of a mile, even if they are many sections in size. Use the other categories only if the location is not precisely known.

Sources of Data.

Include citations for published sources of data here (if they've already been cited under "Description", just write "See above"). Also include citations for any personal contacts who provided data on the site. (Maximum 200 characters.) For these, use the author and date method again, and fill out an 3" X 5" index card similar to the following:

Jones, W. B. 1985.

Hydrologist, USFS, Beaverhead N. F., Box 553, Dillon 59725 (225-7604)

Telephone conversation with Tom Ring, DNRC, June 12, 1985.

Assignment of Value Classes.

Assign a tentative rating in each category using the criteria and standards listed in the study plan. USE PENCIL ONLY, as these will likely be revised after agency review.

On August 7, 1985, Tom Ring and Nancy Johnson of DNRC interviewed Stewart Allen, a widely experienced river boater, to determine the location of significant river rapids and whitewater reaches. Dr. Allen reviewed the BLM maps for about 1.5 hours and provided 12 locations.

On August 9, 1985, Larry Thompson and Tom Ring conducted interviews in Missoula with Bill Melton and Robert Fields of the University of Montana Geology Department and Janet Johnson of the USFS. Melton and Fields reviewed the full set of BLM maps (on which sites G-1 through G-43 had been plotted) except for the Harlowton map. The review lasted from 8:30 to 1:30, and although the emphasis was on significant paleontological sites, many other geological natural features were identified. About 80-100 new sites were recorded, beginning with site No. G-432. Due to time limitations, interviewers did not ask reviewers to assign value classes to any sites, although Dr. Fields felt that any paleontological sites he or Melton mentioned were of statewide or national significance and were significant to the scientific community. Larry Thompson met with Janet Johnson between 12:30 and 3:00. Ms. Johnson did not review the BLM maps but provided National Forest maps showing the locations of all designated and proposed Research Natural Areas (RNA's) and Special Interest Areas officially designated by the USFS; these are the Coram, Cliff Lake, Cottonwood Creek, and Poker Jim RNA's. All other sites are under consideration but are not currently designated. Janet also provided locations of a few significant ecological natural features that are not proposed as RNA's.

On August 16, 1985, Larry Thompson and Tom Ring reviewed a portion of the BLM Rivers Study maps with Ray Breuninger and Wayne Wetzel for about two hours. Dr. Breuninger reviewed maps 1-29 and Dr. Wetzel reviewed maps 6-29. Several dozen new sites were identified.

On August 19, 1985, Larry Thompson and Tom Ring conducted interviews in Bozeman with Dr. Steve Custer, head of the Montana State University Earth Science Department, and Dr. Cliff Montagne of the MSU Plant and Soils Science Department. Dr. John Montagne of the Earth Science Department was present for review of maps 51 and 52 only, and students Ginger Schmidt and Don Long sat in as observers. The interviews took about 3 hours and covered the complete set of maps. Dr. Custer provided a list of Montana sites that will be listed in the USGS Guidebook as exemplary educational sites.

On August 20, 1985, Larry Thompson and Tom Ring conducted interviews in Missoula with Drs. Dave Alt and Don Hyndman of the University of Montana Geology Department. They identified features that will appear in the forthcoming revision of their book, "Roadside Geology of Montana." This interview lasted about 3 hours and was recorded on tape.

None of the experts interviewed through August 20 had thorough knowledge of geological natural features in eastern Montana, and as a consequence, very few sites had been identified on the map sheets for eastern Montana. Some promising sources for eastern Montana sites were mentioned during the interviews, and included:

Dave Fullerton, USGS, Federal Center, Denver
Roger Colton, USGS, Federal Center, Denver
Marvin Miller, Montana Bureau of Mines and Geology, Butte
Wayne Van Voast, Montana Bureau of Mines and Geology, Billings
Bob Bergantino, Montana Bureau of Mines and Geology, Butte
Larry French, Miles Community College, Miles City
Dennis Smetana, Soil Conservation Service, Roundup
Frank Munshower, MSU, Bozeman

These parties were later contacted by telephone and/or letter.

Dr. Cliff Montagne suggested that soil type localities were of far less importance than geological type localities, and that it would probably not be worthwhile to attempt to compile the several hundred type locations in Montana. Dr. Montagne volunteered to provide a list of any high priority soil type locations that would be important for the study. Dr. Custer also suggested that the USGS register of geological type locations be reviewed to supplement Dalster's listing. This has was not done under the present contract.

Reviewers were not asked to assign value classes to any sites, although sites that were clearly outstanding or of regional or national significance were usually identified as such by the reviewers. This information was recorded in written notes from the meetings and also in stick-on notes that were attached to the maps. In addition to providing the value class ratings for sites identified during the interview, Drs. Alt and Hyndman were consulted regarding the ratings they had previously assigned to the proposed national natural landmarks. Dr. Alt emphasized that those ratings were totally subjective, and he argued strongly against any attempt to come up with an objective rating system for natural features. According to Alt, waterfalls should not be rated on the basis of discharge and drop. That's simply hydroelectric potential, which has little relation to "value" or "significance" as used in this study. Dr. Alt suggested that there is no way to avoid the need to make subjective value judgments (including aesthetic judgments) in rating natural features. This is extremely difficult to do in any case, but is even more difficult without actual visits to the sites.

On September 13, 1985, Tom Ring reviewed BLM maps 30-97 with Ray Breuninger. Tom also reviewed maps Nos. 1-5 and 30-97 with Wayne Wetzel. This was a continuation of the August 16 interview with Dr. Breuninger and Dr. Wetzel. Several dozen new sites were identified. Part of the interview with Dr. Breuninger was recorded.

On September 15, 1985, Larry Thompson and Tom Ring conducted interviews in Bozeman with Mick Hager and Jack Horner of the Museum of the Rockies and John Montagne of the MSU Earth Sciences Department. Dr. Hager and Dr. Montagne reviewed all the maps; Dr. Horner could only stay long enough to review maps Nos. 1-65. Before he left, Dr. Horner provided a list of paleontological sites which, in his estimation, are the most significant in Montana.

Drs. Horner and Hager also said that the entire C. M. Russell National Wildlife Refuge should be considered a paleontological area of national significance. The entire interview was recorded.

On October 2, Chuck Dalby, DNRC, met with Tom Ring and Larry Thompson to review the maps for the Montana Rivers study. The meeting lasted from 1:30 to 4:00 and only a few additional sites were recommended.

Mr. Dalby discussed the relationship between fresh alluvium and cottonwood stands. The literature points out that riparian cottonwood forests bordering major rivers are an important habitat very closely tied to dynamic fluvial systems (Beidleman 1978; see also Johnson and Jones 1977; Johnson and McCormick 1978).

The goal was to develop a method to identify areas where fresh alluvium is actively renewed over the long term. Literature indicates that new cottonwood stands initially develop on fresh alluvium (Everitt 1968, Sigafoos 1964, Silverman and Tomlinson 1984, Hoar and Erwin 1985).

Mr. Dalby discussed the proposed method of studying river channels in map sections 3 miles long and extending 1/2 mile on each side of the river to identify active channels with island complexes. He felt this method might work in the lower reaches of large rivers but probably would not be useful in identifying active channels on the upper reaches of rivers where the channels and islands are smaller.

Further investigation showed additional problems with the proposed method. The method would only identify segments with islands indicated on the maps. Active channels without islands would not be detected.

According to Mr. Dalby, a more logical way to identify river reaches where fresh alluvium is likely to accumulate would be to carefully examine aerial photos. Agriculture Stabilization and Conservation Service (ASCS) aerial photography with a scale of at least 1:24,000 is readily. Aerial photo interpretation could identify fresh gravel bars and areas with recent channel movement. Further, aerial photos could show cottonwood stands and where land-use practices, such as cropland and subdivision growth, have eliminated these cottonwood communities. Topographic maps do not show the most up-to-date land-use information which is needed to show the location of remaining cottonwood stands.

The suggested additional work on riparian cottonwood/island complexes could not be done during the present study, but is recommended as a high-priority item for future work (see the section of this report entitled, "Data Gaps and Recommendations for Future Work").

The Nature Conservancy Subcontract

The Nature Conservancy conducted inventory of botanical features under contract to DNRC. The scope of work of that contract is included in this report as Appendix N. Peter Lesica was the principal investigator for The Nature Conservancy. The Conservancy's final report is included as Appendix O.

The National Park Service Inventory of Undeveloped Segments

Duane Holmes of the National Park Service provided 1:250,000 maps showing "undeveloped segments" as determined by standard Park Service methodology. These are on file at DNRC.

Review Meetings

On August 28, 1985, Larry Thompson met with senior resource experts from Washington, Oregon, and Idaho to discuss the natural features inventory approach. The minutes of this meeting are included as Appendix C to this report.

On October 25, 1985, DNRC held a meeting to review and discuss the natural features inventory maps and data base. The purpose of the meeting was (1) to receive final comments on the list of sites and the value class assignments from participating agencies (particularly USFS and BLM), (2) to receive general comments on study design, and (3) to discuss and prioritize additional tasks needed to complete or expand the data base. Present were: Janet Johnson, USFS; Tom Ring, Larry Thompson, and Nancy Johnson, DNRC; Gael Bissell and Stewart Allen, DFWP; Joan Bird, Steve Shelley, and Nancy Grulke, The Nature Conservancy; Duane Holmes, National Park Service; and Tom Pansky, BPA. Bert Williams, official BLM contact, could not be present; a copy of the computer data base was sent to him for comment but no comments were received. Minutes of the meeting are included as Appendix L to this report.

Mapping of Sites

As sites were located, they were plotted on a set of 1:100,000 BLM topographic maps using colored signal dots: green for botanical resources, red for geological or hydrological features. Each site was given a unique number which was then lettered on the appropriate signal dot. For each site, a data entry form (Table 3) was completed and assigned the same code number as the site.

Rating of Sites

Staff members rated sites as soon as they were identified. At the completion of the mapping effort, the ratings of all sites identified were reviewed and modified as needed, based on the findings of the study. Finally, the cooperating agency contacts and technical advisors were given an opportunity to review the ratings and suggest changes. The maps and other data were reviewed at a meeting in Helena on October 25, 1985 (see Appendix L for minutes of meeting and a list of those attending). A color code was used to indicate the final rating on the maps.

Data Automation

As part of Phase II of this study, data were entered from the data entry forms (Table 3) into an automated data base on DNRC's Honeywell computer using the Honeywell records processing software. The definitions of fields used in this data base are presented in Appendix N. This data base has been converted to ASCII format on 5 1/4-inch floppy disks, and also is entered in the Northwest Power Planning Council's data base in Portland. The data base contains approximately 1.3 megabytes of information.

PROJECT EVALUATION

The Montana Rivers Study natural features inventory was the first comprehensive statewide effort to compile a data base of information on significant natural features. The process provided a unique opportunity to gather this information into one central data base and to document much valuable unpublished information.

The restriction of the study generally to the area within 1000 feet of rivers is artificial and arbitrary; impacts of hydroelectric development could occur much farther from the river channel. If the study will be used to evaluate individual hydroelectric sites, more field investigations at individual sites will be required.

For the most part, the level of detail and reliability of sources were adequate. River segments were plotted accurately on 1:100,000 maps, but in many instances references are given to sources describing the site in much greater detail--often at a scale of 1:24,000. Paleontological sites were only located to the nearest township in order to avoid disturbance of these sensitive features.

In general, data on natural features were far less available and less reliable for eastern Montana than western. In particular, the areas within a 35-mile radius of Bozeman and Missoula are the most thoroughly studied parts of the state; data availability falls off with distance from these centers and appears to reach a minimum in the northeastern corner of the state.

LIMITATIONS AND USE CONSIDERATIONS

The data gathered here are suitable for fist-level screening of sites for siting and planning purposes. However, this preliminary inventory is based entirely on interviews with knowledgeable persons and on review of certain existing published data and does not constitute a comprehensive study acquired for hydro power siting. No field inventory, study of USGS quadrangle maps, or study of aerial photography was conducted. More intensive study will reveal many additional sites, and many river reaches may be found upon closer study to contain high value natural features. The value class assignments, while based on systematic application of the criteria and standards defined in the study plan, are subjective and represent the judgment of DNRC project staff subject to review by designated representatives of BLM and the USFS. While the maps may be used as a planning tool, users are advised to consult the final report before making decisions on the basis of this inventory.

PARTICIPANTS

1. Primary Agency Contacts

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U.S. Forest Service
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DATA GAPS AND RECOMMENDATIONS FOR FUTURE WORK

The following are recommended in the order of their priority for future work.

(1) Cottonwood/island/alluvium complexes should be inventoried. Some possible methods for accomplishing this are discussed elsewhere in this report. The first task in accomplishing this should be to develop a study plan for the task. Then funding would be sought for the study itself. Much of the work could likely be done in conjunction with other BPA-funded projects in northwestern Montana.

(2) A more comprehensive set of criteria for evaluation of waterfalls should be developed. Criteria would include aesthetic considerations. The study would be initiated by conducting a literature review to determine what research has been done in this area and whether study methods could be adapted. Following this, compile a more comprehensive inventory, including an esthetic evaluation, of waterfalls and rapids to supplement existing information.

(3) Additional peer review of the data base and maps produced should be done statewide. Review meetings should be set up in seven different parts of the state, and all likely participants within each region should be contacted and invited to participate.

(4) Integrate the natural features data base with the Montana Heritage Program data base and establish a systematic method for monitoring and periodically updating the data base for filling in significant data gaps. Pages 48-49 of the Nature Conservancy's final report (Appendix O) list high priority areas for future botanical work.

Additional recommended tasks in order of priority are:

(1) Incorporate recent changes in the U.S. Fish and Wildlife Service's list of threatened and endangered candidate plant species.

(2) Conduct an inventory of all state game ranges and other areas managed by the state.

(3) Incorporate site ownership into the data base.

(4) Add a category in the data base on threats or potential threats to each site.

(5) Work with the National Park Service, USFS, and BLM to complete the inventory within national parks and wilderness areas.

(6) Add citations for additional sources (theses, USGS, reports, etc.) to data entries.

(7) Check Alden's eastern and western Montana monographs in greater detail for significant glacial features.

(8) Check USGS for types of site localities not in Balster (1971).

(9) Caves - check with spelunkers; check the register of anthropological sites at the University of Montana; complete mapping Campbell's sites.

(10) Compile a list of features located on Indian reservations.

(11) Obtain more detailed descriptions of proposed RNA's from USFS and add these to the data base.

(12) Examine 7.5 minute quadrangle maps and aerial photographs in detail for geological features statewide.

(13) Determine which sites have been lost/developed.

(14) Add drainage basin codes and EPA codes for all sites.

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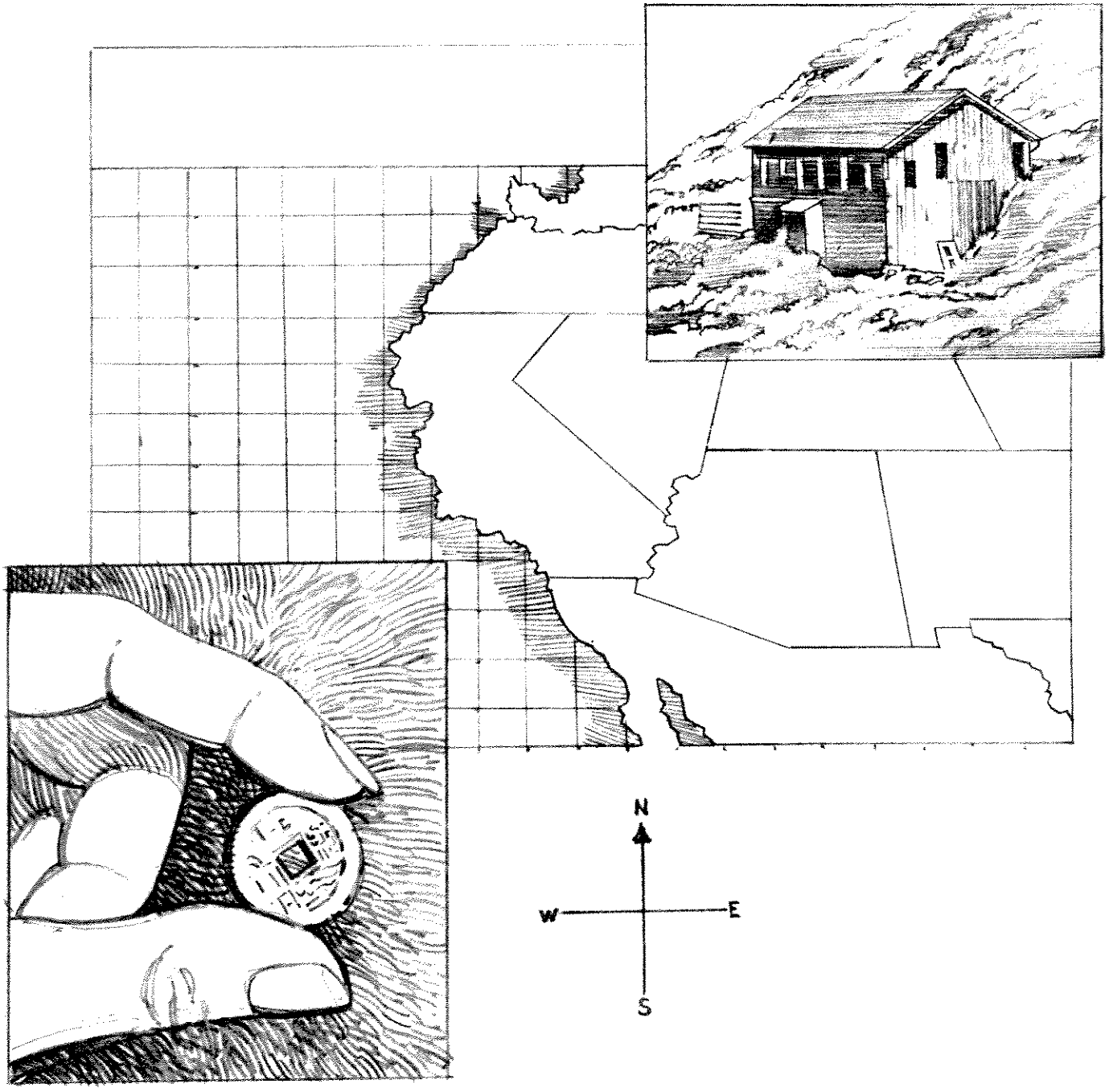
Cultural Features



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INTRODUCTION:

The Pacific Northwest Rivers Study was initiated to assess the significance of river segments and systems for a variety of fish, wildlife, natural, recreational, and cultural resource values. The Montana State Historic Preservation Office and Thomas A. Foor, of the Department of Anthropology, University of Montana have been designated to take the lead in assessing the value of rivers for cultural resources in the State of Montana.

This report summarizes the method which was used to complete this assessment. It identifies the value classes to which river segments were assigned, the criteria which were used to determine the value of river segments, the standards used to apply these criteria, and the process by which decisions were made.

CATEGORY DESCRIPTION:

Montana Cultural Resources. By "Cultural Resources" we mean reported Montana districts, sites, buildings, structures or objects of State or national significance in architecture, American history or prehistory.

VALUE CLASSES:

Value Class

1. Class I.
2. Class II.
3. Class III.

All of the river segments are classified into one of these categories based on the below-listed criteria.

CRITERIA:

Class I. Sites listed in or determined eligible for listing in the National Register of Historic Places have been recorded on the river segment.

Class II. Sites have been recorded on the river segment and are thought by both the Montana State Historic Preservation Officer and a responsible Federal Agency to be eligible for listing in the National Register of Historic Places (this is known as a "consensus determination" and does not involve the Keeper of the National Register at the earliest stages).

CLASS III. The river reach probably contains sites eligible for listing in the National Register. Consultations with other professional archaeologists active in Montana (see attachment A for an example) suggest that almost all reaches not assigned to either Class I or Class II will fall into this category.

STUDY METHODS:

The first stage of the cultural resources assessment began with a comparison of the the Montana State Department of Fish, Wildlife and Parks list of rivers and streams against the cultural resource information maintained at the Department of Anthropology, University of Montana. This comparison resulted in a table that lists reported cultural resources by stream or river (see attachment B for an example). Next, we used the results of this comparison to test whether we could make meaningful predictions about cultural values on river segments not yet inventoried by professional field archaeologists. On the negative side, the results indicate that such predictions are probably premature. However, on the positive side, they indicated that when a National Register quality site is recorded there is a strong likelihood of another site of equal stature within 10 kilometers.

Armed with this information, we anticipated recommendations made in the National Park Service Summary of Cultural Features Assessment published in May, 1986 by two years and decided to classify stream reaches using a descriptive system based on National Register criteria. The procedure

we followed was:

1. Note whether a site is reported within ten kilometers of the stream reach.

2. If a site is reported within 10 kilometers, note whether it was listed in the National Register of Historic Places, or determined eligible for listing in the National Register by the Keeper of the Register, or determined eligible for listing in the National Register by a Federal Agency in consultation with the Montana State Historic Preservation Officer (a "consensus determination"), or whether it has yet to be evaluated. In the course of doing this work we discovered that there is no record of whether a site was evaluated and found ineligible for listing in the National Register. Nor was it possible to reconstruct such a record.

3. Based on the above assessment, a set of tables was constructed (see attachment C for an example). These tables summarize our original river reach codings.

4. Reaches were color-coded on the maps using the 5 originally proposed "value categories" (see attachment D).

During the second year of the project we were asked to review and evaluate the study procedures while creating a computerized catalog of the Cultural Resource Value Ratings. Our review resulted in two extensive modifications to the final catalog:

1. The five original value classes were reduced to the three presented here under the section labeled "CRITERIA"; and,

2. based on new information compiled and provided by the Montana State Historic Preservation Office, evaluations were edited and changed with some reaches being deleted and others added.

The final computer file contains the following information for each evaluated river segment:

1. map name,
2. river name of coded segment as listed on the map,
3. value class for the coded segment,
4. legal description of the starting point for the segment, and
5. legal description of the segment end point.

This data file is currently maintained at the University of Montana, Department of Anthropology. A copy has been provided to the Montana State Natural Resources Information System project at the State Library in Helena, Montana.

If a river segment could be placed within more than one class then the category of highest significance (the lower numbered category) was used for mapping purposes.

PROJECT EVALUATION:

The most valuable aspects of this project lie in collecting and reviewing existing sources of information on Montana's cultural resources. The maps provide a quick measure of the certainty that a stream reach contains National Register eligible properties. However, it should be noted that most Federal or State assisted undertakings will still involve consultation with the State Historic Preservation Officer. This consultation will undoubtedly provide more useful information in the latter stages of project planning.

Montana properties are evaluated for National Register qualities on an almost daily basis. This suggests that for this study to remain useful, it must be periodically updated. Because updating is keyed to Montana State Historic Preservation Office reviews and activities and all relevant information is compiled and stored at the University of Montana, Department of Anthropology, we believe that updating can be accomplished by either agency. The system as modified in the second year and presented here is relatively simple and straightforward. This implies that updating should be relatively quick and inexpensive. We estimate that a regular annual update should involve a total of 80 work hours a year. If student work-study labor is used, the total costs will be reduced even further.

One final suggestion is that the cultural resources information in other files maintained by the Department of Anthropology, University of Montana be studied for incorporation into the Rivers Assessment program. For example, a second classification system could be used to summarize whether a stream reach of interest was ever surveyed by professional archaeologists for cultural resources; or, given a series of legal descriptions a subfile search could detail the kinds of cultural resources found within a specific area of interest.

ATTACHMENT A

United States Department of Agriculture | Forest Service | Kootenai NF | RR 3, Box 700 Libby, MT 59923

Reply to: 2360

Date: August 20, 1985

Dr. Thomas Foor
Department of Anthropology
University of Montana
Missoula, Montana 59812

Dear Dr. Foor:

In reply to your request for information on the potential of finding sites in stream localities on the Kootenai National Forest, we have not formally collected that kind of data. Until such a time that we could say that a thorough survey of the Forest (including it's streams) has been conducted, information of this sort would be so speculative as to be misleading. We do have a map of the Forest with our recorded sites, however all that this indicates is where surveys have been conducted. You could also get an idea of what streams we have surveyed by referring to our cultural resource inventory reports. These surveys are designed around project boundaries that don't require that we walk the entire creek, so at best we have only walked fractions of individual creeks.

I am sorry that we cannot be of help to you. Please let us know if I have misinterpreted your needs.

Sincerely,

Becky Timmons

REBECCA S. TIMMONS
Forest Archaeologist

ATTACHMENT B

Page 1 of 1

WATER CODE: C/3/22-0350/01 WATER NAME Bear Creek COUNTY Park LOC: 09S09E-19

NR	NRE	US	P	MP	I?	SITE #	SITE TYPE	PERIOD	COMMENTS
						PA 0235	47		unkn Sec. 4
						" 0410	39		SE " "
						" 0339	45		SW " "
						" 0342	47		SE " 5
						" 0173	20		" " 6
						" 0169	45	6	SW " "
						" 0235	47		unkn " 8
						" 0339	39		NW " 9
						" 0185	39		NE " "
						" 0340	1, 22, 45		NW " 17
						" 0159	1		SW " "

ATTACHMENT C

STREAM NAME/WATER CODE	TRS	TRES	CC	C/F	COMMENTS
Big Dry Creek E/7/16-0245/02				✓	
Big Eddy Creek W/1/05-0528/10				✓	
Big Elk Creek C/5/18-0360/01			✓		
Big George Gulch C/4/30-0600/01				✓	
Big Gulch W/1/07-0320/10			✓		
Big Hill Creek C/4/16-0260/01				✓	
Big Hole Creek W/1/05-0544/01				✓	
Big Hole River Drainage C/3/02-0360/10					
Big Hole River Drainage C/3/02-1635/10					
Big Hole River Drainage C/3/02-3635/10					
Big Hole River Drainage C/3/02-5515/10					
Big Hole River sec 01 C/3/02-0425/01		✓		✓	
Big Hole River sec 02 C/3/02-0450/01		✓		✓	
Big Hole River sec 03 C/3/02-0475/01				✓	
Big Hollow C/3/01-0620/01				✓	
Big Indian Creek C/3/22-0504/01				✓	
Big Knife Coulee E/6/15-0420/01				✓	
Big Knife Creek W/1/07-0340/10				✓	

ATTACHMENT D

The Five Value Classes Originally Proposed for the Rivers Study

Class I. Sites listed in or determined eligible for listing in the National Register of Historic Places have been recorded on the river segment.

Class II. Sites have been recorded on the river segment and may be eligible for listing in the National Register of Historic Places.

Class III. No sites have been recorded but there is the potential for National Register eligible properties on the river reach

Class IV. No possibility of significant cultural resources existing on the river segment.

Class V. Not enough information available to classify the river segment in categories I, II, III, or IV.

If a river segment can be placed within more than one class the category of highest significance (the lower numbered category) will be used for mapping purposes.

Institutional Constraints

PACIFIC NORTHWEST RIVERS STUDY

Method of Assessing the Significance of River Segments and Systems for Institutional Constraints in Montana

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INTRODUCTION:

The Pacific Northwest Rivers Study was initiated to assess the significance of river segments and systems for a variety of fish, wildlife, natural, recreational, and cultural resource values. The State of Montana has been designated to take the lead in compiling the institutional constraints in Montana. This report summarizes the kinds of institutional constraints which were used in this assessment.

CATEGORY DESCRIPTION:

Institutional constraints are comprised of laws or policies with direct implications for hydropower development imposed and/or administered by agencies of government at the Federal, state or local level, or by the Tribes. Institutional constraints may prohibit, significantly limit, or otherwise impose conditions on hydropower development. For purposes of this survey only the potential prohibitions are included. Other constraints would be addressed in an actual siting study.

CONSTRAINT CLASSES

CLASS DESCRIPTION

1. Federal, state, or local regulations prohibit hydropower development.
2. Potential Federal and state prohibitions (such as wilderness study areas).

CRITERIA AND STANDARDS:

Wild and Scenic Rivers - All such designated rivers were Class I but considered along with other reaches for the other five resource areas.

Wilderness-Areas and National Parks - All such designated rivers were Class I and will not be considered along with other reaches in the other five resource areas unless time permits. They can be excluded because it is presumed that the land typed designation was not determined on the quality of the streams. It is assumed that these streams represent a mix of value classes but because of their inclusion in wilderness or National Parks designations will not be developed for hydropower.

Roadless Areas, National Natural Landmarks, Fish Hatcheries, Wildlife Refuges, Biosphere Reserves - All such designated areas adjacent to rivers were classified a minimum of class two unless expert judgment warrants class one designation.

EVALUATION PROCESS

Each constraint was assigned to a senior resource expert for inclusion in their categorization. River segments affected by Class I and II constraints were mapped at 1:100,000.