DOE/EIS - 0091 - F

FILE COPY

Final Environmental Impact Statement

BONNEVILLE POWER ADMINISTRATION

BPA

GARRISON-SPOKANE 500-kV TRANSMISSION PROJECT

U.S. Department of Energy

DEPARTMENT OF ENERGY UNITED STATES OF AMERICA

March 1983

VOLUME I

DOE/EIS - 0091 - F

Final Environmental Impact Statement

BONNEVILLE POWER ADMINISTRATION

GARRISON-SPOKANE 500-kV TRANSMISSION PROJECT

U.S. Department of Energy

March 1983

Responsible Official:
WILLIAM A. VAUGHAN
Assistant Secretary for
Environmental Protection, Safety,
and Emergency Preparedness

VOLUME I

COVER SHEET

Responsible Agency: Department of Energy, Bonneville Power Administration.

Cooperating Agencies: Department of Agriculture, Forest Service
Department of the Army, Corps of Engineers
Department of the Interior, Bureau of Indian Affairs
Department of the Interior, Bureau of Land Management
Department of the Interior, Fish and Wildlife Service
Department of the Interior, National Park Service
State of Idaho, Division of Financial Management
State of Montana, Department of Natural Resources and Conservation

Title of Proposed Action: Garrison-Spokane 500-kV Transmission Project

Title of Forest Service and Bureau of Land Management Action: Land Use Allocation on Federal Lands for Future Right-of-Way Use

States and Counties Involved: Idaho - Bonner, Kootenai, Shoshone; Montana - Granite, Lake, Lincoln, Mineral, Missoula, Powell, Sanders; Washington - Spokane.

Abstract: The proposal involves the building of between 254 and 271 miles of 500-kV transmission line (part single-circuit and part double-circuit) and associated substation terminal and control equipment by Bonneville Power Administration (BPA). The Taft Plan has been designated as the Preferred Alternative. The proposal also addresses the building of between 32 and 63 miles of 230-kV transmission line and associated substation facilities by The Washington Water Power Company (WWP), a private utility. The Noxon Plan is preferred by The Washington Water Power Company. This related action could be developed in conjunction with the proposed 500-kV transmission facilities or independently. Implementing the proposal(s) would affect land use by changing forested lands to uses compatible with a transmission line right-of-way and by altering relatively small amounts of farmland and rangeland. The proposal would create visual impacts especially noticeable near recreational and residential areas. Cultural resources may be affected. The proposal would introduce some dust and combustion byproducts into the atmosphere as the result of open slash burning from clearing and construction equipment. It would remove vegetation, increase erosion, and change wildlife habitat (positively and negatively) along much of the right-of-way. Collision hazards would increase for waterfowl and birds of prey; fishery resources and vegetation may be affected to a slight degree where the line crosses streams. The facilities would integrate new energy into the Pacific Northwest interconnected power system; maintain electrical stability and reliability; conserve energy by reducing transmission system losses; commit material, energy, and human resources to constructing these facilities; and both create new right-of-way and expand an existing east-west right-of-way.

For additional information or copies of the EIS, contact:

George Eskridge, Montana District Manager
Bonneville Power Administration
Transmission Coordination Office
1620 Regent
P.O. Box 4327
Missoula, MT 59806
Area Code (406) 329-3737
Toll-free (Montana): 1-800-332-2421
Toll-free (all other areas): 1-800-548-4285

P R E F A C E

This document is the final Environmental Impact Statement (EIS) for the Garrison-Spokane 500-kV Transmission Project. The draft EIS was issued for a ten-week period of public and agency review in March 1982. Over 4,000 comments were received and analyzed for content. In addition, the interagency study team undertook a joint review and evaluation (November 1982) with the Montana Department of Natural Resources and Conservation of the routes proposed for this facility. That review and the public review have assisted in revising the draft EIS to produce this final document.

The final EIS consists of two volumes. Volume I presents the body of the findings; Volume II presents all comments and responses. The Appendices issued with the draft EIS are not reprinted; all changes to the Appendices are documented in Chapter IX (ERRATA) of Volume I.

All additions and substantive changes to the draft EIS are underlined in the text of this final EIS. To assist the reader further, important points of information are boxed.

Table of Contents

GARRISON-SPOKANE 500-kV TRANSMISSION PROJECT

Table of Contents

VOLUME I

Table of Contents

Table of Contents

VOLUME II

APPENDICES*

* Appendices were distributed with the draft EIS; any appendix changes have been entered in Volume I as ERRATA (Chapter IX).

List of Tables

After Page

List of Figures

Summary

S U M M A R Y

STATUS

The Garrison-Spokane 500-kV Transmission Project is a proposal to build 500,000-volt transmission line facilities across western Montana and northern Idaho to the Spokane area in order to reinforce a section of the Bonneville Power Administration's electric power grid and to permit reliable integration of 1240 megawatts of power produced by Colstrip Units 3 and 4, for use in Montana and throughout the Northwest.

The Colstrip Project, subject of a previous Federal Environmental Impact Statement (1979), involves the addition of two 700-MW coal-fired generator units and their associated coal and water supply facilities to two existing generators. Power produced is needed initially by the winter of 1983-84 (output of Unit 3) and the winter of 1985 (Units 3 and 4) in Montana and the Northwest. 1/ Two parallel, 500-kV transmission lines are being built by The Montana Power Company from Colstrip to Townsend, Montana, and by Bonneville Power Administration from Townsend to the western substations, so that power may be integrated into The Montana Power Company 230,000-volt system and into the Federal Columbia River Transmission System (FCRTS) at both the 230,000- and 500,000-volt level.

The Hot Springs-Bell 500-kV Transmission Project, forerunner of the Garrison-Spokane Project and designed to reinforce the FCRTS and also to transmit Colstrip power over the FCRTS, was first described in a BPA Facility Planning Supplement issued in draft (November 1974) and final (March 1975) form. After public meetings and consideration of technical and environmental information, the Hot Springs-Bell plan was selected. Not selected was a Hot Springs-Dworshak-Lower Granite plan, or a plan to route the 500-kV transmission line via Libby Dam, Troy, Bonners Ferry, Sandpoint, and Athol. The alternative of nonconstruction was also discussed and rejected.

The Colstrip Record of Decision issued on September 21, 1979, by the Montana State Director of the Bureau of Land Management and the Regional Forester of the U.S. Forest Service, Northern Region, designated a corridor for location of the two Colstrip 500-kV circuits on Federal lands, including a routing across the Flathead Indian Reservation to Hot Springs Substation. An alternative through Siegel Pass to Plains was also identified, in the event that arrangements could not be made to cross the Reservation and if no other alternative emerged from studies then underway by BPA.

BPA studies did identify a new potential route connecting with a substation that could be built near Taft, Montana. The Washington Water Power Company also identified new increasing needs for reinforcement in the Kellogg-Wallace area. On August 6, 1979, Bonneville Power announced in the Federal Register its intent to revise and reissue the Hot Springs-Bell EIS to consider these changes.

1/ Need for the power is addressed in the Colstrip Project EIS in Volume 1, Sections 1.2 (Significant Issues), 1.5 (Need for the Project), and 2.7 (Alternatives); and in Volume 2, Appendix A1.5, Supporting Data for Alternative Federal Decisions: Need and Conservation.

When, during the latter stages of the revision, public controversy emerged over building on the approved corridor, BPA decided to expand the scope of the project to consider the impacts and alternative locations associated with interconnecting the Federal Columbia River Transmission System to the Colstrip Transmission System at a point east of Missoula, Montana, rather than west of Missoula as originally proposed (Federal Register Notice of Intent, April 28, 1981). The project name then became "Garrison-Spokane 500-kV Transmission Project." The scope also expanded to consider the potential for future reinforcement serving Missoula area needs.

After studies for the expanded scope of the project were completed and the draft EIS had been reviewed, the State of Montana and BPA agreed that the Montana Department of Natural Resources and Conservation would review all BPA studies and evaluate the results. One consequence of this agreement was a joint State-BPA interagency team review and reevaluation of route alternatives, followed by consensus on the environmentally preferred route [the Taft (South) Plan].

Present schedules call for:

- Issue Draft EIS	March 1982
- Issue Final EIS	March 1983
- Issue Record of Decision	April 1983
- Conduct Preliminary Transmission Line Surveys	Summer 1982
- Acquire Right-of-Way Easements	Summer 1983
- Start Clearing and Access Road Construction	Summer 1983
- Begin Construction of Transmission Facilities	Spring 1984
- Energize Transmission Line to the Intermediate Substation	Fall 1985
- Energize Transmission Line to Bell Substation	Fall 1986

MAJOR CONCLUSIONS

1. The Taft Plan is the Preferred Alternative. The Taft Plan was selected as the preferred alternative based on an interagency project review. The siting preference considers environmental, social, economic, engineering, institutional, and public concern factors. Comparative analysis of alternatives reveals that the Taft Plan is environmentally preferred, with a routing from Garrison, running south through the Flint Creek Valley, across the Sapphire Mountains, and south of Missoula, south and west of the Ninemile Valley, and connecting with a new substation to be built at Taft. From Taft, the plan would proceed north and west, going north of Mullan and through the Coeur d'Alene Mountains to a point north of Hayden Lake and west through the Rathdrum Prairie to Bell Substation near Spokane, Washington. The Hot Springs Plan and the Plains Plan rank below the Taft Plan (see discussion under COMPARISON OF ALTERNATIVES, Chapter II), with more serious consequences for many resources.

   The Taft Plan is environmentally preferred for the following reasons. It has the least social impact. It crosses less private land, and crosses the least amount of agricultural land, both irrigated and non-irrigated. It best avoids impacts in environmentally sensitive areas, and best avoids developed and developing urban and residential areas, although it passes just north of Maxville in the Flint Creek Valley and it crosses between two developing suburban areas in the Miller Creek-Lolo area. It minimizes impacts on archeologic and historic resources. Although it nears some important recreation areas, it would affect fewer recreationists on a year-round basis. It also avoids serious problem soils areas, although it encounters more steeply sloping land and consequent potential for erosion problems. With the fewest major river crossings, it avoids affecting the bald eagle, an endangered species. However, along with the Plains Plan, it would have the greatest effect on big game species. The Taft Plan also minimizes visual impacts, most serious in the Rattlesnake, the Thompson Falls area, and the Clark Fork Valley. This plan does rank last for impacts on forestry, vegetation, and water resources, as it encounters more heavily timbered land, more highly productive forests, and longer stretches of watersheds serving downslope communities than either the Hot Springs or Plains alternatives. It offers the best options for future parallel lines, should they be found necessary, by best avoiding serious problem areas already constrained by geology, geography, or previous development.

From a technical and economic viewpoint, the Taft Plan would reliably integrate electric power supplied by the Colstrip generating units in eastern Montana. Constructing transmission facilities for this plan would allow the Bonneville Power Administration to maintain the electrical reliability and stability of the Federal Columbia River Power System. This alternative would cost approximately $244 million; it has the highest total cost.

Considering all factors (environmental impact, project cost, and technical performance), The Washington Water Power Company has determined that the Noxon Plan is their company's preferred alternative. The Noxon plan would have slightly higher overall environmental impact than the WWP Taft Plan. However, it offers the opportunity to alleviate a long-term maintenance and environmental problem in the Marten Creek drainage and to upgrade part of an existing line within essentially the same right-of-way. The Noxon Plan allows WWP to maintain reliable system service and to increase their 230-kV transmission capacity. This alternative would cost approximately $21.4 million.

2. The possibility of No Action by BPA was found to be inadequate to meet regional electrical service needs. The Garrison-Spokane 500-kV Transmission Project calls for reinforcement of the Federal Columbia River Transmission System to transmit Colstrip power efficiently and reliably. The No Action Alternative would permit transmission of only part of the power over the existing (unreinforced) system; such transmission, however, would be neither reliable nor efficient. An outage of the line would probably require shutdown of one of the 350-MW generating units until the outage is repaired. Shutdown would violate both Bonneville's and Western System Coordinating Council's reliability criteria for power system design and performance.

   If this project were not built, power overloads would be more likely to occur in the Pacific Northwest and The Montana Power Company systems, with indirect impacts on industry, urban/residential customers, and on forestry. Isolated difficulties of maintaining voltage levels might occur for industry and commercial users, as well as for agriculture (especially irrigated) and urban and residential uses. The stimulus of increased income in the area from both local and non-local workers and from subsidiary construction purchases would not occur.

For the No Action alternative, power transmission losses would average about 58,000 KW higher for the interconnected transmission system serving Oregon, Washington, Idaho, and Montana than for other alternatives. The cost of replacing this energy is likely to be about two million dollars to BPA and WWP systems. The transmission loss savings for the Montana power system would be several times that amount.

Under No Action, the environmental impacts associated with development of this proposal would not occur or would at least be deferred if the project were to be built at another time. Since a new/expanded 260-270 mile transmission line would not be developed, capital expenditures, materials (steel, aluminum, ceramics, and fuels), labor, and other resources (primarily forest productivity) would not be committed. Short- and long-term impacts associated with the line, the right-of-way, substation facilities, and access road system would not occur.

Specifically, effects on land use and on social, economic, and cultural values would not occur. New transmission facilities would not be introduced near urban or residential land. Short-term construction disruption of land uses would not occur. Between 1 and 17 acres of agricultural land would not be permanently removed from production; between 2200 and 3300 acres of forest land would not be converted to transmission line right-of-way. Between 1 and 20 acres of rangeland would not be removed from use. Visual intrusion and recreational conflicts would not occur. The appearance of the study area landscape would not be altered. No conflicts with historic or archeological resources would occur. Economic losses associated with long-term farm and forest productivity would not occur. No jobs would be created by the project, nor would local expenditures and induced economic activity from the project occur.

Potential disturbances of natural resources--geology, soils, water resources, vegetation, and wildife--would be avoided. Vegetation removal, soil disturbance, erosion, and sedimentation from right-of-way and access road development would not occur. Correspondingly, there would be no effect on wildlife or habitat.

3. Several alternatives did not meet the underlying need and purposes to which the agencies are responding, and were eliminated from detailed study (see in Chapter II, Alternatives Eliminated From Detailed Discussion).

ALTERNATIVES COMPARISON

In evaluating the potential effects of the proposed action, many analysis techniques and procedures were employed; these, considered together, are the analysis method. The term "method" is used simply to mean a systematic way of doing an environmental analysis. The major parts of the method include: 1) a comprehensive program to involve the public in the process; 2) a systematic data inventory, evaluation, and collection procedure; 3) a regional analysis to identify geographic areas where relatively high impacts may occur; 4) definition of alternative routes; 5) environmental analysis of the impacts of routes; 6) a systematic comparison of route alternatives; and 7) preparation of the environmental statement. The environmental analysis method is detailed in APPENDIX A: METHODOLOGY.

Comparison of the alternatives is drawn from a series of tables (table 2.1-table 2.7). Four comparisons are made. First, technical considerations that influence the type and amount of impacts, including cost estimates, are shown (table 2.1). Second, routes are compared according to the amount of resources that they would potentially affect (table 2.2). Third, the alternative plans are ranked according to how well they meet evaluation criteria developed from public and agency comments received during the scoping process (table 2.3). And fourth, the relative environmental advantages, disadvantages, and other considerations are described (tables 2.4-2.7).

DESCRIPTION OF ALTERNATIVES

ALTERNATIVE A: HOT SPRINGS PLAN

Two hundred sixty-eight miles of transmission line would be needed for this plan, as well as equipment additions to Garrison, Hot Springs, and Bell Substations.

In this plan, the 500-kV double-circuit Colstrip transmission system would be extended from a substation near Garrison to Hot Springs Substation, a distance of 157 miles for the route of lowest impact. A 125-foot-wide right-of-way would be needed.

From Hot Springs to Bell, the 111-mile route would be designed for single-circuit construction. Through parts of an environmentally sensitive and congested area between Hot Springs and Thompson Falls (34 miles), existing lines would be removed and replaced with multi-circuit towers on the same right-of-way. The capacity of the multi-circuit line could then be increased in the future with minimal line construction and minimal disruption of the area. Figure 2.3 shows the types and approximate dimensions of the 500-kV towers that would be used for the system.

Garrison, Hot Springs, and Bell Substations would be expanded within property owned by BPA to accommodate new terminal equipment. A new six-acre 500/230-kV Eagle Creek Substation may be jointly developed with The Washington Water Power Company (WWP), if they select the Eagle Creek Plan (WWP Alternative 2) as their proposed action.

ALTERNATIVE B: PLAINS PLAN

About two hundred and sixty-four miles of transmission line would be needed for the route of least impact for this plan. A new substation would be built near Plains; Garrison and Bell Substations would be expanded. The two Colstrip 500-kV lines would be extended west from Garrison to the vicinity of Plains, Montana. A new 10-acre substation, on a 25-acre site, would be built where these circuits intersect with existing lines. Route length for the double-circuit portion is about 153 miles.

Between Plains and Thompson Falls, a multi-circuit line would be built, replacing an existing line. A 500-kV single-circuit line would then be constructed to Bell Substation (111 miles); the substation would be expanded to accommodate new terminal equipment.

ALTERNATIVE C: TAFT PLAN (PREFERRED ALTERNATIVE)

Two hundred fifty-eight miles of transmission line would be needed, as well as a new substation at Taft and expansion of the yards at Garrison and Bell.

The two 500-kV Colstrip circuits would be extended from Garrison to a new 10-acre Taft Substation to be constructed near where the proposed double-circuit line would intersect the Hot Springs-Dworshak 500-kV line (157 miles).

From Taft, a single-circuit 500-kV line (101 miles) would be constructed to Bell Substation, which would be expanded within existing property boundaries in order to install new terminal equipment.

NO ACTION

The No Action alternative assumes that the Colstrip transmission system would continue to be built to the vicinity of Garrison, Montana, but that Bonneville's transmission system would not be reinforced as proposed. A decision to take no action would affect both the performance of the Pacific Northwest interconnected transmission system and the human environment as well. (For consequences of No Action, see Major Conclusions.)

ALTERNATIVES TO REINFORCE THE WASHINGTON WATER POWER COMPANY'S TRANSMISSION SYSTEM

The WWP alternatives depend, to some degree, upon which BPA plan is selected. Alternatives 1 and 4 could be developed independently of BPA plans. Alternatives 2 and 3 would require connection with proposed BPA facilities.

ALTERNATIVE 1: THOMPSON FALLS PLAN

This plan involves constructing a six-acre Thompson Falls 230-kV switching station near the existing Hot Springs-Noxon No. 2, 230-kV line near Thompson Falls, Montana; constructing a six-acre 230/115-kV substation at Wallace, Idaho 2/; and constructing a 48-mile 230-kV line from the Thompson Falls switching station to the Wallace Substation and then to the Pine Creek Substation (fig. 2.2). This plan could be built with BPA Plans A (Hot Springs), B (Plains), C (Taft), or with BPA No Action.

The Thompson Falls-Wallace-Pine Creek line would be single-circuit steel to Wallace Substation (figs. 2.2, 2.3; tables 2.1, 2.2, 2.7). From Wallace to Pine Creek Substation, the line would be built on wood pole structures, following an existing WWP right-of-way. The Wallace-Pine Creek part of the route is common to all WWP construction alternatives.

ALTERNATIVE 2: EAGLE CREEK PLAN

This plan involves tapping BPA's proposed line and constructing a six-acre 500/230-kV substation at Eagle Creek; constructing a six-acre 230/115-kV substation at Wallace, Idaho; and constructing a 230-kV line from Eagle Creek Substation to the Wallace Substation and then to the Pine Creek Substation. The existing Noxon-Pine Creek 230-kV line would be rebuilt and reconductored on single-circuit steel towers from Noxon to the Eagle Creek area, where it would connect into and out of the substation using double-circuit towers. Transmission line construction involves about 26 miles of teardown-rebuild and about 37 miles of new route. This plan could be built with BPA Plans A (Hot Springs) or B (Plains).

ALTERNATIVE 3: TAFT PLAN

This plan involves constructing a 230-kV line from the proposed BPA Taft Substation to the Wallace Substation and then to the Pine Creek Substation; developing 230-kV interconnecting terminal facilities at Taft Substation; and constructing a six-acre 230/115-kV substation at Wallace, Idaho. This WWP plan could be built with BPA Plan C (Taft). It would have the lowest overall environmental impact.

2/ Bunker Hill mining operations shut down in 1982, creating uncertainty about future energy demands in the area. Since that time, new owners of the mine have implemented plans to return the facility to operation. The Washington Water Power Company still considers the need to provide additional transmission capacity to the Coeur d'Alene area mining loads in order to maintain reliable service as one of the underlying reasons for their proposed project: "The shutdown of the Bunker Hill load in 1982 reduced the mining area load by 60 average megawatts. However, the new Bunker Hill operation has asked our company to assure sufficient capacity for the resumption of essentially full operation, which is planned for by not later than 1986. Thus, all the needs which were shown in the Draft EIS for the WWP 230-kV project, are still fully applicable today to justify this project." Letter, D. L. Olson, Senior Vice President-Resources, The Washington Water Power Company, to Marvin Klinger, Assistant Administrator for Engineering and Construction, Bonneville Power Administration (January 19, 1983).

The 36-mile Taft-Wallace-Pine Creek line would involve 230-kV steel line north and west out of a proposed Taft Substation north of the South Fork of the Coeur d'Alene River, parallel to BPA routes in Plan C into Wallace Substation (fig. 2.2). The last 2 miles would parallel an existing WWP line.

ALTERNATIVE 4: NOXON PLAN (PREFERRED BY WWP)

This plan involves constructing a six-acre 230/115-kV substation at Wallace, Idaho; constructing a double-circuit 230-kV line to replace part of the existing line between Noxon switchyard and Wallace Substation; and constructing a new line from Wallace Substation to Pine Creek Substation.

The routing of this plan resembles that of Alternative 2, which entails rebuilding the existing WWP Noxon-Pine Creek line and constructing on a new route. However, under this alternative, the line would be rebuilt to double-circuit 230-kV lines on steel towers and would extend further south. After crossing the Coeur d'Alene River, it would follow an existing line up Beaver Creek, and on to Wallace Substation. The line extends from Wallace Substation on to Pine Creek Substation, as described under Alternative 1. This plan could be built with BPA Plans A (Hot Springs), B (Plains), C (Taft), or No Action. (See Chapter II, pp. II-28 to 30, for more detailed discussion of this preference.)

ALTERNATIVE 5: NO ACTION

Under the NO ACTION alternative, the WWP facilities proposed to reinforce the electric service to the Wallace-Kellogg mining area would not be constructed or at least would be delayed. WWP would then be unable to provide strong reliable service to critical mining operation loads. The NO ACTION alternative could result in lengthy outages under several possible single-contingency situations, should loads continue to follow trends of the past decade. Outages of the 230-kV or 115-kV busses or of the 230/115-kV transformer at Pine Creek would require dropping significant portions of the area load. The potential for such outages currently exists for 2 to 6 months a year and would increase to 4 to 9 months per year (WWP 1980).

The 230/115-kV transformers at Pine Creek would be less and less able to support the area load. With no additional 230-kV support, outages of BPA's proposed 500-kV system west of Hot Springs or Plains would force the additional Colstrip generation over the already-stressed 230-kV system in the Noxon-Cabinet area, causing severe overloads, especially during high generation periods. Although the likelihood of such outages may be low, the potential threat to safe mining operations is significant. Without reinforcement to this area, mine operators may have to seek backup generators, which would most likely be oil- or gas-fired (WWP 1980).

Under NO ACTION, the environmental impacts associated with reinforcing the WWP 230-kV transmission system would not occur or would at least be deferred if the project were to be built at another time. Since a new or rebuilt transmission line would not be developed, capital expenditures, materials (wood poles, tower steel, aluminum, ceramics, and fuels), labor and other resources (primarily forest productivity) would not be committed. Short- and long-term impacts associated with the line, the right-of-way, substation facilities, and access road system would not occur.

MITIGATION

Construction, operation, and maintenance of transmission facilities produce both beneficial and adverse environmental impacts. The best mitigation for adverse impacts is to avoid areas where impacts may occur. To a large extent, this has been accomplished: The routes under consideration are the result of a comprehensive location procedure designed to avoid sensitive resources as much as possible. Where environmental effects are not avoidable, measures can be used to minimize them. Mitigation included as part of the proposal, such as providing erosion control, selective right-of-way clearing, and darkening towers to reduce visibility, appears in Chapter II: ALTERNATIVES INCLUDING THE PROPOSED ACTION. A mitigation "not included" section also discusses measures which are still being considered but which have not been proposed because mitigation for one resource could increase impacts on another or because specific locations have yet to be identified.

AREAS OF CONTROVERSY

Areas of controversy are topics over which substantial disagreement exists and which are not easy to resolve. Such areas for this project, derived from questions and comments by members of the public and by government agencies, are listed below. These issues and others were raised by commentors on the draft EIS: See Comment/Response Volume (Volume II) for further discussions.

HEALTH AND SAFETY

Many studies have been made of the biological effects of electric fields on laboratory animals and on electrical workers. However, there is no universal agreement on how to relate these studies to actual conditions near transmission lines. Although most studies have found no adverse effects, some have reported such effects. No one can say with certainty whether long-term exposure to transmission line electric fields could produce adverse effects; however, most reviews of the studies suggest that the possibility of such effects is remote. Just how remote is a subject of controversy.

USE OF PUBLIC VS. PRIVATE LANDS FOR ROUTING

Both public and private land must be crossed in the course of transmitting power from Garrison Substation to Bell Substation near Spokane. Many private landowners would prefer to see routes located wherever possible on public land, most of which is administered by the Forest Service and the BLM. Constraints of cost, accessibility, terrain, and legally-designated areas for special management, however, as well as the need to bring lines to points of interconnection with existing systems, often make location on private land both necessary and desirable. Wherever there is a choice between public and private lands for routing, a controversy over values arises.

WHO BENEFITS/WHO PAYS

Controversy and misunderstanding exist over who will benefit from the line. If those through whose property or communities the line would pass feel that all the power is being funneled to the West Coast, and none to their own areas, then they often feel that they are "paying" in environmental impacts for the luxuries of others.

IMPACTS ON WILDLIFE AND VEGETATION

Routing choices which locate the line farther from populated areas increase potential impacts on wildlife and other natural resources. Some species, classified by law as Threatened or Endangered, or of concern because of small populations in the area, must be protected from any adverse impacts that would jeopardize their existence. Controversy arises over whether it is more important to spare impacts on people, at the cost of wildlife, vegetation, and other natural resources, or to preserve and protect species and habitat at the risk of incurring social impacts.

ECONOMIC IMPACTS

Controversy exists over whether the building of this project by a Federal (tax-exempt) agency where originally a private (tax-paying) company was to construct a large part constitutes a loss of revenue or a revenue foregone. Controversy also exists over whether a property adjacent to or near the right-of-way is devalued by a project and over whether the means (single payment vs. annual payments) and extent of compensation for easements is equitable. Finally, there is controversy over the extent to which a transmission line may affect people's livelihoods (for instance, forestry or agriculture by loss of land or interference with operations) and, if so, the extent to which it is a compensable effect.

ESTHETIC IMPACTS

The extent to which the visual change caused by the towers and lines of this project can be mitigated by screening, painting, or outright removal from common public viewsheds is a source of controversy. Related issues include tradeoffs between effects on visual quality in areas out of the valleys and away from people and those on viewers in more populated or well-travelled areas; relative importance of long-term impacts on a few residential viewers vs. short-term impacts on many travellers temporarily in an area; and the potential for and cost of undergrounding portions of a line as mitigation.

NEED FOR THE LINE

Question has arisen over need for the line and need for the power, particularly in Montana. Need for power was addressed in the 1979 Federal Colstrip Project EIS, which covered the building of the additional Colstrip units and associated facilities to transmit the power to a point of interconnection with the FCRTS. The Garrison-Spokane project addresses the need for construction to reinforce the Federal Columbia River Transmission System for receipt and transmittal of Colstrip power within Montana and the Northwest. Related to this area of controversy are the issues of whether conservation or shipping coal to the West Coast could substitute for the proposed action.

LONG-RANGE PLANNING

This area includes the extent to which long-range energy planning can and must be done and included in this EIS; the likelihood and impacts of multiple lines in any given corridor; and both the potential for and the likelihood of development of additional energy corridors crossing the study area.

BONNEVILLE POWER'S ROLE

Question and controversy exist over why Bonneville Power is now building this portion (Garrison to intermediate substation) of the line instead of Montana Power Company, as originally proposed; whether BPA is permitted to build east into Montana; and whether BPA and Montana Power have entered into negotiations contrary to the public interest.

SEGMENTATION

The added output of Colstrip Unit 3 must be available for transmittal to western Montana (at a transmission intertie near Garrison, Montana) by the winter of 1983-84. The output of Unit 4, scheduled for completion in 1985, must be available for transmittal to western Montana and to the FCRTS by the fall of 1985. The extent to which these two needs and their respective environmental studies are related is a subject of controversy.

FACILITY SITING ACTS

The States of Montana and Washington have Acts governing the siting of major facilities. The States have sought to require that BPA transmission line projects be subject to these Acts. However, under the current court interpretations, BPA is prohibited under the U.S. Constitution from being bound by these provisions without Congressional authorization. The lack of Congressional authorization was reaffirmed by two Federal court decisions after the draft EIS was issued. (See in Chapter I, Background of the Project for more detail.)

ISSUES TO BE RESOLVED

The choice of an environmentally preferred plan was the result of rankings of impacts for 12 resource topics: socioeconomics, urban/residential, forestry, agriculture, recreation, wildlife, vegetation, water resources, soils/geology, esthetics, cultural resources, and engineering and site development. Issues to be resolved include the extent to which impacts related to social conflict and/or impacts related to natural resources may determine the route selected: that is, what balance of these resource impacts is most desirable. The Taft and Plains Plans better reduce impacts on people; the Hot Springs Plan better reduces impacts on most natural resources. Based on a balance of environmental impact, project cost, technical performance, and public comment, the Taft Plan has been identified as the Preferred Alternative.

Several decisions must be made for this project:

THE BONNEVILLE POWER ADMINISTRATION IS TO DECIDE: Which plan of service and route to select in the building of the proposed transmission facilities.

THE WASHINGTON WATER POWER COMPANY IS TO DECIDE: Whether to construct proposed transmission facilities; and, if the decision is to construct, whether to connect with Bonneville's proposed facilities or to build independent facilities. This last decision involves selection of a plan and route.

THE FOREST SERVICE AND BUREAU OF LAND MANAGEMENT ARE TO DECIDE: Whether to grant a right-of-way permit on National Forest System lands and BLM-administered lands. The decision would consider overall location of both BPA and WWP facilities as well as issues related to private lands.

THE STATE OF MONTANA WILL REVIEW the project to determine whether the provisions of Montana's Major Facility Siting Act have been met for the segment of the transmission line from Garrison Substation to Montana's western border. The State of Montana may need to make a licensing decision under the Major Facility Siting Act, if over 10 miles of WWP transmission line should be constructed in Montana. Parts of this Federal EIS could be used in the licensing process. The State, under provisions of its Major Facility Siting Act, would also review any future Montana Power Company proposal to reinforce electrical service at Missoula.

Purpose of and Need for Action

P U R P O S E   O F   A N D   N E E D   F O R   A C T I O N

Two actions, which can be developed together or independently, are proposed in this document. Bonneville Power Administration (BPA) proposes to add 500-kV transmission facilities to its regional power system serving the Northwest: A 500-kV double-circuit transmission line would be built from a substation near Garrison, Montana, either to an existing substation that would be expanded at Hot Springs or to a new substation that BPA would construct near Taft or Plains in western Montana; a 500-kV single-circuit transmission line would also then be built from there to the Glenn H. Bell Substation near Spokane, Washington (see fig. 1.1). Several transmission route location alternatives are possible east toward Garrison as well as west toward Spokane from each of these substation sites.

This action would satisfy two needs: 1) to integrate and transmit additional electric power supplied by the Colstrip generating units located in eastern Montana to the project participants and ultimately to users in the Northwest; and 2) to maintain the electrical reliability and stability of the Federal Columbia River Power System (FCRPS). BPA purposes, or goals, are to: 1) preserve and enhance environmental quality, as directed by the National Environmental Policy Act (1969); 2) save energy; 3) minimize cost; 4) provide for potential future reinforcement of electrical service to Missoula; 5) identify in conjunction with The Washington Water Power Company an overall combined electrical plan for meeting areawide and regional transmission requirements, especially in the Wallace-Kellogg area; 6) allow for parallel line location should additional future transmission be needed; and 7) achieve consistency with other National policies. 1/

The Washington Water Power Company (WWP) proposes to build 230-kV transmission facilities to satisfy two needs: 1) to maintain adequate and reliable electric service to the critical backup needs for mining operations in the

1/ Consistency with applicable National policies includes conformance to Acts and regulations governing the following: noise; air and water quality; protection of archeological and historic resources and of endangered and threatened species of plants and animals; management and protection of floodplains and wetlands, National Trails System, and Wild and Scenic Rivers; contract compliance; use and disposal of insecticides, herbicides, fungicides, rodenticides, and toxic and hazardous wastes; rights-of-way on public land; discharges into waters; structures in navigable waters; resource conservation and recovery; energy conservation; consistency with intergovernmental plans and programs. Also applicable are regulations of the Council on Environmental Quality as developed from the National Environmental Policy Act. See Consultation, Review, and Permit Requirements (Chapter IV).

Kellogg-Wallace area of northern Idaho 2/; and 2) to increase 230-kV transmission capacity in the northern Idaho area. WWP will also adhere to goals of 1) preserving and enhancing environmental quality; 2) saving energy; 3) minimizing cost; and 4) achieving consistency with other National policies. 3/

BACKGROUND OF PROJECT

In 1971, The Montana Power Company (MPC) agreed with Puget Sound Power and Light Company, Portland General Electric, The Washington Water Power Company, and Pacific Power and Light to submit a proposal to the State of Montana to build two 700-MW coal-fired generating units to supplement the two smaller MPC units at Colstrip, Montana. Coal would be supplied by the MPC-owned Rosebud coal mine in Colstrip. Of the total power generated by Units 1-4, about 1310 MW were to be conveyed approximately 430 miles west on two new parallel 500-kV lines from Colstrip to the Bonneville Power Administration (BPA) system at BPA's Hot Springs Substation in western Montana. There the output could be integrated into Bonneville Power Administration's Federal Columbia River Transmission System. Intermediate substations were to be built at Billings and at Helena, Montana, to supply a strong new source of area power for central and western Montana. Units 3 and 4 were scheduled for completion in 1978 and 1979, respectively. The 500-kV transmission system was scheduled for energization in 1979.

The Montana Major Facility Siting Act required a formal State examination of major facility need and consequences before permission to build could be granted. Accordingly, the Montana Department of Natural Resources and Conservation (DNRC), Energy Facility Siting Division, began preparation of studies and an environmental impact statement in order to support its recommendations to the Board of Natural Resources and Conservation (BNRC) on the need for and environmental compatibility of the project.

2/ Bunker Hill mining operations shut down in 1982, creating uncertainty about future energy demands in the area. Since that time, new owners of the mine have implemented plans to return the facility to operation. The Washington Water Power Company still considers the need to provide additional transmission capacity to the Coeur d'Alene area mining loads in order to maintain reliable service as one of the underlying reasons for their proposed project: "The shutdown of the Bunker Hill load in 1982 reduced the mining area load by 60 average megawatts. However, the new Bunker Hill operation has asked our company to assure sufficient capacity for the resumption of essentially full operation, which is planned for by not later than 1986. Thus, all the needs which were shown in the Draft EIS for the WWP 230-kV project, are still fully applicable today to justify this project." Letter, D. L. Olson, Senior Vice President-Resources, The Washington Water Power Company, to Marvin Klinger, Assistant Administrator for Engineering and Construction, Bonneville Power Administration (January 19, 1983).

3/ "Other National policies" are listed in footnote #1.

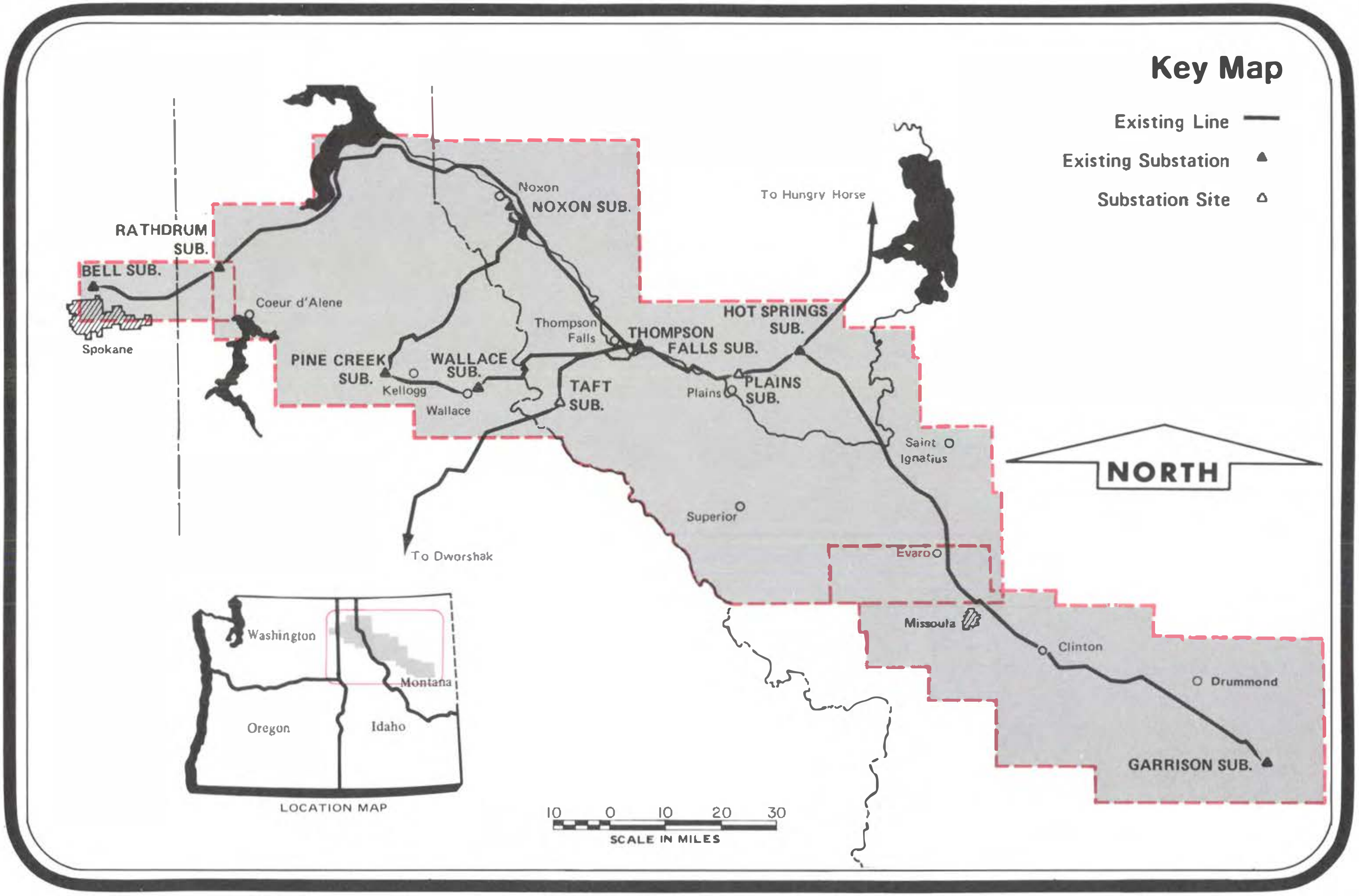


Figure 1.1
Garrison-Spokane Project
76-6

The Colstrip consortium retained Chas. T. Main, Inc., Engineers, to conduct engineering and location studies and Westinghouse Environmental Systems Department to conduct environmental studies on the proposed project. The Westinghouse Report, published in November 1973 and presented to State and Federal officials at the Big Sky Conference at Big Sky, Montana, recommended a major corridor as follows:

> From Colstrip, the corridor would cross the Yellowstone River and proceed west to Helena, running south of Broadview (and permitting connection with the Billings Substation) and south of Townsend to the proposed Helena Substation. The corridor would then proceed north and west, crossing the Continental Divide somewhat north of Mullen Pass, continuing through the Avon and Nevada Valleys, crossing Blackfoot and Clearwater Rivers, and continuing to the south of Placid Lake. After crossing through the Jocko Pass, the corridor would head northwest into the Flathead Valley, pass south of St. Ignatius and end at the Hot Springs Substation, where integration with BPA facilities would occur.

Alternate segments and routes were systematically eliminated in the Westinghouse Report on the basis of necessary Montana transmission system connections with Helena and Billings Substations, esthetic impacts, other environmental costs, technical engineering and terrain difficulties, length of route, and economics.

Simultaneously, the Bonneville Power Administration began planning and location work for constructing and reinforcing its transmission facilities from Hot Springs west to the Spokane area. The Hot Springs-Bell project was authorized for budget presentation in the Fiscal Year 1975 Program Statement.

In January of 1974, BPA filed with the Council on Environmental Quality (CEQ) a draft facility planning supplement to the BPA draft Fiscal Year 1975 Proposed Statement. It proposed for construction a single-circuit 500-kV transmission line using steel towers through an approximately 165-mile-long corridor from Hot Springs Substation (to be expanded with new terminal facilities), west near Thompson Falls, north through Noxon, and west to an expanded Glenn H. Bell Substation near Spokane, Washington. This plan also possessed the potential for integrating planned additional output from generators at Libby Dam by 1983.

A potential alternate 201-mile plan south to Dworshak and west to Lower Granite was also developed, although it would require more terminal facilities and a longer line. A variation involved a plan of service running west from Hot Springs Substation toward Thompson Falls, then directly west to Spokane through the Coeur d'Alene River Basin. Neither variation permitted immediate integration from planned Libby output. DC transmission directly to Portland as a point of interconnection was also considered, but rejected for the likelihood of great controversy over environmental impact potential in passage through the Magruder Corridor. The alternative of nonconstruction was also examined.

Public meetings for information and comment on the proposed plan were held in February and March of 1974. Although the Hot Springs-Bell project was authorized for construction as part of BPA's Fiscal Year 1975 budget and Program EIS, the project was deferred for inclusion in BPA's Fiscal Year 1976 Budget and Draft Program Statement. BPA began to develop a draft location supplement for the proposed plan (Hot Springs-Noxon-Bell).

In February of 1974, the Bureau of Land Management (BLM) was designated as lead agency for the Federal EIS necessary to grant right-of-way permits for the Colstrip project, but the study team was released pending completion of the State's environmental impact study and of the BNRC hearings.

Meanwhile, the DNRC continued throughout 1974 with its study of the Applicant's proposal, including both generating unit and transmission line impacts. Different system-wide options were described, including No Action, direct current (DC) transmission (rejected as too costly except over very long distances), and undergrounding of the line (limited by technical capability and by significantly higher costs).

Four plans, including the Applicant's proposed corridor, were examined for engineering feasibility alone. All plans were assumed to terminate at Hot Springs. Plan A (Helena Plan) would be least costly, most stable, and would require the least amount of control equipment to regulate current (energy) flow. Plans B and C (Great Falls; Butte-Anaconda) presented greater ease of access and routes which passed through minimum or moderate earthquake danger zones, rather than through the higher risk earthquake zones crossed by Plan A. However, both cost and compensation factors were likely to be higher. Plan D, involving a net of three 500-kV circuits, was judged technically less feasible than the others. No comparative environmental analysis was made.

In January of 1975, the Montana Department of Natural Resources and Conservation (DNRC) submitted a final environmental impact statement, recommending that the Colstrip Project be denied because the Department was not persuaded of the need for or advantages of the project.

However, during the hearing and review process, both the Board of Natural Resources and Conservation (BNRC) and the Board of Health and Environmental Sciences (BHES) recognized a need for the project. The BHES issued a conditional certification for Colstrip Units 3 and 4; the BNRC approved the application and granted a Certificate of Environmental Compatibility and Public Need, subject to certain conditions, in July 1976.

In March of 1975, the final facility planning supplement for Hot Springs-Bell was issued in appendix form to the Final BPA Fiscal Year 1976 Program Statement filed with CEQ. It identified Hot Springs-Noxon-Bell, with its potential for integrating future Libby generation, as the preferred plan-of-service. The Hot Springs-Dworshak-Lower Granite plan was discussed as a technically feasible alternative; impacts of nonconstruction were also discussed. Another, 247-mile alternative plan running north and west from Hot Springs through Libby, Troy, Bonner's Ferry, Sandpoint, and Athol, was considered but rejected as not feasible on economic, engineering, and environmental grounds.

In September of 1975, BPA prepared and submitted a draft Facility Location Evaluation for the Hot Springs-Bell 500-kV line. A final environmental statement was not filed, however, as the Colstrip project was delayed and as Libby integration plans changed, eliminating the need for a Libby/Hot Springs-Bell connection at Noxon.

The BNRC decision, the 1974 decision by the Governor of Montana that the State would not participate in a joint State-Federal EIS but would actively observe the Federal process, and the increasingly urgent need for new energy prompted Deputy Under Secretary Lyons (U.S. Department of Interior) to transfer lead agency status on the Colstrip EIS from the Bureau of Land Management to Bonneville Power Administration (November 1976). The memorandum of transfer specified the conditions under which the Federal Colstrip EIS was to be developed, including the scope of the Statement: "The 'proposal' should be the corridor approved by the State and the alternatives should include those considered by the State. We want to emphasize that, if there are any Federal or Indian objections or reservations to the State's approved corridor or stipulations, appropriate alternatives must be developed." (Lyons, 1976). Although BPA was designated to build only the Hot Springs-Bell project, it now held major responsibility for EIS development for both the Colstrip-Hot Springs and the Hot Springs-Bell transmission projects.

An interagency study team composed of representatives from BPA, BLM, and the U.S. Forest Service (USFS) was formed to prepare a comparative environmental analysis of transmission alternatives for the Colstrip Project. This extensive analysis of the Colstrip study area and route options was to be documented in a Colstrip Transmission Environmental Report (TER), to be used as a basis for the Federal Colstrip EIS.

The Steering Committee decided not merely to concentrate on the State-approved corridor but to evaluate fully and equally all alternatives and jointly to develop alternative segments to avoid areas of concern identified by the Bureau of Land Management and the Forest Service. A total of 12 alternatives was examined, including denial of a Federal corridor option. Of particular concern were the crossings of the Flathead Indian Reservation, as the impacts on the reservation as a whole and, in particular, on the Indian-designated "Jocko Primitive Area" were the subject of much controversy. 4/ The only suggested alternative to this crossing, a route through Siegel Pass, substantially increased environmental impacts in some areas. The TER suggested that, should access to Hot Springs be restricted, a substation could be developed near the Hot Springs-Dworshak line (for instance, near Plains), enabling the transmission line to avoid the Reservation entirely. (For discussion of other problem areas in the Applicant's corridor, including

4/ Letters from the Bureau of Indian Affairs (February, March, April, and December 1977) indicated a refusal to participate in preparation of the TER because the Confederated Salish and Kootenai Tribal Council decided not to approve right-of-way for the proposed corridor through the Flathead Indian Reservation.

strong objections by residents in the vicinity of Helena and difficulties with crossing a BLM long-term Elk Logging project, see Step 3 of the TER.)

In a letter of September 26, 1977, the Montana Power Company, on behalf of the Colstrip Project Consortium, requested that, under the provisions of the Federal Columbia River Transmission Act (P.L. 93-454), BPA construct transmission lines west from a new point of interconnection with the Montana Power grid, preferably in the Helena-Ovando area. In a letter dated December 2, 1977, the Administrator of BPA agreed to build transmission facilities as far east as Townsend, Montana, including a new substation in the Garrison area, subject to the following conditions: Congressional authorization 5/, final agreement on the electrical plan of service, completion of satisfactory contractual agreements between BPA and the Colstrip management companies, issuance of necessary permits and approvals, and compliance with all NEPA provisions.

In March 1978, the Montana State Director of the BLM, the Regional Forester for Region I of the USFS, and the BPA Administrator agreed to a joint evaluation of key factors which would affect Federal decisions on a right-of-way corridor for the Colstrip transmission lines, should the overall project be approved. This allowed the public to review not only the analysis of impacts in the Federal Colstrip Environmental Impact Statement, but also principal management issues considered important in the review process. The draft document, the Corridor Option Summary, was completed in September 1978.

Some of the major environmental and jurisdictional issues raised by the transmission line portion of the Colstrip project include:

1. Overall environmental impacts of the transmission lines.

2. Overall need for the electricity to be generated by the Colstrip project.

3. Crossing of the Flathead Indian Reservation.

5/ On October 18, 1978, Congress passed House Joint Resolution 1139 (later Public Law 95-482) authorizing funds for BPA's construction from the Helena area west. This authorization incorporated, by reference, the specific authorization specified in part of the earlier H.R. 12928:

> "Provided, That expenditures from the Bonneville Power Administration Fund established by Public Law 93-454 are hereby specifically approved...for the construction of facilities to integrate new generating facilities at Colstrip, Montana, and the Bonneville Power Administration transmission grid."

When H.R. 12928 was vetoed by President Carter, Congress passed the Joint Resolution cited above in order to authorize BPA's programs for Fiscal Year 1979.

4. Impacts on residential areas and people generally.

5. Use of existing utility corridors as opposed to the development of a new corridor.

6. Adverse impacts on unique natural resources and scenic beauty.

7. Encroachment on designated wilderness or natural areas.

8. Project cost.

9. Potential BPA construction of part of the line.

10. Compatibility with State of Montana approved corridor. 6/

Results in the draft option summary and the EIS and TER upon which it was based indicated that several options would create less environmental impact than would the Applicant's corridor.

Meetings held during 1978 between BPA and the Colstrip Applicants produced the following tentative plan-of-service:

> From a location on the DNRC-approved corridor near Townsend, BPA would build a double-circuit 500-kV line to a new substation near Garrison, Montana. That substation would include a 500/230-kV transformer and a 230-kV switchyard to loop in both the existing BPA 230-kV Hot Springs-Anaconda line and an MPC 230-kV line. BPA would then construct a double-circuit 500-kV line west from the substation, on existing right-of-way, to Hot Springs Substation.

The potential difficulty of crossing the Flathead Reservation and newly identified needs for providing service to the Wallace-Kellogg area in Idaho led to further investigation of alternative corridor options. In May, examination began of a route running directly to Bell Substation, with connection to a new substation in the Taft area (rather than at Hot Springs) and with potential connection to Washington Water Power's Pine Creek Substation. In not connecting through the Hot Springs or a Plains Substation, this route would avoid both the Reservation and the crowded Clark Fork Valley in and near Thompson Falls.

On June 1, 1979, the Montana Board of Natural Resources and Conservation issued "Additional Findings of Fact and Conclusions of Law" about the Colstrip projects. Support was given to use of Rosebud coal, not the higher-sulfur McKay coal; to mine-mouth, not load-center generation, as of minimal environmental impact and of environmental acceptability; and to the transmission corridor previously approved, over any other alternates.

6/ Federal Corridor Option Summary (August 1979), pp. 1-2.

The final Colstrip EIS was published July 31, 1979. After conferring with the Governor of Montana, the Forest Service and the Bureau of Land Management issued a joint Record of Decision on the Colstrip Project on September 21, 1979. They recommended that Townsend-Boulder be the Federally approved corridor, as it was environmentally preferred. The corridor was to be identical to the Applicant's from Colstrip to Townsend. Then it diverged, passing instead near Boulder, Garrison, and Missoula, northward across the Flathead Indian Reservation, and terminating at Hot Springs. (An alternate routing, should crossing the Reservation prove impossible, called for crossing through Siegal Pass to Plains, unless BPA/FS studies should find a better way.)

On August 6th, BPA announced in the Federal Register its intent to revise and reissue the Hot Springs-Bell EIS. Alternatives, some developed too late to be included in the Colstrip decision, were to be explored for connections at points other than the Hot Springs Substation. Also to be considered were means to reinforce The Washington Water Power Company's transmission lines in the Wallace-Kellogg areas, a newly identified need.

Following the 1979 Federal Record of Decision selecting Townsend-Boulder as the best corridor for which permits for rights-of-way over Federal land would be granted, centerline location was begun. Location meetings held in the Townsend-Garrison area brought forth substantial public controversy over centerline and corridor location, particularly in the Boulder and Deer Lodge Valleys. BLM, FS, and BPA decided, therefore, to prepare and issue a supplemental EIS to evaluate additional transmission line corridors from Boulder to alternative substation locations near Garrison, Montana.

In March 1981, during preparation of the Supplement, the State of Montana brought suit to establish that the project would be subject to findings entered by the Board of Natural Resources and Conservation pursuant to the Montana Major Facility Siting Act. The District Court's decision holding that the project is not subject to such findings has been appealed by the State of Montana.

The Colstrip Supplement, issued in July 1981, was followed by an August 18 Record of Decision signed by the Bureau of Land Management, the Forest Service, and BPA. The Boulder alternative, the Black Mountain +AAA alternatives, and a substation site near Garrison were designated for location. 7/ Public concerns over centerline location between Garrison and Missoula raised questions of the need for further investigation of alternatives to connect with the Hot Springs-Bell portion of the Colstrip project. Also raised for consideration was the potential for future reinforcement of the Missoula area. Since 1) the writing of an entirely new supplement would create untenable delay in the completion and energization of the whole project; 2) the Garrison-Missoula section and the Hot Springs-Bell project were linked by the need for a common point of connection; and 3) the

7/ See Colstrip Project EIS Supplement for greater detail. Note that the transmission line from Townsend to Garrison and the Garrison Substation are now under construction and are scheduled for operation in the fall of 1983.

Hot Springs-Bell Project EIS was still in draft stage, BPA decided in March to expand the scope of the Hot Springs-Bell project east to include the Garrison-Missoula section. A single combined revised EIS was then to be developed and written to cover the entire facility from Garrison west. The new name for the project became "Garrison-Spokane 500-kV Transmission Project." A Notice of Intent was published in the Federal Register on April 28, 1981. The Garrison-Spokane draft EIS was issued for review in March 1982. The final EIS (this document) was made available in March 1983.

Recent Events

In early 1982 and during public review of the Garrison-Spokane project draft EIS, several events focused attention on the regional energy situation of the Pacific Northwest states (Oregon, Washington, Idaho, and Montana). In January 1982, the Washington Public Power Supply System, which had five nuclear plants under construction, terminated two of those construction projects. In April 1982, the Bonneville Power Administration completed a draft of its first-ever regionwide energy forecast. Previous forecasts done by utilities generally showed load growth in the range of 3.5 percent per year (or higher) through the year 2000. The BPA forecast pointed to demand growth of about 1.7 percent. (The final version, issued in August, estimated 0.8 percent growth on the low side, 1.6 percent midrange, and 2.4 percent on the high side.) These estimates are comparable to the range of load growth forecast independently by the Northwest Power Planning Council (January 1983). These forecasts estimated a slower rate of growth and reversed the picture of near-term (in the mid-late 1980's) energy deficits.

The Supply System, acting on BPA analysis and recommendation, reviewed the schedule for their three remaining nuclear plant construction projects and decided to delay completion of WPPSS-1 for a period of up to five years. These events fueled concerns about whether Colstrip generating Units 3 and 4 were still required.

Electric loads in the Pacific Northwest are growing at a slower rate than was predicted in the load projections of the 1970's. This rate of growth and the lower forecasts that are being made for future years have prompted many individuals to question the need for generating resources and transmission facilities scheduled for construction during the next 10 years.

The Pacific Northwest would face deficits of energy in the late 1980's and early 1990's in the event that generating facilities currently under construction were not brought on line. The Colstrip generating resources and Colstrip transmission lines, without which the electricity produced cannot be conveyed to load centers, have figured prominently in every analysis of resource and transmission requirements made in recent years. The draft Regional Conservation and Electric Power Plan (January 1983) prepared by the Northwest Power Planning Council includes Colstrip 3 and 4 as "facilities under construction and assumed to be completed on schedule."

Figure 1.2 shows the historical growth in electricity use within the region. Within the last few years, that rate has declined and BPA's forecast depicts loads growing between 0.8 and 2.4 percent per year. Table 1.1 presents information on forecast electricity loads according to sector. These estimates reflect the recent changes in energy use trends.

Figure 1.3 is a composite of forecast electrical energy demand in the Pacific Northwest and energy generating resources available to meet that demand. Depending on the actual rate of change in electrical energy use, energy deficits may occur as early as the late 1980's or they may not occur within the forecast period at all, if the committed generating resources produce energy as scheduled. Colstrip generating Units 3 and 4 are an important resource in balancing energy demand and supply, especially considering unknowns and uncertainties regarding both the Regional energy load and availability of energy resources.

Construction of the Colstrip project is well underway. Work on generating Units 3 and 4 is about 60 percent complete and on schedule. The integrating transmission lines from Colstrip to Garrison, Montana, are being built, and should be ready to transmit energy in the fall of 1983 when generating Unit 3 starts producing power.

BONNEVILLE POWER ADMINISTRATION NEEDS

Need to integrate and transmit a portion of Colstrip power to Pacific Northwest users: Under provisions of the Federal Columbia River Transmission System Act (16 USC 838) and as authorized by the Bonneville Project Act, BPA is required to integrate and transmit electric power from existing or additional Federal or non-Federal generating units. Congress has also authorized BPA to commit funds to this project: "Such amounts as may be necessary . . . for programs, projects, and activities to the extent and in the manner provided for in the Energy and Water Development Appropriations Act, 1979 (H.R. 12928) as enacted by The Congress." (P.L. 95-482).

To transmit the additional Colstrip power reliably and efficiently, the existing Federal Columbia River Transmission System must be reinforced. Two 500-kV transmission lines will cross the State to western Montana so that power may be so integrated. At the request of the Colstrip Project Applicants, Bonneville has agreed to build part of the Colstrip integrating transmission system.

The Colstrip project is being developed by a consortium of private utilities to meet projected increased demand for power in the Northwest (table 1.1, figs. 1.2, 1.3). When Units 3 and 4 are completed, the generating capacity will be about 2100 MW; 860 MW, by contract, will directly serve the needs of Montana residents, while the remaining contracted 1240 MW will be transmitted to the utility participants to serve customers throughout the Northwest. One-half (65 MW) of Pacific Power and Light's share will be additionally delivered within Montana at Libby and Flathead. Successful integration into Bonneville's system will require reinforcement of part of the Federal system

TABLE 1.1 - FORECASTS OF FIRM ELECTRICITY LOADS FOR THE PACIFIC NORTHWEST
(In Average Megawatts)

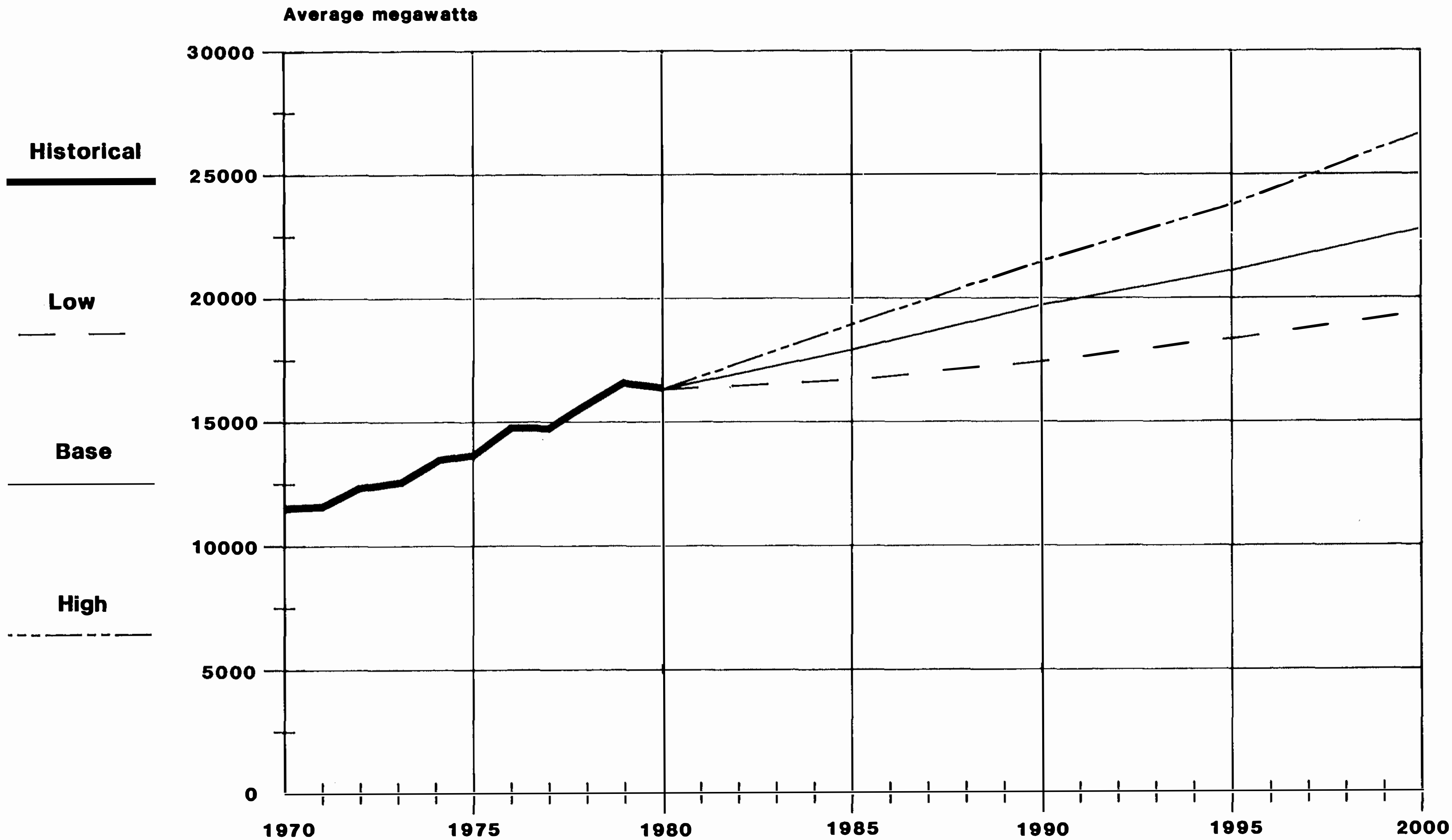
SECTOR	1980	1985	1990	1995	2000	1980-1990 AARG*(%)	1990-2000 AARG(%)	1980-2000 AARG(%)
Residential								
Low	5813	5969	6245	6453	6620	0.7	0.6	0.7
Base	5813	6202	6745	7219	7728	1.5	1.4	1.4
High	5809	6728	7612	8474	9425	2.7	2.2	2.4
Commercial								
Low	2750	2925	3022	3196	3444	0.4	1.9	1.1
Base	2762	3192	3508	3876	4326	2.4	2.1	2.3
High	2767	3469	4072	4759	5583	3.9	3.2	3.6
Industrial								
Low	5980	5841	6116	6566	7090	0.4	1.5	0.9
Base	6130	6421	7182	7564	8090	1.6	1.2	1.4
High	6153	6587	7365	7845	8659	1.8	1.6	1.7
Irrigation								
Low	752	796	827	850	876	0.7	0.6	0.6
Base	752	833	903	971	1048	1.8	1.5	1.7
High	752	842	915	1017	1115	2.0	2.0	2.0
Total Sales								
Low	15295	15531	16209	17065	18030	0.6	1.1	0.8
Base	15457	16649	18339	19629	21191	1.7	1.5	1.6
High	15481	17626	19964	22095	24782	2.6	2.2	2.4
Losses								
Low	1147	1165	1216	1280	1352	0.6	1.1	0.8
Base	1159	1249	1375	1472	1589	1.7	1.5	1.6
High	1161	1322	1497	1657	1859	2.6	2.2	2.4
Total Load								
Low	16442	16696	17425	18345	19382	0.6	1.1	0.8
Base	16616	17898	19714	21101	22781	1.7	1.5	1.6
High	16642	18948	21461	23752	26641	2.6	2.2	2.4

This table provides the numerical projections at 5-year intervals for the high, baseline, and low cases by sector. Average annual rates of growth are given for 1980-2000, 1990-2000, and for the total forecast period.

* AARG = Average Annual Rates of Growth

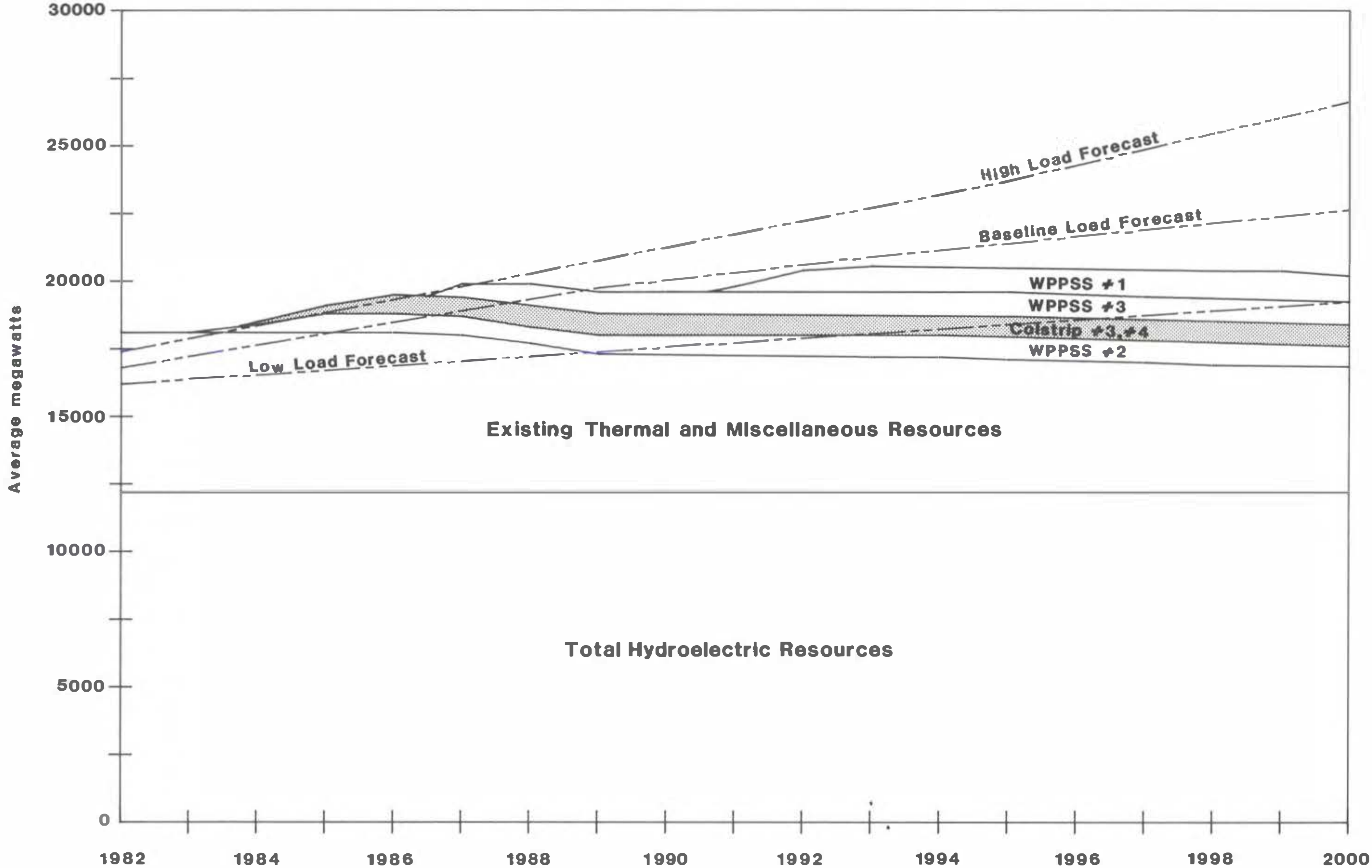
Source: BPA, Division of Power Requirements, July 1982

Figure 1.2 - Forecasts of Firm Electricity Loads for the Pacific Northwest Projected to Year 2000



Source: BPA, Division of Power Requirements, July 1982.

Figure 1.3 - Regional Firm Electricity Loads and Energy Resources [1/]



Source: BPA,Division of Power Requirements,July 1982; Pacific Northwest Utility Conference Committee,August 1982.

1/ Includes Valmy (95MW), does not include Creston or Skagit

and extension of the main 500-kV electrical grid to the vicinity of Garrison, Montana. Without adding 500-kV transmission facilities to BPA's power grid, the existing transmission system would not be viable for transmitting the output of Unit 4, and would not form a reliable intertie to transmit the scheduled 1240 MW of energy to Northwest users.

Need to maintain electrical reliability and electrical stability: In general, a transmission system should be designed so that a problem (contingency) on one system would not adversely affect another system and so that maximum service can be provided even if a generator or transmission line should be unexpectedly disabled. BPA's system is designed and operated to standards that will preserve interconnected operation under such conditions of stress. 8/ Standards for maintenance of stability require strong electrical ties between generators and the rest of a power system so that if a generator or line is unexpectedly put out of service, alternate routings for power flow can keep the supply of power equal to the demand. Failure to regulate voltage levels or failure to synchronize generation and load would create an unstable and thus unreliable system and would produce outages (loss of power) in the service area.

To maintain stability and reliability when Colstrip Unit 4 starts producing power (approximately April 1985), the present Federal transmission system needs to be reinforced.

WASHINGTON WATER POWER COMPANY NEEDS

Need to maintain adequate and reliable system service: According to The Washington Water Power Company, reliability of service also represents a critical factor in the development of their plan. In 1975, WWP determined that increased power needs would require additional 230-kV transmission facilities, including a 230/115-kV substation for the Kellogg-Wallace mining area, in the early 1980's. 9/ The crucial time will be 1985-86, when power from Colstrip Units 3 and 4 will begin to enter the system.

The additional facilities are required to continue reliable service to the mining area and to relieve possible overloads on 230-kV lines west out of the Noxon Rapids Dam-Cabinet Gorge Dam area. Single contingency transmission line outages, especially during periods of peak generation in the spring, could

---

8/ A transmission system must be able to tolerate any single contingency outage without overloading transmission lines or having transmission voltage drops of 7 percent or more from normal. (Bonneville Power Administration, 1980. Reliability Criteria and Standards; Western System Coordinating Council, 1973. Reliability for System Design; WWP Reliability Criteria, per letter of 1980.)

9/ The temporary reduction in energy load for the Bunker Hill mining operations would affect only the timing (a delay for this common element of the WWP proposal until 1987) of the Wallace transformer and substation. See footnote 2/.

create such overloads. Additional outages during maintenance of the older wood-frame transmission lines out of the Noxon Rapids-Cabinet Gorge area will also occur, as major rebuilding is required every 22 to 25 years. Since WWP has about 230 miles of such transmission lines in this area, the probability of lines being down for maintenance/rebuilding and of corresponding overloads is high in the foreseeable future (WWP, 1980).

Need to increase 230-kV transmission capacity: The Coeur d'Alene Mining Area of Northern Idaho is currently served by two 115-kV lines running from the WWP Pine Creek Substation to Burke Substation and on to the Montana Power Company's Thompson Falls Substation. Table 1.2 shows winter and summer power loads. Since Pine Creek Substation is the only 230/115-kV substation in the area, loss of the 230-kV or 115-kV busses serving lines at the substation would produce major outages for the North Idaho region. According to The Washington Water Power Company, the 115-kV support from outside the area would be unable to carry the projected 230 MW of mining area load for the winter of 1985-86. The proposed facilities would permit an increase in east-west power transfer capability and in system reliability.

SCOPING ISSUES

As part of the public involvement plan for the Garrison-Spokane Project, meetings were held throughout the study area to estimate the nature and scope of public concerns about the proposed facilities. In September 1979, when the project (then named Hot Springs-Bell) encompassed a smaller area, scoping meetings were held in Missoula, Montana, and in Coeur d'Alene, Idaho. Follow-up workshops to inform the public and to determine further issues were held in March 1980 at eight study area locations. When the project was expanded eastward as far as Garrison, Montana, and the project name changed to Garrison-Spokane, scoping meetings were held in May 1981, in Drummond, Potomac, Clinton, Missoula, Frenchtown, and Lolo (the eastern portion of the study area). Information meetings were held farther west. Analysis of records of these meetings and of response sheets and letters received on the project has enabled BPA to identify a variety of issues of public concern. "Issue," as used here, describes a topic or question of widespread or repeated concern or interest in the planning and location of the proposed high-voltage transmission facilities.

Below is a list of the major public issues. See the INDEX for places in the EIS where these issues are discussed.

Scoping Issues

Need for/Benefit from the Power and the Line
Long-Range Corridor and Energy Development
BPA's Role in the Project and Its Relationship
  to the Montana Power Company
Applicability to Major Facility Siting Acts
Process of Decisionmaking
Electrical and Biological Effects and Studies

Table 1.2 - The Washington Water Power Company Coeur d'Alene Mining Area Loads (in Megawatts)

Station	Season	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Big Creek	W	--	11.0	10.8	9.7	10.5	10.8	10.6	10.4	10.8	10.2	11.6	12.4
	S	10.5	9.1	9.0	9.2	10.2	10.9	10.2	10.2	10.6	10.4	6.9	--
Bunker Hill	W	--	11.4	12.1	15.4	12.8	14.0	14.9	17.8	19.6	19.2	12.7	20.1
	S	13.2	10.0	10.4	13.4	10.1	13.2	10.8	15.7	15.8	8.7	14.5	--
Hecla	W	--	5.4	6.0	6.6	8.0	8.2	7.4	7.9	7.4	7.6	7.4	12.6
	S	4.8	5.7	6.5	6.7	6.9	7.6	7.2	8.0	8.1	7.6	5.0	--
Mission*	W	--	--	--	--	--	--	--	--	--	--	--	2.1
	S	--	--	--	--	--	--	--	--	--	--	1.3	--
O'Gara	W	--	0.8	0.8	0.9	1.0	1.0	1.2	1.1	1.8	1.4	1.7	2.5
	S	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.5	1.4	1.9	1.4	--
Osburn	W	--	10.1	9.1	9.1	8.7	9.6	9.9	10.1	11.1	13.4	13.8	8.4
	S	9.1	8.6	7.9	8.4	7.9	7.9	8.4	8.4	9.2	9.4	6.9	--
Pine Creek	W	--	8.4	9.2	9.4	9.6	10.1	11.3	12.4	12.9	16.1	14.1	9.7
	S	6.6	6.2	6.4	6.4	6.4	7.9	7.9	8.0	8.6	9.4	6.0	--
Smelter Heights	W	--	10.4	11.4	12.1	10.9	12.9	11.8	13.8	10.9	9.7	11.6	11.3
	S	11.8	10.6	11.4	12.1	11.9	12.1	12.8	12.8	12.3	12.4	9.9	--
St. Maries	W	--	8.5	9.6	10.9	11.5	12.8	14.4	17.3	17.6	22.5	36.0	26.5
	S	7.1	7.2	7.2	7.9	9.9	8.5	12.7	11.5	14.4	20.7	21.0	--
Wallace	W	--	11.8	12.1	13.3	12.9	12.9	13.6	14.1	14.1	17.0	14.3	9.9
	S	9.3	9.7	12.6	9.7	9.9	10.1	10.5	10.1	10.3	13.6	10.3	--
Yellowstone	W	--	--	--	--	1.3	1.3	1.3	1.3	1.3	0.02	--	--
	S	--	--	--	1.3	1.3	1.3	1.3	1.3	1.4	1.3	--	--
Zinc Plant	W	--	52.3	53.4	54.6	54.0	60.0	60.0	59.1	67.2	51.0	66.8	70.0
	S	52.2	52.8	54.0	53.4	53.4	52.2	60.0	50.4	63.6	49.6	67.0	--
Totals	W	--	130.1	134.5	142.0	141.2	153.6	156.7	165.3	174.7	168.12	181.7	185.5
	S	125.0	120.3	125.8	129.0	128.3	134.2	142.4	136.9	155.7	144.01	150.2	--

*New Substation, 1980

Source: The Washington Water Power Company, 1982.

Table 1.2 - The Washington Water Power Company Coeur d'Alene Mining Area Loads (in Megawatts)

Station	Season	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Big Creek	W	14.9	15.7	16.6	17.6	18.3	18.9	19.5	20.0	20.6	21.1	21.6
	S	14.0	14.8	15.7	16.6	17.2	17.8	18.4	18.9	19.4	19.9	20.4
Bunker Hill	W	15.0	21.0	21.4	21.8	22.2	22.6	23.1	23.5	24.0	24.5	25.0
	S	12.1	17.9	18.3	18.7	19.0	19.3	19.7	20.1	20.5	20.9	21.3
Hecla	W	17.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	S	17.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Mullan	W	0.0	12.5	12.8	13.1	13.5	13.8	14.2	14.6	14.9	15.3	15.7
	S	0.0	12.5	12.8	13.1	13.5	13.8	14.2	14.6	14.9	15.3	15.7
O'Gara	W	2.2	2.4	2.4	2.4	2.5	2.6	2.6	2.7	2.8	2.8	2.9
	S	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.6
Osburn	W	12.6	12.8	13.2	13.5	13.9	14.2	14.6	15.0	15.4	15.8	16.2
	S	10.8	11.1	11.4	11.7	12.0	12.3	12.7	13.0	13.3	13.7	14.1
Pine Creek	W	12.6	13.2	13.3	13.6	14.0	14.4	14.7	15.1	15.5	15.9	16.3
	S	8.5	8.7	9.0	9.2	9.4	9.7	9.9	10.2	10.5	10.7	11.0
Smelter Heights	W	1.1	1.1	11.5	11.8	12.1	12.4	12.8	13.1	13.4	13.8	14.2
	S	1.1	1.1	11.0	11.3	11.6	11.9	12.2	12.5	12.8	13.2	13.5
St. Maries	W	26.1	27.0	27.9	29.0	29.8	30.5	31.3	32.2	33.0	33.9	34.8
	S	18.1	18.7	19.3	19.9	20.5	21.0	21.6	22.1	22.7	23.3	23.9
Wallace	W	12.3	12.8	13.3	13.9	14.4	14.8	15.2	15.6	16.0	16.5	16.9
	S	7.4	7.7	8.0	8.3	8.6	8.9	9.1	9.4	9.6	9.9	10.2
Yellowstone	W	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	S	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Zinc Plant	W	2.0	7.0	18.0	67.0	67.0	69.0	69.0	69.0	69.0	69.0	69.0
	S	2.0	13.0	54.0	67.0	69.0	69.0	69.0	69.0	69.0	69.0	69.0
Mission	W	2.5	2.5	2.6	2.7	2.7	2.8	2.9	3.0	3.0	3.1	3.2
	S	1.7	1.8	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.3
Total	W	120.1	130.8	155.0	208.4	212.4	218.0	221.9	225.8	229.6	233.7	237.8
	S	96.3	111.5	165.2	181.7	186.7	189.9	192.9	196.1	199.1	202.4	205.8

Source: The Washington Water Power Company, February 1983.

Use of Public vs. Private Land
Effects on Confederated Salish and Kootenai Tribes and Land
Economic Impacts on People
Effects on
- Recreation
- Esthetics
- Natural Resources

Alternatives to Construction

> The criteria used in evaluating the Garrison-Spokane 500-kV Transmission Project were derived from and reflect major issues and concerns. They form the basis for the comparative evaluation of alternative plans and corridors. (See Chapter II, ALTERNATIVES INCLUDING THE PROPOSED ACTION, and table 2.3, Comparison of Alternatives: Environmental Ranking Summary, for a discussion of the findings.) A more comprehensive discussion of these criteria is found in APPENDIX A: METHODOLOGY.

Evaluation criteria for the Garrison-Spokane Transmission Project are as follows:

1. Minimizes disruption of existing and planned land uses:
   a. Avoids residential and inhabited areas.
   b. Avoids agricultural land, especially irrigated land.
   c. Avoids intensively managed forest land.

2. Minimizes disruption of people's lives and lifestyles (including disruption of more densely populated and/or privately owned areas; and visual, economic, and inconvenience effects on both public and private land).

3. Minimizes adverse effects on scenic areas and esthetic values.

4. Avoids adverse effects on important historic and cultural resources.

5. Minimizes disturbance of natural resources (geology/soils, water features, vegetation, wildlife).

6. Avoids environmentally sensitive areas (areas with a single significant or multiple interrelated resources particularly susceptible to impact; widespread impacts; serious impacts with a very high probability of occurrence; unmitigable impacts).

7. Uses existing utility corridors wherever feasible.

8. Future transmission facilities: allows for (does not preclude possibility of) building parallel lines in the future.

FUTURE CONNECTED ACTIONS

MISSOULA AREA REINFORCEMENT

An action potentially connected to the Garrison-Spokane Project is The Montana Power Company's possible future (1990's) electrical reinforcement of the Missoula area. Present plans for the completion of the Townsend-Garrison section of the Colstrip Project in Montana call for construction of the 500-kV line to the Garrison Substation by the fall of 1983. There, tie-ins will be established to Bonneville Power 230-kV and Montana Power Company 230-kV lines servicing Helena, Butte, and Missoula via a connection to the existing Montana Power Company 161-kV line. According to Montana Power load projections, this tie-in should prove adequate to supply the area for six to eight years. However, continued growth will create a need for new transmission facilities by the early 1990's. Only three options exist to provide that new transmission: to build a substation to step down the 500-kV line to 230-kV or 161-kV if the 500-kV line should be located near enough to Missoula; to build an additional 50 to 70 miles of 230-kV line from Ovando, Garrison, or Hot Springs Substation (or Plains or Taft Substation, should those options be chosen farther west) back to Missoula; or to build a 500-kV line into Missoula from wherever a substation source might exist. Should Montana Power Company reinforce the area, it would be subject, as a private utility, to all provisions of the Montana State Facility Siting Act.

DECISIONS TO BE MADE

THE BONNEVILLE POWER ADMINISTRATION IS TO DECIDE: Which plan of service and route to select in building the proposed transmission facilities.

THE WASHINGTON WATER POWER COMPANY IS TO DECIDE: Whether to construct proposed transmission facilities; and, if the decision is to construct them, whether to connect with Bonneville's proposed facilities or to build independent facilities. This last decision involves selection of a plan and route.

THE FOREST SERVICE AND BUREAU OF LAND MANAGEMENT ARE TO DECIDE: Whether to allocate land use rights on National Forest System lands and BLM-administered lands for future right-of-way use. The decision would consider overall location of both BPA and WWP facilities as well as issues related to private lands.

THE STATE OF MONTANA WILL REVIEW the project to determine whether the provisions of Montana's Major Facility Siting Act have been met for the segment of the transmission line from Garrison Substation to Montana's western border. The State of Montana may need to make a licensing decision under the Major Facility Siting Act, if over 10 miles of WWP transmission line should be constructed in Montana. Parts of this Federal EIS could be used in the licensing process. The State, under provisions of its Major Facility Siting Act, would also review any future Montana Power Company proposal to reinforce electrical service at Missoula.

Alternatives including the Proposed Action

ALTERNATIVES INCLUDING THE PROPOSED ACTION

INTRODUCTION

This chapter first summarizes the analysis steps, then describes the characteristics of the proposed action. Next, it describes and compares the alternative plans by describing and comparing the route of lowest environmental impact for each plan. 1/ A discussion of No Action (the alternative not to build transmission facilities) is included as well. Mitigation included in the proposal is then discussed for each plan. The chapter concludes with a discussion of alternatives eliminated from further consideration, and with a discussion of mitigation not included as part of the proposal but still under consideration.

ANALYSIS METHODS

In evaluating the potential effects of the proposed action, many analysis techniques and procedures were employed; these, considered together, are the analysis method. The term "method" is used simply to mean a systematic way of doing an environmental analysis. The major parts of the method included: 1) a comprehensive program to involve the public in the process; 2) a systematic data inventory, evaluation, and collection procedure; 3) a regional analysis to identify geographic areas where relatively high impacts may occur; 4) definition of alternative routes; 5) environmental analysis of the impacts of routes; 6) a systematic comparison of route alternatives; and 7) preparation of the environmental statement. The environmental analysis method is summarized here; a more detailed description is found in APPENDIX A: METHODOLOGY.

The public involvement process centered on three objectives: to inform, to encourage and implement participation, and to provide convenient opportunities for people to be involved. Through scoping (the seeking out of important issues as seen by the public and by concerned agencies) workshops, news and information letters, information exchange meetings, and use of an interagency steering committee, public comment has been sought and incorporated into the planning and environmental analysis process.

Data inventory, evaluation, and collection meant assessing the availability and quality of information, gathering and correlating data from a multitude of local, regional, and national information sources, and recording the data on maps and in reports.

Once a comprehensive set of natural and social resource information was assembled, it was used to help determine potential environmental impacts within the broad regional study area that encompasses nearly 9,000 square miles, including parts of eleven counties in three states.

1/ Impacts of all segments, and thus of all possible alternative routes, are discussed in Chapter IV, ENVIRONMENTAL CONSEQUENCES.

Fourteen major factors for locating and predicting the impact of high-voltage transmission systems were evaluated. Relative levels of potential impact were examined for:

Natural Resources	Land Uses
Geology/Soils	Urban/Residential
Water Features	Forestry
Vegetation	Agriculture
Wildlife	Recreation
Esthetic/Cultural	Corridor Development
Visual Resources	Parallel Rights-of-Way
Historic/Archeologic	Land Use Constraints
	Terrain Suitability
	Acquisition Considerations

Analysis maps were prepared for each of these factors, geographically showing up to four different impact levels. These maps were used individually and in combination to outline broad corridors. The corridors (variable-width paths between two points) served as guidelines in delineating transmission line routes that avoided, as much as possible, major impact problem areas. This regional analysis produced a series of analysis maps and a network of corridors that guided and bounded route location.

Next, transmission line route alternatives were delineated, using resource data maps, corridor and analysis maps, aerial photography, topographic charts, and aerial and field review. Engineers and environmental team members worked together to define route locations that would avoid or minimize environmental impacts. The route definition phase resulted in the location of a system of route segments. These alternative routing variations formed the basis for detailed environmental impact analysis.

The major elements in the analysis of environmental impacts were impact identification, impact measurement, and impact interpretation. Effects of the proposed transmission facilities on the landscape and study area resources were analyzed. Issues and concerns developed from public comments were evaluated. Measurements were made of where impacts occurred and the amount of disturbance predicted for each data item. (Examples of such measurements are illustrated in table 2.2.) After an assessment was done to interpret the nature, likelihood, timing (when) and duration (how long), and potential significance (in terms of context and intensity of the impacts), route alternatives for both Bonneville Power Administration and The Washington Water Power Company were compared by focusing on differences in their environmental effects. Interdisciplinary team meetings were held to evaluate and discuss further the impacts of the alternatives. The interdisciplinary team assigned rankings for impact on 12 resource topics: socioeconomic, urban/residential, forestry, agriculture, recreation, wildlife, vegetation, water resources, soils/geology, esthetics, cultural resources, and engineering and site development.

Different levels of routing alternatives were ranked from those with least impact to those with most. (See APPENDIX A: METHODOLOGY.) First, short combinations of segments in local areas were compared. In some cases, high impact options were eliminated (see Alternatives Eliminated From Detailed Discussion in Chapter II). Next, routes within each plan were compared and ranked. Finally, plans were compared to determine environmental preference.

ALTERNATIVES COMPARISON

Comparison of the alternatives is drawn from a series of tables (table 2.1 - table 2.7). Four comparisons are made. First, technical considerations that influence the type and amount of impacts, including cost estimates, are shown (table 2.1). Second, routes are compared according to the amount of resources that they would potentially affect (table 2.2). Third, the alternative plans are ranked according to how well they meet evaluation criteria developed from public and agency comments received during the scoping process (table 2.3). And fourth, the relative environmental advantages, disadvantages, and other considerations are described in tables 2.4 - 2.7. The comparative discussion of alternative plans draws conclusions from this information and from analysis contained in the ENVIRONMENTAL CONSEQUENCES chapter.

MITIGATION

Construction, operation, and maintenance of transmission facilities produce both beneficial and adverse environmental impacts. The best mitigation for adverse impacts is to avoid areas where impacts may occur. To a large extent, this has been accomplished: The routes under consideration are the result of a comprehensive location procedure designed to avoid sensitive resources as much as possible. Where environmental effects are not avoidable, measures can be used to minimize them. Mitigation included as part of the proposal appears in the alternative comparisons. The mitigation "not included" section discusses measures which are still being considered but which have not been proposed because of resource tradeoffs or because specific locations have yet to be identified.

PLAN COMPARISON

Four alternative plans have been developed for the BPA portion of the project. They are the Hot Springs Plan, the Plains Plan, the Taft Plan (fig. 2.1), and No Action. The BPA plan comparisons are based on the route of least impact for each plan. For the plan selected, the route with lowest impacts is the one BPA would propose to build. 2/

2/ Route locations are tentative at this time, and are subject to change due to final surveying, agreements with landowners, and other factors.

The Washington Water Power Company has developed five alternatives (fig. 2.2). They are: a Thompson Falls plan, an Eagle Creek plan, a Taft plan, a Noxon plan, and No Action. All project alternatives have been evaluated both independently and in combination.

DESCRIPTION OF CONSTRUCTION ACTIONS

The proposal involves the building of between 254 and 271 miles of 500,000-volt transmission line (part single-circuit and part double-circuit) and associated substation terminal and control equipment by Bonneville Power Administration. The preferred alternative is the Taft Plan (258 miles). The proposal also covers the building of between 32 and 63 miles of 230,000-volt transmission line and associated substation facilities by The Washington Water Power Company (WWP), a private utility. WWP's preferred alternative is the Noxon Plan (33.4 miles of new line; rebuild existing line 28.5 miles.) This related action could be developed in conjunction with the proposed 500,000-volt transmission facilities or independently.

Numerous activities may cause impacts (project-induced changes) that may be either positive or negative. In building a transmission line, the following sequence of actions occurs: acquiring right-of-way easements, constructing access roads, clearing right-of-way, erecting towers, and stringing conductor wires. Substation construction involves site development (clearing, grading, building control house) and installation of terminal equipment (busses, transformers, power circuit breakers, reactors, capacitors, microwave, and associated electrical equipment). Once the transmission facilities are built and energized, they are operated and maintained to ensure continuous and reliable electrical service for the life of the line.

Right-of-way acquisition involves obtaining specified access road and/or line easements from the landowner or land managing agency. The Government seeks the right to enter, construct, maintain, and operate the electric transmission line. These easement rights (which are not for the entire land parcel) may be acquired through a mutually negotiated purchase or, in the event that a mutual agreement cannot be reached or that a clear title to the right-of-way cannot be obtained, through an "eminent domain" action. In the absence of agreement on compensation for easement rights, a court determines just compensation based on evidence presented by the landowner and by the agency seeking such rights. Right-of-way required for the proposed transmission line is about 125 feet in width.

A system of roads must also be built to obtain access to each tower site. On level terrain, the road may be no more than a single track from one tower site to another along the right-of-way. In this case, complete restoration of the land is often possible. When the line is built in an area having many existing roads, construction can be limited to additional short lengths of road to the tower sites. In crossing unroaded, rugged terrain, however, road construction and maintenance can have an extensive environmental impact.

Table 2.1 Comparison of Alternatives: Technical Considerations

Plan	Route	Total Miles	Number of Circuits[1]	Miles	Right-of-Way (Miles): New Non-Parallel	Right-of-Way (Miles): New Parallel	Right-of-Way (Miles): Existing[3]	Access Requirements (Miles)[7]: High	Access Requirements (Miles)[7]: Mod.	Access Requirements (Miles)[7]: Low	Substation Requirements: Substation	Substation Requirements: New or Expansion	Substation Requirements: Size	Estimated Costs (Millions of Dollars): Substation	Estimated Costs (Millions of Dollars): Transmission	Estimated Costs (Millions of Dollars): Total Cost	Route
HOT SPRINGS PLAN 500-kV Transmission		268.0	DC	156.7	16.8	45.8	94.1[6]	27.6	101.8	138.6	Garrison Hot Springs Bell	Expansion Expansion Expansion	On existing property On existing property On existing property	17.6 14.3 8.3	184.8	225.0	Hot Springs
			SC	111.3	77.8	0.0	33.5[6]										
PLAINS PLAN 500-kV Transmission	North	264.1	DC	152.8	112.7	18.8	21.3	41.8	144.9	77.4	Garrison Plains Bell	Expansion New Expansion	On existing property 12 On existing property	17.6 16.1 8.3	191.4	233.4	Plains North
			SC	111.3	77.8	0.0	33.5										
	South	264.2	DC	152.9	131.6	0.0	21.3	21.2	121.7	121.3	Garrison Plains Bell	Expansion New Expansion	On existing property 12 ac On existing property	17.6 16.1 8.3	187.4	229.4	Plains South
			SC	111.3	77.8	0.0	33.5										
TAFT PLAN 500-kV Transmission	North	257.6	DC	156.2	137.4	18.8	0.0	47.4	154.1	56.1	Garrison Taft Bell	Expansion New (with WWP) Expansion	On existing property 10 ac On existing property	17.9 22.2 8.3	198.1	246.5	Taft North
			SC	101.4	67.9	0.0	33.5										
	South (Proposed action)	257.7	DC	156.3	156.3	0.0	0.0	26.8	130.9	100.0	Garrison Taft Bell	Expansion New (with WWP) Expansion	On existing property 10 ac On existing property	17.9 22.2 8.3	195.1	243.5	Taft South
			SC	101.4	67.9	0.0	33.5										
WASHINGTON WATER POWER PLANS 1-4: 230-kV Reinforcement	1	48.4	SC Steel	30.7	21.7[4]	9.0	—	12.5	17.4	18.5	Thompson Falls Wallace Pine Creek	Expansion Expansion Expansion	6 ac 6 ac On existing property	2.0 4.3 0.7	11.5	18.5	1
			SC Wood	17.7	9.7	8.0	—										
	2	62.6	SC Steel	31.4	5.5[4]	—	25.9	1.8	13.2	47.5	Eagle Creek Wallace Pine Creek	New (with BPA) Expansion Expansion	6 ac 6 ac On existing property	7.2[8] 4.3 0.7	14.9	27.2	2
			SC Wood	31.2	11.8	19.4[5]	—										
	3 North	35.7	SC Steel	18.0	18.0	—	—	—	23.0	12.7	Taft Wallace Pine Creek	New (with BPA) Expansion Expansion	10 ac 6 ac On existing property	6.8[8] 4.3 0.7	7.8	19.6	3 North
			SC Wood	17.7	9.7	8.0	—										
	3 South	31.9	SC Wood	31.9	20.9	11.0	—	1.2	17.7	13.0	Taft Wallace Pine Creek	New (with BPA) Expansion Expansion	10 ac 6 ac On existing property	6.8[8] 4.3 0.7	6.6	18.4	3 South
	4 (WWP Preferred)	61.9	DC Steel	28.5	—	—	28.5	3.3	8.2	50.4	Noxon Wallace Pine Creek	Expansion Expansion Expansion	On existing property 6 ac On existing property	0.8 4.3 0.7	15.7	21.4	4
			SC Wood	33.4	13.0	20.4	—										

1 SC = Single-Circuit; DC = Double-Circuit. All BPA alternatives are 500-kV steel. All WWP alternatives are 230-kV woodpole or steel construction, as indicated. 500-kV double and triple-circuit steel towers in this area would be 165-175 feet high. 500-kV single-circuit circuit towers are about 125-135 feet high. For 230-kV construction, woodpoles average 65-70 feet high; single-circuit steel, 80 feet; and double-circuit steel, 120-130 feet. Also see figure 2.5, a sketch of transmission line towers.

2 Nominal right-of-way widths required for the new facilities vary. Whether new, parallel, or rebuild, a 125-foot right-of-way would be required for 500-kV double-circuit and 230-kV steel construction. 500-kV single-circuit would require a 105-foot right-of-way and right-of way for 230-kV woodpole construction would be about 100 feet. For parallel situations, these figures are in addition to existing right-of-way width. No new right-of-way would be required where lines would be rebuilt.

3 Refers to rebuilding a line on existing right-of-way, or building a line on a vacant BPA right-of-way.

4 Portions would parallel a BPA proposal, if selected.

5 About 2 miles follow an existing 13-kV line with a cleared right-of-way of 40-50 feet.

6 About 15 miles of existing line east of Thompson Falls and about 6 miles near Rainbow Lake would be torn down and rebuilt on an existing cleared right-of-way. Triple-circuit would be involved along portions.

7. The following categories show the miles of new access roads that would be required for each mile of transmission line:

High - 4 or more miles.
Moderate - 2-4 miles.
Low - Less than 2 miles.

8 WWP cost estimates include work at Taft and Eagle Creek Substations (actual cost responsibility of 500/230-kV transformation at Taft or Eagle Creek subject to negotiations between WWP and BPA).

Table 2.2 Comparison of Alternatives: Data Summary (Miles)

	Route	Miles	GEOLOGY/ HYDRO-LOGY		WILDLIFE						LAND USE-LAND COVER					AGRICULTURE					LAND OWNERSHIP					FOREST PRODUCTIVITY			VISUAL RESOURCES						CULT. RES.
			Slope 30+ %	Municipal Watersheds	Big Game	Bald Eagle	Osprey	Grizzly Bear	Waterfowl	Game Refuge–Mgmt. Areas	Residences within 1/2 Mile	Agricultural Land	Forest Land	Rangeland [1]	Wetlands	Irrigated	Non-Irrigated	Prime Farmland	Additional Farmland of Statewide Importance	Roadless Area [2]	Federal	State	Indian Reservation	Private	Undeveloped Subdivided Land	High	Moderate	Low	High Visual Quality	Low Visual Compatibility	Viewer Sensitivity High	Viewer Sensitivity Moderate	Viewer Sensitivity Low	High Viewer Exposure	Area of High Sensitivity To Impact
HOT SPRINGS PLAN 500-kV Transmission		268.0	44.2	10.4	89.1	20.6	3.7	1.9	20.9	.9	1110	55.9	147.5	62.8	1.1	18.2	37.7	32.0	9.0	2.7	78.7	8.5	19.2	161.6	7.7	78.4	57.5	31.9	95.2	126.3	137.3	33.8	95.6	94.1	26.0
PLAINS PLAN 500-kV Transmission	North	264:1	83.1	7.6	104.4	33.3	5.5	0	26.2	.9	925	47.4	178.0	37.6	.4	18.1	29.3	25.6	10.2	5.2	121.3	11.1	0	131.7	4.7	87.8	70.9	39.0	105.1	153.2	125.2	36.1	101.5	87.9	12.5
	South	264.2	71.0	7.6	85.3	24.1	5.5	0	23.4	.9	926	45.5	198.7	18.9	.4	16.3	29.2	23.8	10.2	5.2	150.3	10.8	0	103.1	3.1	90.9	93.7	33.8	152.1	173.9	95.3	34.0	134.9	57.5	12.0
TAFT PLAN 500-kV Transmission	North	257.6	88.0	16.6	105.9	15.7	0	0	7.5	.9	883	27.6	196.2	32.8	0	15.4	12.2	20.9	10.2	6.1	134.0	10.3	0	113.3	5.2	82.5	79.8	36.4	66.0	168.3	93.8	38.8	123.7	67.1	7.0
	South (Proposed Action)	257.7	75.9	16.6	86.8	6.5	0	0	4.7	.9	884	25.7	216.9	14.1	0	13.6	12.1	19.1	10.2	6.1	163.0	10.0	0	84.7	3.6	85.6	102.6	31.2	113.0	189.0	63.9	36.7	157.1	36.7	6.5
WASHINGTON WATER POWER PLANS 1-4: 230-kV Reinforcement	1	48.4	21.5	12.4	11.9	2.0	1.6	3.9	1.8	0	4.7 [5]	1.5	40.7	1.5	0	0	1.0	0	0	4.4	22.9	1.0	0	24.5	.5	25.3	10.6	.6	12.5	29.2	32.5	2.2	13.7	19.4	9.4
	2 [3]	36.7	5.6	4.5	4.5	0	0	0	0	0	3.9 [5]	0	31.3	1.5	0	0	0	0	0	1.9	18.6	0	0	18.1	.3	26.7	.4	0	7.1	23.8	27.2	8.7	.8	15.8	21.0
	3 North	35.7	16.8	4.4	3.0	0	0	0	0	0	3.3 [5]	0	30.9	1.5	0	0	0	0	0	0	16.7	0	0	19.0	0	22.3	4.4	0	12.4	23.1	27.0	0	8.7	25.1	16.9
	3 South	31.9	14.2	3.3	3.7	0	0	0	0	0	3.0 [5]	0	27.4	1.5	0	0	0	0	0	0	14.4	0	0	17.5	0	21.9	1.3	0	.6	18.6	31.9	0	0	30.8	3.0
	4 [3,4] (WWP Preferred)	33.4	6.5	4.5	3.0	0	0	0	0	0	3.6 [5]	0	28.3	1.5	0	0	0	0	0	0	15.3	0	0	18.1	0	23.7	.4	0	2.8	20.5	25.1	8.3	0	15.8	11.0

1 Between Rathdrum and Bell (Segment 50) and between Wallace and Pine Creek (common to all WWP plans), "barren" land crossed is classified under rangeland.

2 Included in this category are both RARE II areas (as of December, 1980) and areas managed for the unroaded condition under Planning Unit management plans. Management objectives for RARE II lands have since been resolved and some of these areas have been returned to multiple-use management.

3 Does not include rebuilding between Noxon and Eagle Creek area (25.9 miles for Eagle Creek plan, 28.5 miles for Noxon Plan)

4 Preferred by The Washington Water Power Company

5 Data on number of residences within 1/2 mile was not available for WWP routes. The numbers shown above refer to miles of urban/residential land and dispersed development crossed.

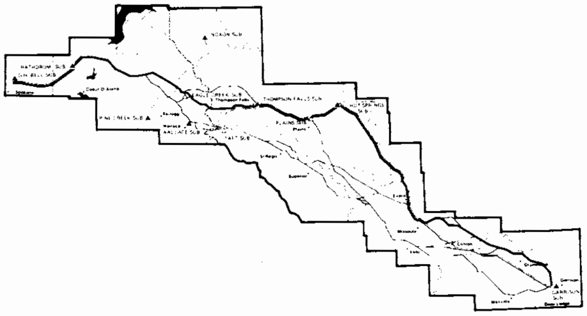
TABLE 2.3 COMPARISON OF ALTERNATIVES: ENVIRONMENTAL RANKING SUMMARY[1]

EVALUATION CRITERIA	HOT SPRINGS PLAN	PLAINS PLAN	PROPOSED ACTION TAFT PLAN
1. Minimizes Disruption of Existing and Planned Land Uses:			
a. Avoids Residential and Inhabited Areas	3	2	1
b. Avoids Agricultural Land, especially Irrigated Land	3	2	1
c. Avoids Intensively Managed Forest Land	1	2	3
2. Minimizes Disruption of People's Lives and Lifestyles	3	2	1
3. Minimizes Adverse Effects on Scenic Areas and Esthetic Values.	2	3	1
4. Avoids Adverse Effects on Important Historical and Cultural Resources.	3	2	1
5. Minimizes Disturbance of Natural Resources (Geo/Soils, Water Features, Vegetation, Wildlife).	1	3	2
6. Avoids Environmentally Sensitive Areas.	2	3	1
7. Uses Existing Utility Corridors Wherever Feasible.	1	2	3
8. Future Transmission Facilities: Allows for (Does not preclude possibility of) Building Future Parallel Lines.	3	2	1

Degree to which criterion is met: 1 = Best
3 = Least

[1] Evaluation criteria are standards which provide a consistent basis for evaluating alternatives. In general, the alternative which best meets the most criteria is considered to have the lowest overall environmental impact potential. This table is a rank order summary of interdisciplinary team conclusions for each of the criteria listed. Also see Appendix A - Methodology.

Table 2.4 ALTERNATIVE A - HOT SPRINGS PLAN



Advantages and disadvantages listed below are based on the relative impacts from the Hot Springs, Plains, and Taft Plans. Where possible, impacts were graphed to show the relationships between plans. The data items selected for these tables represent data items which lend themselves to graphic representaion of relative impacts.

ADVANTAGES

```
                              Least                                   Most
---------------------------------------------------------------------------
Effect on forest land     H.S.                               P         T
and timber production      X---------------------------------X---------X
                          148                               199       217
                                (miles of forest land crossed)

                          H.S.                                    P    T
                           X--------------------------------------X----X
                          136                                    184  188
                  (miles of mod. and highly productive forest land)
---------------------------------------------------------------------------
Short term increase in    H.S.                               P         T
stream sedimentation       X---------------------------------X---------X
                           77                               100       106
                           (number of perennial streams crossed)

                          H.S.                                 P       T
                           X-----------------------------------X-------X
                           44                                 71      76
                                   (miles of slope >30%)
---------------------------------------------------------------------------
Change to appearance      H.S.      T                                  P
of the landscape           X--------X----------------------------------X
                           95      113                               152
                               (miles of high visual quality)

                          H.S.                               P         T
                           X---------------------------------X---------X
                          126                               174       189
                            (miles of low visual compatability)
---------------------------------------------------------------------------
Total cost                H.S.      P                                  T
                           X--------X----------------------------------X
                          225      229                               244
              (cost of transmission and substations (in millions))
---------------------------------------------------------------------------
Uses existing trans-      H.S.                                   P     T
mission line corridors     X-------------------------------------X-----X
                           95                                   209   224
                            (miles of new non-parallel R-O-W)

                           T    P                                   H.S.
                           X----X--------------------------------------X
                           34   55                                   128
                            (miles of existing or vacant R-O-W)
```

DISADVANTAGES

```
                              Least                                   Most
---------------------------------------------------------------------------
Effect on peoples'         T          P                               H.S.
lives and lifestyles       X----------X-------------------------------X
                           37         58                              94
                             (miles of high viewer exposure)

                           T     P                                    H.S.
                           X-----X------------------------------------X
                          884   926                                 1110
                          (number of residences within 1/2 mile)
---------------------------------------------------------------------------
Agricultural Land          T                         P                H.S.
                           X-------------------------X----------------X
                           26                        45               56
                             (miles of agricultural land crossed)
---------------------------------------------------------------------------
Wildlife                   P                      T                   H.S.
                           X----------------------X-------------------X
                           85                     87                  89
                     (miles of big game concentration areas crossed)

                           T                                    H.S.    P
                           X------------------------------------X-------X
                           5                                    21     23
                     (miles of waterfowl concentration areas crossed)
---------------------------------------------------------------------------
Mass soil movement         P          T                               H.S.
and significant erosion    X----------X-------------------------------X
problems                   9          13                              28
                              (miles of problem soils crossed)

                           P                                    T     H.S.
                           X------------------------------------X-----X
                           21                                   27    28
                            (miles with high access requirements)
---------------------------------------------------------------------------
Cultural resources         T        P                                 H.S.
                           X--------X---------------------------------X
                           7        12                                26
                               (miles of high site potential)
---------------------------------------------------------------------------
Amount of public          H.S.                               P         T
land crossed               X---------------------------------X---------X
                           88                               161       173
                          (miles of Federal and State lands crossed)
---------------------------------------------------------------------------
```

Other Hot Springs Disadvantages:

Greatest potential impact on social and economic resources.

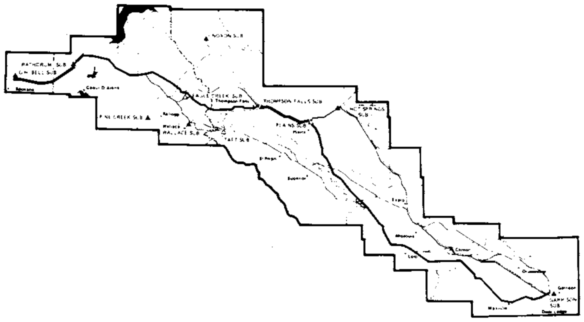
OTHER

Least potential for future transmission lines.

Crosses Flathead Indian Reservation.

Allows for future reinforcement to the Missoula area.

Table 2.5 ALTERNATIVE B - PLAINS PLAN



Advantages and disadvantages listed below are based on the relative impacts from the Hot Springs, Plains, and Taft Plans. Where possible, impacts were graphed to show the relationships between plans. The data items selected for these tables represent data items which lend themselves to graphic representaion of relative impacts.

ADVANTAGES

```
                          Least                             Most
-----------------------------------------------------------------
Amount of public         H.S.                          P      T
land crossed             X-----------------------------X------X
                         88                           161    173
                         (miles of Federal and State lands crossed)
-----------------------------------------------------------------
Mass soil movement       P        T                          H.S.
and significant erosion  X--------X---------------------------X
problems                 9        13                          28
                            (miles of problem soils crossed)

                         P                               T    H.S.
                         X-------------------------------X----X
                         21                              27   28
                           (miles with high access requirements)
-----------------------------------------------------------------
Effect on peoples'       T        P                          H.S.
lives and lifestyles     X--------X---------------------------X
                         37       58                          94
                            (miles of high viewer exposure)

                         T    P                              H.S.
                         X----X-------------------------------X
                         884  926                            1110
                           (number of residences within 1/2 mile)
```

DISADVANTAGES

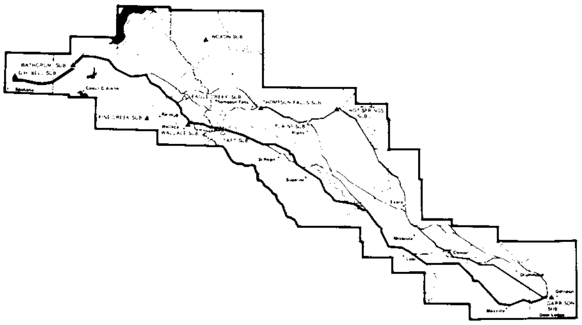
```
                          Least                             Most
-----------------------------------------------------------------
Effect on forest land    H.S.                          P      T
and timber production    X-----------------------------X------X
                         148                          199    217
                            (miles of forest land crossed)

                         H.S.                              P  T
                         X---------------------------------X--X
                         136                             184 188
                  (miles of mod. and highly productive forest land)
-----------------------------------------------------------------
Short term increase in   H.S.                            P     T
stream sedimentation     X-------------------------------X-----X
                         77                             100   106
                         (number of perennial streams crossed)

                         H.S.                              P    T
                         X---------------------------------X----X
                         44                                71   76
                                 (miles of slope >30%)
-----------------------------------------------------------------
Change to appearance     H.S.    T                             P
of the landscape         X-------X-----------------------------X
                         95      113                          152
                            (miles of high visual quality)

                         H.S.                         P        T
                         X----------------------------X--------X
                         126                         174      189
                          (miles of low visual compatability)
-----------------------------------------------------------------
Uses existing trans-     H.S.                            P    T
mission line corridors   X-------------------------------X----X
                         95                             209  224
                          (miles of new non-parallel R-O-W)

                         T   P                               H.S.
                         X---X--------------------------------X
                         34  55                              128
                          (miles of existing or vacant R-O-W)
-----------------------------------------------------------------
Wildlife                 P                T                  H.S.
                         X----------------X-------------------X
                         85               87                  89
               (miles of big game concentration areas crossed)

                         T                               H.S. P
                         X-------------------------------X----X
                         5                               21   23
               (miles of waterfowl concentration areas crossed)
-----------------------------------------------------------------
Agricultural land        T                       P           H.S.
                         X-----------------------X------------X
                         26                      45           56
                          (miles of agricultural land crossed)
```

OTHER

Allows for future reinforcement to the Missoula-Bitterroot Valley area.

One new substation required (Plains substation).

Table 2.6 ALTERNATIVE C - TAFT PLAN (PROPOSED ACTION)



Advantages and disadvantages listed below are based on the relative impacts from the Hot Springs, Plains, and Taft Plans. Where possible, impacts were graphed to show the relationships between plans. The data items selected for these tables represent data items which lend themselves to graphic representaion of relative impacts.

ADVANTAGES

```
                              Least                                        Most

Effect on peoples'        T          P                              H.S.
lives and lifestyles      X----------X------------------------------X
                          37         58                             94
                              (miles of high viewer exposure)

                          T    P                                    H.S.
                          X----X------------------------------------X
                          884  926                                  1110
                           (number of residences within 1/2 mile)

Agricultural land         T                            P            H.S.
                          X----------------------------X------------X
                          26                           45           56
                            (miles of agricultural land crossed)

Wildlife                  P                      T                  H.S.
                          X----------------------X------------------X
                          85                     87                 89
                      (miles of big game concentration areas crossed)

                          T                                    H.S. P
                          X------------------------------------X----X
                          5                                    21   23
                     (miles of waterfowl concentration areas crossed)

Mass soil movement        P          T                              H.S.
and significant erosion   X----------X------------------------------X
problems                  9          13                             28
                              (miles of problem soils crossed)

                          P                                    T    H.S.
                          X------------------------------------X----X
                          21                                   27   28
                           (miles with high access requirements)

Cultural resources        T        P                                H.S.
                          X--------X--------------------------------X
                          7        12                               26
                               (miles of high site potential)

Amount of public          H.S.                             P        T
land crossed              X--------------------------------X--------X
                          88                               161      173
                          (miles of Federal and State lands crossed)
```

Other Taft Advantages:

Least impact on social and economic resources.

DISADVANTAGES

```
                              Least                                        Most

Effect on forest land     H.S.                             P        T
and timber production     X--------------------------------X--------X
                          148                              199      217
                               (miles of forest land crossed)

                          H.S.                                   P  T
                          X--------------------------------------X--X
                          136                                  184 188
                   (miles of mod. and highly productive forest land)

Short term increase in    H.S.                               P      T
stream sedimentation      X----------------------------------X------X
                          77                                 100    106
                            (number of perennial streams crossed)

                          H.S.                                 P    T
                          X------------------------------------X----X
                          44                                   71   76
                                   (miles of slope >30%)

Change to appearance      H.S.    T                                 P
of the landscape          X-------X---------------------------------X
                          95      113                               152
                               (miles of high visual quality)

                          H.S.                             P        T
                          X--------------------------------X--------X
                          126                              174      189
                             (miles of low visual compatability)

Total cost                H.S.     P                                T
                          X--------X--------------------------------X
                          225      229                              244
               (cost of transmission and substations (in millions))

Uses existing trans-      H.S.                                  P   T
mission line corridors    X-------------------------------------X---X
                          95                                  209   224
                              (miles of new non-parallel R-O-W)

                          T    P                                    H.S.
                          X----X------------------------------------X
                          34   55                                   128
                             (miles of existing or vacant R-O-W)
```

OTHER

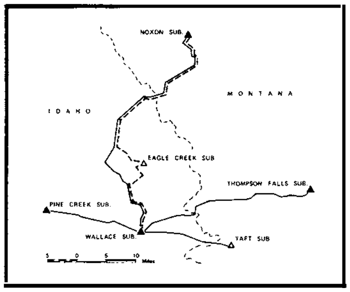
Best allows for future transmission line(s).

Allows for future reinforcement of electrical service to the Missoula-Bitterroot Valley area.

One new substation required (Taft substation).

Table 2.7 - ALTERNATIVES TO REINFORCE THE WASHINGTON WATER POWER TRANSMISSION SYSTEM (WWP)

Advantages and disadvantages listed below are based on the relative impacts from the Thompson Falls, Eagle Creek, Taft, and Noxon Plans. Where possible, data items were graphed to show the relationships between plans. The data items selected for these tables represent data items which lend themselves to graphic representaion of relative impacts.



Plan 1 - Thompson Falls 1/

ADVANTAGES

```
                          Least                                     Most

Total cost                1   3      4                              2
                          X---X------X------------------------------X
                          19  20     21                             27
                 (cost of transmission and substations (in millions))

Cultural resources        1 4                            3          2
                          X-X----------------------------X----------X
                          9 11                           17         21
                         (miles of high site potential)
```

DISADVANTAGES

```
                          Least                                     Most

Change to appearance      4                    2           3        1
of the landscape          X--------------------X-----------X--------X
                          3                    7           12       13
                           (miles of high visual quality)

                          4        3   2                            1
                          X--------X---X----------------------------X
                          21       23  24                           29
                           (miles of low visual compatability)

Effect on forest land     4        2,3                              1
and timber production     X--------X--------------------------------X
                          28       31                               41
                           (miles of forest land crossed)

                          4         2,3                             1
                          X---------X-------------------------------X
                          24        27                              36
                 (miles of mod. and highly productive forest land)

Wildlife                  3,4   2                                   1
                          X-----X-----------------------------------X
                          3     5                                   12
                 (miles of big game concentration areas crossed)

Short term increase       3   2   4                                 1
in stream sedimentation   X---X---X---------------------------------X
and potential erosion     1   2   3                                 13
problems.                  (miles with high access requirements)

                          2,4                                 1     3
                          X-----------------------------------X-----X
                          6                                   22    23
                                (miles of slope >30%)
```

Other Thompson Falls Disadvantages:

Most overall environmental impact.

Greatest impact on social resources.

Located close to the greatest number of towns, communities, residences, and developed land uses.

Greatest overall effect on recreation resources.

OTHER

Most new non-parallel right-of-way needed.

Substation development at Eagle Creek, Wallace, Pine Creek.

Plan 2 - Eagle Creek 1/

ADVANTAGES

```
                          Least                                     Most

Short term increase       3   2   4                                 1
in stream sedimentation   X---X---X---------------------------------X
and potential erosion     1   2   3                                 13
problems.                  (miles with high access requirements)

                          2,4                                 1     3
                          X-----------------------------------X-----X
                          6                                   22    23
                                (miles of slope >30%)
```

Other Eagle Creek Advantages:

Least impact on social resources.

DISADVANTAGES

```
                          Least                                     Most

Total cost                1   3      4                              2
                          X---X------X------------------------------X
                          19  20     21                             27
                 (cost of transmission and substations (in millions))

Cultural resources        1 4                            3          2
                          X-X----------------------------X----------X
                          9 11                           17         21
                         (miles of high site potential)
```

OTHER

Significant length of rebuilding on existing right-of-way (26 mi.).

Substation development/expansion at Eagle Creek, Wallace, Pine Creek.

1/ The Washington Water Power Company has concluded that the Thompson Falls (Plan 1) and Eagle Creek (Plan 2) alternatives should be removed from further consideration based on their review of environmental, technical, and cost factors. Letter from D.L. Olson, Senior Vice President - Resources, The Washington Water Power Company to Marvin Klinger, Assistant Administrator for Engineering and Construction, Bonneville Power Administration (January 19, 1983).

Table 2.7 - cont'd.

Advantages and disadvantages listed below are based on the relative impacts from the Thompson Falls, Eagle Creek, Taft, and Noxon Plans. Where possible, data items were graphed to show the relationships between plans. The data items selected for these tables represent data items which lend themselves to graphic representaion of relative impacts.

Plan 3 - Taft

ADVANTAGES

```
                     Least                              Most

Wildlife             3,4   2                              1
                     X-----X------------------------------X
                     3     5                             12
                 (miles of big game concentration areas crossed)

Total cost           1    3     4                         2
                     X----X-----X-------------------------X
                     19   20    21                       27
             (cost of transmission and substations (in millions))
```

Other Taft Advantages:

Least overall environmental impact.

Least new access required considering parallel construction with BPA route.

Best avoids towns, communities, residences, and developed land uses.

Least effect on recreation resources.

DISADVANTAGES

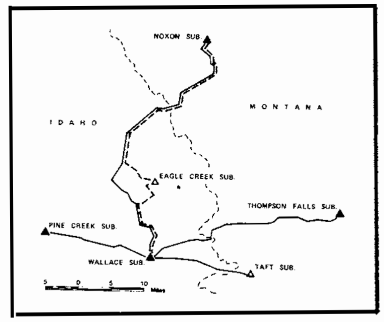
```
                     Least                              Most

Cultural resources   1  4                        3        2
                     X--X------------------------X--------X
                     9  11                      17       21
                          (miles of high site potential)
```

Other Taft Disadvantages:

Could cause significant visual impacts in Lookout Pass/Mullan area.

OTHER

Substation development/expansion required at Taft, Wallace, Pine Creek.



Plan 4 - Noxon **(preferred by WWP)**

ADVANTAGES

```
                     Least                              Most

Cultural resources   1  4                        3        2
                     X--X------------------------X--------X
                     9  11                      17       21
                     (miles of high site potential)

Wildlife             3,4   2                              1
                     X-----X------------------------------X
                     3     5                             12
               (miles of big game concentration areas crossed)

Effect on forest land  4        2,3                       1
and timber production  X--------X-------------------------X
                       28       31                       41
                          (miles of forest land crossed)

                       4         2,3                      1
                       X---------X------------------------X
                       24        27                      36
          (miles of mod. and highly productive forest land)

Short term increase    3   2   4                          1
in stream sedimentation X--X---X--------------------------X
and potential erosion  1   2   3                         13
problems.                (miles with high access requirements)

                       2,4                          1     3
                       X----------------------------X-----X
                       6                           22    23
                                (miles of slope >30%)

Change to appearance   4                  2         3     1
of the landscape       X------------------X---------X-----X
                       3                  7        12    13
                            (miles of high visual quality)

                       4       3    2                     1
                       X-------X----X---------------------X
                       21     23   24                    29
                         (miles of low visual compatability)
```

OTHER

Least new non-parallel right-of-way needed. Significant lengths of rebuilding on existing right-of-way.

Would allow an existing environmental and transmission line maintenance problem in Marten Creek area to be alleviated.

Substation development/expansion required at Noxon, Wallace, Pine Creek.

Ranks first (best) in transmission line energy loss savings.

Lowest overall cost when transmission line losses are considered.

Access roads are needed to enable large pieces of equipment to get to and maneuver about the tower sites. The actual equipment used depends on the design of the line and the construction methods employed by the contractor, but usually includes a large crane, large trucks (sometimes semi-trailers), concrete mixers, and a variety of smaller vehicles. Stringing of the conductor requires more heavy equipment but not at each tower.

Where access roads are required off the right-of-way, a 50-foot easement for a new road 16 feet wide is needed. (In situations where existing roads can be used without improvement, only 20 feet of additional easement would be needed.) These standards would be constant, except where a greater width would be needed for vehicle turnouts or around curves. Large trucks capable of carrying 40-foot lengths of steel require a turning radius of at least 45 feet; large truck-mounted hydraulic cranes may need more than a 50-foot radius. In addition, on such a turn, the road must be about 20 feet wide to allow the rear of the vehicle to follow through. A minimum turning radius of 60 feet is specified on access roads, about the minimum practical width for a road to handle this kind of equipment. Building roads in steep terrain may also require extensive cut and fill work plus drainage provisions which can require a total cleared and disturbed area greater than 50 feet wide.

Access roads would be maintained to each tower for maintenance and repair of the line. Therefore, most of the roads would not be reclaimed. Some vegetation, such as grasses and herbs, will be allowed to grow, but shrubs and trees which might interfere with vehicular movement would not be permitted on the roadway.

The clearing operation removes trees that would interfere with the transmission line from the right-of-way and establishes access roads to tower sites. A minimum clearance of 18 feet between the native vegetation and conductor is a required standard. Trees that would extend into this zone within a 15-year time (based on calculations of normal tree growth rate) would be removed. Other trees on or off the right-of-way that could fall into the line would be removed. Trees may be cleared using power saws or tractors equipped with a clearing blade. Once cleared, larger trees are sold, and smaller trees and brush are burned or chipped.

The next step in the construction process is footing excavation and installation. Footing excavations vary in size but typically have an area of about 100 cubic yards per tower leg for high-voltage steel tower lines. They are usually dug with a large backhoe but may be dug with a clamshell or by hand in areas where access is restricted. Tower footings may consist of steel grids or plates that are buried in the ground or of steel-reinforced concrete.

Steel lattice towers are usually assembled in a one-half acre area within the right-of-way. The tower has six major components, each assembled separately: four leg extensions, body, and bridge. Tower assembly takes from one to three days and is accomplished by crews frequently assisted by a mobile crane. The components are lifted into place with the crane and bolted together by the crew, which can average five towers per day. Erection is occasionally assisted by helicopters in environmentally sensitive areas.

Stringing conductor wires is accomplished by means of a flexible nylon rope or steel cable "sock line." The sock line is threaded between towers with a tractor or helicopter and then is used to draw the conductor from a reel through a two- to three-mile section of transmission line. After stringing is completed, the conductors are tensioned between specially reinforced dead-end towers using tractors and other tensioning equipment.

After construction is complete, the ground around the tower sites is reshaped to fit the natural landscape and reseeded. Farmers whose land has been compacted by construction activity receive compensation for lost production, for loosening the soil by subsoiling, and for replanting their crops. If no longer needed, access roads are reseeded and allowed to revegetate.

Substation construction involves extensive design and site development work before electrical terminal equipment can be installed. Property is purchased for the site within which a level or terraced gravel yard is graded. Road access is extended to the yard. The fence-enclosed yard will normally contain a control house for metering, communications, and electrical control equipment. Terminal equipment such as switches, power circuit breakers, transformers, towers, buss, and microwave are installed in this yard. The completed substation serves as a control and transfer point on the electrical transmission system. It may serve the purposes to route and control electrical power flow, to transform a voltage to a higher or lower voltage, or to serve as a delivery point to an individual customer (utility).

When completed, towers for the 500-kV transmission line would be spaced four or five per mile. The double-circuit towers between Garrison and the intermediate substation would stand about 175 feet tall (see fig. 2.3), supporting six conductors spaced about 55 feet apart in three layers of two. The lowest layer of two conductors would be attached to the tower about 86 feet above the ground, sagging no lower than 35 feet above the ground. The single-circuit towers between the intermediate substation and the Bell Sub-station would be of delta-type construction (see fig. 2.3), standing about 130 feet tall and supporting three conductors. Bases for both types of towers would occupy an area approximately 35 feet square, which amounts to between .05 and .3 acres of ground per mile of line.

BPA performs both routine and emergency maintenance on its electrical equipment and towers, substations, access roads, and rights-of-way. Electrical equipment and towers are inspected four to eight times a year, by helicopter or from the ground, and are repaired when necessary. Repair activities include repainting airway-marked structures, replacing insulators, repairing frayed conductors, and repairing steel towers. Access roads are graded, seeded, ditched, and rocked to prevent erosion and ensure access to transmission line facilities at all times of the year. Rights-of-way are managed to prevent tall-growing vegetation from interfering with the conductor.

Although the economic life of the transmission line and substation facilities have been estimated at thirty-nine and twenty-eight years, respectively, their useful lives might be much longer. However, at some point the transmission facilities might no longer be useful and might be abandonded.

In the past, when BPA transmission line facilities have proved no longer useful, they usually have been replaced with higher-voltage and higher-capacity facilities. For example, 230-kV facilities have frequently been replaced with 500-kV facilities. The decision to abandon or replace any line built now would be affected by the technological and economic conditions of the future and cannot be accurately forecast today.

When transmission lines are replaced, the contract for construction of the new line includes removal of the old one. Old poles, steel, and conductor are removed and scrapped or salvaged. Tower footings are removed or buried.

Substations are very infrequently removed. Substations no longer needed by BPA are usually released to one of its customers. If removal is necessary, the electrical equipment is removed and reused or scrapped. Concrete and fixtures may be removed before the site is abandoned or left for another industrial use.

The project would result in the irreversible and irretrievable commitment of resources. The steel, aluminum, copper, and other materials used directly in construction would be committed to transmission uses. About 30,000 tons of tower steel would be needed along with approximately 16,000 tons of conductor wire. If any of the facilities should be retired and removed, materials used in construction could generally be reused or recycled. Labor (as many as 400 workers at the peak construction period) and fuel for construction equipment would be irretrievably committed. A capital investment in the neighborhood of $200 million would be committed in developing the proposed transmission facilities.

BONNEVILLE POWER ALTERNATIVES

ALTERNATIVE A: HOT SPRINGS PLAN

Two hundred sixty-eight miles of transmission line would be needed, as well as equipment additions to Garrison, Hot Springs, and Bell Substations. See figure 2.1, a map of the routing of each alternative plan. Table 2.1 lists technical and cost information for this and other alternative plans. 3/ Tables 2.2, 2.3, and 2.4 show comparative information upon which the following discussion is based: amounts of various resources affected, rank order of the plans by environmental criteria, and relative plan advantages, disadvantages, and other considerations.

3/ Part of the line, the section from Garrison to either Hot Springs, Plains, or Taft, could be converted to direct current (d.c.) operation, should such a line be needed in the future. If such an action is ever proposed, a complete environmental analysis of the proposal and alternatives would be conducted.

In this plan, the 500-kV double-circuit Colstrip transmission system 4/ would be extended from a substation near Garrison to Hot Springs Substation, a distance of 122 miles for the route of lowest impact. A 125-foot wide right-of-way would be needed.

From Hot Springs to Bell, 112 miles of the 146-mile-long route of lowest impact would be designed for single-circuit construction. Through parts of an environmentally sensitive and congested area between Hot Springs and Thompson Falls (34 miles), existing lines would be removed and replaced with multi-circuit towers on the same right-of-way. The capacity of the multi-circuit line could then be increased in the future with minimal line construction and minimal disruption of the area. Figure 2.3 shows the types and approximate dimensions of the 500-kV towers that would be used for the system. Garrison, Hot Springs, and Bell Substations would be expanded within property owned by BPA to accommodate new terminal equipment. Also see table 4.11 in the ENVIRONMENTAL CONSEQUENCES chapter for a summary of substation requirements. A new six-acre 500/230-kV Eagle Creek Substation may be jointly developed with The Washington Water Power Company (WWP), if they should select the Eagle Creek Plan (WWP Alternative 2) as their preferred alternative.

This plan parallels existing lines and would use vacant right-of-way for a substantial portion of its length. (In the State of Washington, the line would be built in a utility corridor, parallel to an existing BPA line and on vacant, unused right-of-way.) Consequently, it has the least impact on forest productivity, vegetation, and water features, and the least effect on wildlife, esthetics, soils, and developed land. However, from the standpoint of present social and economic needs, it ranks worst for impacts on agricultural land use, other socioeconomic concerns, recreation, and cultural resources. Although electrical performance and engineering feasibility tend to favor this plan, it would encounter the highest number of serious constraints for development of future lines.

Substantially lower need for access and forest clearing minimizes the potential for loss of forest productivity and disruption of intensively managed forested areas. About 2300 acres of forest land would be affected. From the Potomac area through Rattlesnake Creek and north onto the Flathead Reservation, there is potential for erosion and other physical limitations on problem soils. The route crosses about a mile of wetlands, the Missoula and Hayden Lake watersheds, and 77 streams and rivers. Despite potential soils problems, paralleling is possible across many flat areas, diminishing impact on water resources. The wetlands are located along parallel stretches of line and are crossed where there would be no additional right-of-way clearing.

4/ The Colstrip transmission system involves two parallel 500-kV transmission lines. This system was evaluated in the Federal Colstrip Project EIS issued in January 1979. The present document evaluates a portion of that line (Garrison through either Hot Springs or Plains). See Background of Project, Chapter I, for more information.

Disturbance of big game and removal of habitat would occur at levels similar to those of the other plans. Numerous crossings of major rivers will involve some habitat removal and collision potential for bald eagles and waterfowl. Impacts in the Clark Fork Canyon would be reduced by rebuilding to multiple circuit on existing right-of-way. This design option allows the crossing of important bald eagle habitat with minimal disruption.

Proximity to important cultural sites, particularly on the Flathead Reservation and along the Clark Fork Canyon, and visual intrusion on remnants of early fur trade and mining sites and transportation routes make this plan least desirable for cultural resources.

The most severe impacts for this route would be social. Impacts would arise primarily from crossing dispersed use areas in the Garnet Range and near developed recreation areas near Rainbow Lake and in the Clark Fork Valley. Also, the Flathead River and the North Fork of the Coeur d'Alene River, potential State Wild and Scenic Rivers, would be affected visually where they are crossed. Visual impact would occur along many other portions of the route as well. The route would be highly visible to fairly heavy road traffic and to populated areas, and offers few screening possibilities, especially near Missoula, in the Rattlesnake area, and in the Clark Fork Canyon near Thompson Falls. 5/

Still greater is the potential impact on urban, residential, and agricultural land uses. Strong objections have been raised by residents in the Missoula area and in the Clark Fork Canyon, both of which are extensively settled, privately owned, and often constrained in width. Smaller but similarly constrained developments occur north of Missoula along the existing right-of-way. Scattered residences are found along the valley bottoms and roads that this route crosses or parallels for much of its length. Substantial amounts of private land, much in large timber holdings, would be crossed by new right-of-way in the Garnet Range. Elsewhere, using an existing right-of-way would avoid direct conflicts with urban land uses and would lessen potential for socioeconomic impact and effects on agricultural and private holdings along much of the route. Expansion of the Bell Substation on BPA-owned land would occur in an industrial area and add approximately 13 acres to the existing substation yard.

The route would also cross more than 50 miles of farmland, affecting between 3 and 17 acres by tower placement. The project could conflict with farming practices and cause a loss of productivity during construction, impacts which could be more important on irrigated land. However, much of this agricultural land is within existing vacant right-of-way. Expansion of the Hot Springs substation on BPA-owned land would convert about 11 acres of rangeland to substation yard.

5/ Two route options in the Rattlesnake Creek drainage were originally proposed for the Hot Springs plan. The option across the Rattlesnake National Recreation Area has been dropped from the preferred route alternative for Plan A. Also see Volume II, Part IV. K.

Crossing the reservation of The Confederated Salish and Kootenai Tribes could cause controversy over legal issues and potential impacts on Native American culture.

The route would cross eight major areas identified as environmentally sensitive; four of these also pose physical or land use constraints to corridor development. Two additional constraint areas make this route the most undesirable for future line construction should other facilities be needed. The Rattlesnake and Clark Fork Canyon areas are the most significant constraint areas.

Mitigation

Measures Common to all Plans

BPA will continue to consult closely with landowners and local government agencies to avoid or minimize land use conflicts.

BPA will work with landowners and land managers to develop appropriate mitigation for affected agricultural and range land, including locating towers for minimal disturbance, subsoiling of compacted areas, weed control, compensation for land lost to production and for crops destroyed during construction, and reseeding of disturbed rangeland. BPA will try to avoid construction during adverse weather or field conditions. Other measures which would be considered on irrigated land include: shortening the radius of a circular system to allow passage at a tower; substituting a different kind of irrigation system which would be more compatible; installing equipment to reverse a system automatically as it approaches a tower; or realigning systems so they can pass freely between towers.

To correct possible noise/electrical effect problems, if television or radio (including CB) interference occurs, BPA will restore reception to at least its pre-construction level.

If a telecommunications or railroad company determines that unacceptable voltage or noise levels are appearing on their circuits because of the operation of BPA's transmission line, the problem will be investigated and mitigated according to BPA policy and in cooperation with the affected company.

BPA will work with the USFS, BLM, and private concerns to minimize impacts from clearing and access road systems by building in a manner that meets timber harvest needs and other multiple uses such as recreation and watershed values, as well as transmission line needs. Roads constructed for the transmission line may provide access to timber stands that would otherwise be uneconomical to manage due to development costs. Procedures which will be followed, where possible, include: locating the line in less productive areas; locating roads where they will serve BPA's and the landowner's needs or plans; closing or controlling roads where necessary; use of temporary access where required; well-planned clearing; and disturbing the soil as little as possible. Canyons which can be spanned with adequate line clearance will not be cleared. Temporary use areas will be revegetated. To avoid waste from right-of-way clearing, the use of maximum amounts of timber, wood fiber, and other forested products will be encouraged. Existing clearings and other non-forest areas will be used, where possible, to minimize clearing of forest vegetation.

Where forest vegetation clearing is minimized, the measures above serve to reduce accompanying effects on wildlife, esthetics, soils, and water resources, as well. In addition, where problems with natural resources exist, construction will be limited during periods of adverse weather to avoid erosion problems, and disturbed areas will be seeded with quick-growing grass species easily adaptable to the site and fertilized if necessary. Seasonal restrictions will be implemented to protect wildlife on key habitats (e.g., winter range, nesting sites). Standard erosion control measures such as drainage structures and low-gradient road cuts will also be used in problem soils areas.

In riparian areas, clearing of vegetation for transmission line right-of-way will be limited. Access road construction will avoid riparian areas to the extent possible. Wetlands will be avoided and no transmission towers or access roads will be constructed in wetland areas, where possible. Where construction does occur adjacent to a wetland, measures will be taken to prevent construction materials from entering it.

Vegetation management plans, including uses of and limitations on herbicide applications, will be developed for public lands in cooperation with the appropriate Federal land management agency responsible (USFS, BLM). Similar coordination in the interest of promoting multiple use may be undertaken with respect to State lands, individual landowners, weed control districts, and with the BIA and Confederated Tribes (should tribal lands be affected). 6/

A selective vegetation control program will be used so as not to injure the understory vegetation left after clearing of the right-of-way. This vegetation is compatible with the line and stabilizes the soil. Trees which became a hazard to the transmission line occur relatively sparsely and as a rule are very slow growing, thus requiring little control. Applications will be made in accordance with EPA regulations. BPA will comply with herbicide and vegetative control specifications included in right-of-way agreements with other agencies. Ground applications of herbicides will not be allowed within 10 feet of any water body. BPA may control vegetation using herbicide spraying only as a tool: 1) to control trees along access roads and tall-growing species within the rights-of-way; 2) to control plant growth in substation yards; and 3) to eradicate weeds in ornamental plantings and noxious weeds on rights-of-way in cooperation with adjacent areas where active weed control programs exist.

6/ For a more detailed description of right-of-way management, see Bonneville Power Administration's draft Environmental Impact Statement on its Transmission Facilities Vegetation Management Program (September 1982). The document describes maintenance and vegetation control techniques, including possible herbicide applications, used on the BPA transmission system.

To reduce effects on air quality, debris piles will be kept as clean and dry as possible and burned in such a manner as to reduce smoke. No garbage or petroleum-based products will be burned. Burning will comply with the Montana Cooperative Smoke Management Plan regulated by the State of Montana Air Quality Bureau and with the Washington Smoke Management Plan regulated by the Department of Ecology and by the State Department of Natural Resources. (Presently, the State of Idaho does not have a Smoke Management Plan.) Leftover construction materials will be retained for reuse or reprocessing where practical. Dust control measures such as application of water or gravel will be used on roads as necessary.

All conductors will be made from non-specular (non-reflective) material to reduce visibility. In sensitive areas, towers will be specially treated to darken their appearance in order to diminish their visibility in contrast with the background. Feathering of the right-of-way to eliminate the harsh edges of clearing will reduce the swath effect in forested areas. Right-of-way feathering will be consistent with the objectives of the affected landowner. A buffer of natural vegetation will also be left at road and river crossings, as appropriate, to screen views of the towers and right-of-way, to reduce possibility of removing perching sites for birds of prey, to reduce sedimentation, and to help retain aquatic habitat. This will also minimize visual effects.

BPA will require contractors to minimize damages during construction (including advance notice of necessary work), will continue to implement fair negotiation and compensation practices, and will respond promptly to landowner problems.

BPA will comply with the National Historic Preservation Act of 1966 and all other laws and regulations protecting historic and archeologic resources. BPA will complete an intensive survey on the right-of-way before construction begins. If a previously unknown resource is discovered late or accidentally during construction, BPA will follow the procedures outlined in 36 CFR Part 66, including:

1. Halting work in the area of impact.

2. Notifying the Secretary of the Interior through the Departmental Consulting Archeologist by telephone that potentially significant resources have been discovered during construction or project implementation. A telegraphic abstract of the conditions resulting in the discovery, the potential signifcance of the data, the nature and extent of compliance activities and the availability of funds under section 7 (a) of Public Law 93-291 should follow immediately.

3. Arranging with the Departmental Consulting Archeologist for an on-site inspection, if necessary.

4. If required, redesigning the project to avoid the significant resource or undertaking data recovery. The assessment of preservation and data recovery alternatives should be made in accordance with the guidelines previously presented.

5. Seeking the comments of the Advisory Council on Historic Preservation, if warranted.

Measures Specific to Plan A (Hot Springs)

In addition to non-specular conductor (which would be used along the entire route), use of specially treated towers, selective or constrained clearing for the right-of-way or access roads, and careful tower location are the primary mitigative tools that would be used to minimize, reduce, or avoid impacts on many resources in sensitive areas. Specific locations where these and additional measures would be used are discussed below, along with the intended results.

Along segment 101 in the vicinity of Gold Creek (fig. 2.5), non-specular conductors and treated towers, particularly at the crossing of I-90, would minimize visibility to travelers (including users of the Carten Creek rest area), to nearby residents, and to visitors seeking the possible remnants of the Mullan Road in this area. Direct disturbance of the Mullan Road would be avoided should any remnants be found and be determined eligible for inclusion on the National Register of Historic Places.

Where segment 113 crosses the Blackfoot River, the use of long spans with no clearing or access roads, non-specular conductor, and treated towers would minimize line visibility from the river and from Highway 200 considerably. There would be no loss of possible bald eagle perch sites near the river.

For residential areas close to the line north of Missoula (Rattlesnake area, segments 115, 116; Grant and Butler Creeks, segment 117), the special tower treatment and use of non-specular conductor would help to reduce visual intrusion. These methods would also be used in similar areas around Evaro, Valley Creek, and Dixon (segment 5). Both the existing 230-kV line and a short portion of the proposed line near The Montana Power Company Rattlesnake Substation would be rerouted from the existing right-of-way to avoid direct conflicts where residences and a neighborhood park have encroached on the present right-of-way.

Treated towers and careful tower location and access road construction will reduce line visibility along sensitive portions of segment 5 across the Flathead Indian Reservation.

Survey and tests would be conducted for subsurface remains at the historic Indian encampment near Dixon. Any remains would be avoided should they be determined eligible for nomination to the National Register of Historic Places. Using existing right-of-way and access roads as much as possible would substantially reduce the possibility of direct impact for these sites and for possible prehistoric sites in the same area. Where any Indian tribal religious or cultural site on public land could be affected, notification of and consultation with the relevant tribes will take place.

In the congested, environmentally sensitive Clark Fork canyon (segment 18) and Rainbow Lake area (segment 16), an existing line would be removed and a multi-circuit line rebuilt in its place along parts of 34 miles of route (see fig. 2.4). This design modification would avoid negative effects on numerous resources. By not enlarging the existing right-of-way, no additional land use conflicts would be created. No additional forest clearing would be needed, avoiding loss of productive forest and bald eagle perching/nesting trees (particularly around Eddy Island) along the Clark Fork River. New access road construction and associated effects on wildlife, soils, and water resources, agricultural land, private land, and other land uses would be minimized or avoided. Any construction necessary off existing roads in the wetland area along Malone Creek will attempt to avoid damage to wetland vegetation. As in all areas, should towers for the new line be placed in new locations on the Clark Fork or Prospect Creek floodplains (see fig. 4.14), areas around the old and new tower sites would be regraded to match surrounding contours and reseeded. BPA will coordinate with the U.S. Fish and Wildlife Service and other agencies to avoid construction impacts when bald eagles are present in the area. Non-specular conductor and treated towers would be used in this area and in nearby Prospect Creek to mitigate visual intrusion, including that on historic sites, and efforts would be made to coordinate tower spacing with existing towers. Nevertheless, the level of visual impact in this congested valley would not change appreciably.

Non-specular conductor and treated towers would be used to reduce line visibility from urban-residential areas along the existing right-of-way in the Pleasant Prairie area east of Bell Substation (segment 50). This measure, plus selective clearing, would reduce scarring and visibility to recreationists in the Thompson Pass area and to the Glidden Pass Trail, an historic trail (segment 22); where the Coeur d'Alene River is crossed and to residents and recreationists at Eagle Creek (segment 34); and north of Hayden Lake (segment 47).

Segment 47 has been relocated in consultation with the Forest Service to avoid impacts on sensitive recreation, prehistoric, and fishery resources. (See Volume II, Part IV. U, for comments and responses on this area.)

To minimize erosion in the Chilco Lake area, careful road design and construction practices and stringent erosion control measures will be followed. In addition, project followup will include monitoring and immediate mitigation of any erosion or other earth resource impacts caused by construction or maintenance activities.

To mitigate disturbance of the upland sandpiper colony (along segment 50), timing of construction activities will be coordinated with local wildlife officials (Washington State Department of Game, Nature Conservancy, Spokane Audubon Society). To minimize loss of habitat and nests, as few towers as is practical would be placed in the nesting area, with no permanent access road construction. During survey and construction, interested agencies will be consulted.

ALTERNATIVE B: PLAINS PLAN

About two hundred and sixty-four miles of transmission line would be needed for the route of least impact. A new substation would be built near Plains; Garrison and Bell Substations would be expanded. Table 2.1 lists technical and cost information for this plan. Tables 2.2, 2.3, and 2.5 present comparative information upon which the following discussion is based: amounts of various resources affected; rank order comparison of the plans by environmental criteria; and the relative plan advantages, disadvantages, and other considerations. See figure 2.1 for a map of the plans.

The two Colstrip 500-kV lines would be extended west from Garrison to the vicinity of Plains, Montana. A new 12-acre substation, on a 25-30 acre site, would be built where these circuits intersect with existing lines. Route length for the double-circuit portion is about 153 miles.

Between Plains and Thompson Falls, a multi-circuit line would be built replacing an existing line. A 500-kV single circuit line would then be constructed to Bell Substation (111 miles); the substation would be expanded to accommodate new terminal equipment. Building the Plains substation would convert about 12 acres of pasture/rangeland to a substation yard.

Plan B is identical to Plan C (Taft) between the Garrison Substation and the Clark Fork River near Alberton. From here, Plan B heads north along the west side of the Ninemile Valley, across Siegel Mountain and into Plains Substation. West of Plains, Plan B is identical to Plan A.

Between Garrison and the Miller Creek area are two route variations very similar in overall impact. The preferred route (Plains South; see fig. 2.1) heads southwest and west out of Garrison Substation (segments 118, 129, and 130), across the Flint Creek Valley at Maxville (segment 132), then northwest to the headwaters of Miller Creek (segments 134, 135, 137). The alternative, called Plains North, heads north, then west out of Garrison (segments 101, 102), crosses the Garnet foothills into the Clark Fork Valley (segments 107, 108, 120), parallels an existing 230-kV line to Clinton (segment 121), then continues to the Miller Creek headwaters (segments 127, 128). The Plains North alternative offers a lower-impact option for forestry and for cultural and aquatic resources, but would be closer to more residences and to more recreational viewers.

The impacts of this plan in relation to the Hot Springs and Taft Plans are in the middle overall, as the plan ranks best for two resources, last for two others, and second for the remaining resources. A large portion of the Plains Plan is routed on benches and side slopes out of valley bottoms, off private land and away from concentrations of people. For this reason, the plan ranks best in terms of non-residential inconvenience and second best--close to the Taft Plan--for other human concerns such as agriculture, recreation, urban-residential, visual, cultural, and general socioeconomic values. However, impacts on forestry and hydrology resources would be the greatest.

Major concerns for developed land include potential conflicts with lands proposed for development, and visual and inconvenience effects on existing and proposed areas of dispersed development. Compared to Plan A, however, the plan essentially avoids urban and built-up areas, and is located more consistently away from major travel routes. It crosses Flint Creek about 1/4 mile north of the small rural community of Maxville. In the Miller Creek area, it passes near a small residential development and a few individual dwellings and crosses a proposed residential subdivision. The plan also crosses close to or within view of developed and developing areas where it crosses the Clark Fork River near Alberton and proceeds up the Ninemile Valley. Overall, the plan encounters the second lowest amount of visually sensitive land and the second fewest potential viewers, and also avoids many significant recreation resources. Most extensive recreational effects would be on dispersed recreation users. The main recreation conflicts would occur where the route crosses Rock Creek, a Blue Ribbon trout stream and scenic river; where it closely parallels and crosses the Clark Fork River in areas highly valued for fishery resources; and where it crosses the North Fork of the Coeur d'Alene River, under study for possible future inclusion on the potential State of Idaho Wild and Scenic River System. Some areas crossed by this route are very vulnerable to extensive grading and construction scars. Crossing the Flathead River near the Clark Fork would require highly visible towers. Two more highways would be crossed or paralleled, and the line would be visible from both Paradise and Plains.

This route would also cross more than 40 miles of agricultural lands (the second most), would conflict with cultivation practices, and would cause short-term losses of agricultural productivity. Towers would remove between 2 and 14 acres of farmland. The Plains substation yard would remove about 12 acres of pasture/rangeland.

Tradeoffs from routing upslope and generally out of the valleys include encountering more heavily timbered land and steeper slopes (which imply erosion hazards), requiring more clearing, particularly for access roads. Despite potential erosion hazards, this plan--along with the Taft Plan--ranks best for soils impact because it crosses fewer problem soils than does the Hot Springs Plan. The plan would cross the highest amount of highly productive forest land, creating the second most conflicts in intensively managed areas and resulting in the highest annual potential forest growth loss. About 3,000 acres of forest land would be affected.

Wildlife would be more seriously affected by this route than by Plan A, due primarily to potential effects on osprey, bald eagle, and waterfowl at the Flathead River crossing near Paradise (segment 14). Removing an existing line and rebuilding it on multiple-circuit structures would reduce impacts in the narrow Clark Fork Valley east of Thompson Falls. Although effects on wildlife could be significant in localized areas, for the plan as a whole the wildlife impact is not significant.

This plan ranks second for potential impact on cultural resources. Portions of the route may affect historic mining sites. Numerous unrecorded historical sites and archeological sites could be affected along major portions of the route, particularly in the Ninemile and Clark Fork Valleys, the Siegel Divide, and the area of confluence of the Clark Fork and Flathead Rivers.

This plan also encounters eight major environmentally sensitive areas and two corridor constraint areas. In terms of suitability for future corridor development, this plan is second to the Taft Plan in being able to facilitate an additional line, should one be needed. It shares, with the Hot Springs Plan, the Clark Fork Canyon near Thompson Falls, where building another line after this one would be extremely difficult.

Mitigation

All general mitigation discussed for Plan A would also apply to this plan. Specific measures and locations discussed under Plan A would apply here except for those proposed along segment 5 and with the following additions.

Where the Flint Creek Valley is crossed at Maxville (a narrow part of the valley), the following measures would reduce visual effects on residents of Maxville, travelers, and recreationists along the Pintlar Scenic Highway (Highway 10A): Towers would be located as far back from the highway as possible to maximize this span and would be treated to reduce visibility. Improved appearance towers may also be used (see fig. 2.3). The conductor would be treated to make it non-reflective. Clearing--particularly along the valley floor--would be minimized to retain the screening effect of the vegetation. Trees at the crossing of Highway 10A would be topped, if necessary, rather than removed. BPA is continuing to work closely with local residents on possible centerline/tower locations in this area.

The proposed alignment of segment 135 across Rock Creek has been adjusted in response to concerns about hazards to the emergency flyway. (Please see Volume II, Part IV. H for further detail.) The following mitigation measures would be undertaken at the adjusted Rock Creek crossing. There would be limited access road construction or clearing on the valley sides. Existing roads would be used as much as possible. Clearing and access requirements here and to the west would be planned in conjunction with the U.S. Forest Service to minimize effects on highly productive forest and on critical big game habitat. The valley would be spanned to eliminate towers on its floor. Wherever possible, towers would be situated on side ridges to avoid skylining and to take advantage of landform screening. The towers would be treated and non-specular conductors used. These measures would minimize visual intrusion for travelers and recreationists along the creek and at the Valley of the Moon Ranch. Spanning or topping would eliminate the need for clearing of trees on the valley bottom and would eliminate sedimentation in the creek itself.

Along the first few miles of segment 139, east of Miller Creek, access road construction on unstable slopes will be limited. A minor location adjustment has been made in the Cahoot Creek area to reduce visibility to nearby residents in Miller Creek. Where the line crosses the Bitterroot River just north of Lolo, a number of measures would minimize effects on esthetic and natural system resources. Approaching the Bitterroot from the east, the line would be built down the south side slope of Miller Creek to lower the visibility of the towers from locations to the north (Missoula) and to the south (Lolo). Along with treated towers and non-specular conductor, which are proposed, improved appearance towers are being considered along about four miles in this area (see fig. 2.3). Ground disturbance would be held to a minimum and undercutting of this steep slope would be avoided. Disturbance would be minimized at the river crossing to avoid siltation effects on the river and possible loss of bald eagle perching sites. The line has been adjusted slightly down the south side of Deadman Gulch on the west side of the Bitterroot River crossing to reduce visibility from Miller Creek and South Missoula. Selective clearing here and continuing west into the Blue Mountain area and minimal access road construction would avoid scarring effects and would increase the ability of the line to be absorbed by the landscape in the distant views. Tower heights will be increased to minimize right-of-way clearing.

Effects on natural systems in the Siegel Mountain area (segment 14, between Ninemile Valley and the Flathead River) would be held to a minimum by selective clearing, spanning, and use of existing roads where feasible, making low gradient cuts and building proper drainage structures, and seeding of cut-and-fill slopes and other disturbed areas immediately after construction is finished.

The use of non-reflective conductors, treated towers, and clearing and access road constraints would reduce line visibility and road scarring at the confluence of the Flathead and Clark Fork Rivers near Paradise.

ALTERNATIVE C: TAFT PLAN (PREFERRED ALTERNATIVE)

Two hundred fifty-eight miles of transmission line would be needed, as well as a new substation at Taft and expansion of the yards at Garrison and Bell. Table 2.1 lists technical cost information for this plan. Tables 2.2, 2.3, and 2.6 present further comparative information about the amounts of various resources affected, a rank order comparison of the plans by environmental criteria, and the relative plan advantages, disadvantages, and other considerations.

The two 500-kV Colstrip circuits would be extended from Garrison to a new 10-acre Taft substation to be constructed near where the proposed double-circuit line would intersect the Hot Spring-Dworshak 500-kV line (157 miles).

Between Garrison and Missoula are two route variations very similar in overall impact. The proposed route (Taft South), as seen in figure 2.1, heads southwest out of Garrison Substation (segments 118, 129, 130), proceeds west across the Flint Creek Valley at Maxville (segment 132), then northwest into the headwaters of Miller Creek (segments 134, 135, 137). The alternative route (Taft North) heads north out of Garrison Substation into the Garnet foothills (segments 101, 102), proceeds west and drops into the Clark Fork Valley, and parallels an existing 230-kV line to the Clinton area (segments 107, 108, 120, 121), where it diverges southwest to the Miller Creek headwaters (segments 127, 128). This alternative offers a lower-impact option for forestry and for cultural and aquatic resources, but would affect more residences and recreational viewers.

From Taft, a single-circuit 500-kV line (101 miles) would be constructed to Bell Substation, which would be expanded within existing property boundaries in order to install new terminal equipment.

A large portion of the Taft Plan is routed on benches and side slopes out of valley bottoms, off private land, and away from concentrations of people. For this reason, the plan ranks best for human concerns such as agriculture, recreation, urban-residential, visual, cultural, and general socioeconomic values. However, like the Plains Plan, it would conflict the most with land management objectives. Impacts on forestry, vegetation, and hydrology resources would be significant, and a close second to the Plains Plan.

Major concerns for developed land include potential conflicts with lands proposed for development, and visual and inconvenience effects on existing areas of dispersed development. Compared to Plan A, however, the plan essentially avoids urban and built-up areas, is located more consistently away from major travel routes, and crosses highways and rivers fewer times. It crosses Flint Creek about 1/4 mile north of the small rural community of Maxville. In the Miller Creek area, it would pass near a small residential development and a few individual dwellings and would cross a planned residential subdivision. Overall, the plan encounters the lowest amount of visually sensitive land and the fewest potential viewers, and also avoids many significant recreation resources. Most extensive recreational effects would be on dispersed recreation users, but fewer people would be affected throughout the year than with the other plans. The main recreation conflicts would occur where the route crosses Rock Creek, a Blue Ribbon trout stream and scenic river, and where the route nears and crosses the Coeur d'Alene River, under study for possible future inclusion on the potential State of Idaho Wild and Scenic River System.

Locating out of the valley bottoms allows both agricultural land and areas of high bird population to be avoided as well. Other than the agricultural area between Rathdrum and Bell crossed by all plans, only 5 miles of farmland would be crossed, an amount significantly less than that of the Hot Springs plan. (Approximately one to eight acres under and around towers would be removed from production.) Only a small amount of bald eagle and waterfowl use areas would be crossed, north of St. Regis. No other endangered or threatened species would be encountered. Because it crosses and otherwise modifies the most habitat, the Taft Plan (particularly access roads) would have a greater effect on wildlife than the other two plans. Although effects on wildlife could be significant in localized areas (i.e., increased access to summer security areas), for the plan as a whole the level of wildlife impact is not significant.

Tradeoffs from routing upslope and out of the valleys include encountering more heavily timbered land, steeper slopes (which imply erosion hazards), and longer stretches of watersheds serving downslope communities and requiring more clearing, particularly for access roads. Despite potential erosion hazards, this plan--along with the Plains Plan--ranks best for soils impact because it crosses fewer problem soils than does the Hot Springs Plan. It would cross the second highest amount of highly productive forest land, would create the most conflicts in intensively managed areas, and would result in the highest annual potential forest growth loss. About 3,300 acres of forest land would be affected. About 10 acres of forest would be permanently converted to use as a substation yard for the Taft substation. This plan would also cross more miles of municipal watersheds than the other plans.

For cultural resources, the plan is ranked first (least impact); the most noteworthy problems would be in the Ninemile Valley, as discussed for Plan B.

In terms of suitability for future corridor development, this plan would most easily facilitate an additional line, should one be needed. Although impacts in eight major environmentally sensitive areas would be increased by a future line, no areas are crossed which would pose physical or land use constraints to future transmission line construction.

Mitigation

All general mitigation discussed for Plan A would also apply to this plan. Specific measures and locations discussed under Plans A and B would apply here except for those proposed along segments 5 and 14.

As discussed for the Plains Plan, where the Flint Creek Valley is crossed at Maxville (a narrow part of the valley), the following measures would reduce visual effects on residents of Maxville, travelers, and recreationists along the Pintlar Scenic Highway (Highway 10A): Towers would be located as far back from the highway as possible to maximize this span and would be treated to reduce visibility. Improved appearance towers may also be used (see fig. 2.3). The conductor would be treated to make it non-reflective. Clearing--particularly along the valley floor--would be minimized to retain the screening effect of the vegetation. Trees at the crossing of Highway 10A would be topped, if necessary, rather than removed. BPA is continuing to work closely with local residents on possible centerline/tower locations in this area.

The proposed alignment of segment 135 across Rock Creek has been adjusted in response to concerns about hazards to the emergency flyway. (Please see Volume II, Part IV. H for further detail.) The following mitigation measures would be undertaken at the adjusted Rock Creek crossing. There would be limited access road construction or clearing on the valley sides. Existing roads would be used as much as possible. As in all areas of the project, clearing and access requirements here and to the west would be planned in conjunction with the U.S. Forest Service to minimize effects on highly productive forest and on critical big game habitat. The valley would be spanned to eliminate towers on its floor. Wherever possible, towers would be situated on side ridges to avoid skylining and to take advantage of landform screening. The towers would be treated and non-specular conductors used. These measures would minimize visual intrusion for travelers and recreationists along the creek and at the Valley of the Moon Ranch. Spanning or topping would eliminate the need for clearing of trees on the valley bottom and would eliminate sedimentation in the creek itself.

Along the first few miles of segment 139, east of Miller Creek, access road construction on unstable slopes will be limited. A minor location adjustment has been made in the Cahoot Creek area to reduce visibility to nearby residents in Miller Creek. Where the line crosses the Bitterroot River just north of Lolo, a number of measures would minimize effects on esthetic and natural resources. Approaching the Bitterroot from the east, the line would be built down the south side slope of Miller Creek to lower the visibility of the towers from locations to the north (Missoula) and to the south (Lolo). Along with treated towers and non-specular conductor, which are proposed, improved appearance towers are being considered along about four miles in this area (see fig. 2.3). Ground disturbance would be held to a minimum and undercutting of this steep slope would be avoided. Disturbance would be minimized at the river crossing to avoid siltation effects on the river and possible loss of bald eagle perching sites. The line has been adjusted slightly down the south side of Deadman Gulch on the west side of the Bitterroot River crossing to reduce visibility from Miller Creek and South Missoula. Selective clearing here and continuing west into the Blue Mountain area and minimal access road construction would avoid scarring effects and would increase the ability of the line to be absorbed by the landscape in the distant views. Tower heights will be increased to reduce right-of-way clearing.

In the St. Regis area (segment 15) an alternative alignment to the north has been proposed to reduce effects on developed land, esthetics, recreation, and general socioeconomic resources. This relocation of part of segment 15 in the Tamarack Creek drainage (segment 92) is discussed in detail in Volume II, Part IV. N.

In the Mullan-Lookout Pass area (segment 26), improved-appearance towers or non-specular conductor and treated towers would be used to reduce contrast and thus visibility to travelers, recreationists, and visitors.

Non-specular conductor, treated towers, and selective clearing would also be used to reduce impacts at crossings of the Coeur d'Alene River; on the communities of Bunn (segment 31) and Gem (segment 32); on travelers on Highway 461 and nearby residents where segment 15 crosses the Clark Fork River north of St. Regis; and on travelers along I-90, residents, and viewers of historic sites at the Clark Fork River-Ninemile Creek confluence. These measures would minimize possible visible intrusion on the Pardee-Keystone Historic District (segments 13, 15). The Montana State Historic Preservation Officer would be consulted as to the eligibility of these sites for nomination to the National Register of Historic Places. If they are determined eligible, any direct impacts would be avoided.

NO ACTION

The No Action alternative assumes that the Colstrip transmission system would continue to be built to the vicinity of Garrison, Montana, but that

Bonneville's transmission system would not be reinforced as proposed. A decision to take No Action would affect the performance of the Pacific Northwest interconnected transmission system and man's environment as well.

Direct consequences to the electrical system are reasonably predictable. Major consequences would be instability during stress (outage) conditions and high energy loss in transmitting power. The general impacts from such situations include the inconvenience from localized or area-wide temporary power outages, the risk of significant hardship if temporary outages coincide with other adverse conditions (such as severe weather), and the environmental impact of replacing energy losses with other types of generation.

When all four Colstrip units and the associated transmission system are completed, they are scheduled to be operated to produce and deliver "firm" (assured availability) energy. However, only one 500-kV transmission line currently serves the eastern end of the Pacific Northwest Transmission System. Alone, it cannot reliably transmit the output of Colstrip power plants. An outage of that line would probably require shutdown of one of the 350-MW generating units until the outage is repaired, in order to avoid overloads on the remaining system. Shutdown would mean loss of load--failure to supply needed power--which would violate both Bonneville's and Western System Coordinating Council's (WSCC) reliability criteria for power system design and performance. The likelihood of adverse consequences from such an outage would worsen in the mid-to-late 1980's, as energy resource deficits are forecast for this time.

For the No Action alternative, power transmission losses would average about 58,000 KW higher for the interconnected transmission system serving Oregon, Washington, Idaho, and Montana than for the other alternatives (approximately $13.6 million annually). The cost of replacing this energy is likely to be at least $2.2 million for BPA and WWP systems. Loss savings for the Montana power system would be several times this amount. Based on a 35-year life of project, the value of conserving transmission line energy loss may amount to about $467 million for the region and $77 million for the BPA and WWP systems. As energy costs increase in the future, the value of these losses would also increase. The losses would need to be made up by adding new generation (from coal, nuclear, or renewable sources such as solar, wind, hydro, geothermal, biomass, or similar sources of energy) or by reducing energy consumption (see Conservation).

In transmitting electricity from energy generating facilities (hydroelectric dams, thermal-generating stations, and so on) to load centers, a small fraction of the electricity is lost as waste heat energy. For the Federal Columbia River Power System (FCRPS), energy losses approximate 2.4 percent of the total energy transmitted on the system. If the Garrison-Spokane transmission project were not built, losses on the FCRPS would increase about 5-6 megawatts. However, energy losses on interconnected utilities in the region would also be affected. As noted above, these energy losses could be nearly 58 megawatts (58,000-kw). The following table estimates relative changes in energy transmission losses for the interconnected power systems in the region:

RELATIVE CHANGE IN ENERGY TRANSMISSION LOSSES 8/

Alternative	FCRPS	PNW 9/		Other 10/		Total
Hot Springs Plan	5.9 mw	12.4 mw	+	45.7 mw	=	58.1 mw
Plains Plan	5.8 mw	12.5 mw	+	45.8 mw	=	58.3 mw
Taft Plan	4.7 mw	11.8 mw	+	46.4 mw	=	58.2 mw

Under No Action, the environmental impacts associated with development of this proposal would not occur or would at least be deferred if the project were to be built at another time. Since a new/expanded 260-270 mile transmission line would not be developed, capital expenditures, materials (steel, aluminum, ceramics, and fuels), labor, and other resources (primarily forest productivity) would not be committed to the project. Short- and long-term impacts associated with the line, the right-of-way, substation facilities, and access road system would not occur.

Specifically, effects on land use, social, economic, and cultural values would not occur. New transmission facilities would not be introduced near urban or residential land. Short-term construction disruption of land uses would not occur. Between 1 and 17 acres of agricultural land would not be permanently removed from production; between 2200 and 3300 acres of forest land would not be converted to transmission line right-of-way. Between 1 and 20 acres of rangeland would not be removed from use. Visual intrusion and recreational conflicts would not occur. The appearance of the study area landscape would not be altered. No conflicts with historic or archeological resources would occur. Economic losses associated with long-term loss of farm and forest productivity would not occur. No jobs would be created by the project, nor would local expenditures and induced economic activity from the project occur.

Potential disturbances of natural resources--geology, soils, water resources, vegetation, and wildife--would be avoided. Vegetation removal, soil disturbance, erosion, and sedimentation from right-of-way and access road development would not occur. Correspondingly, there would be no effect on wildlife or their habitats.

ALTERNATIVES TO REINFORCE THE WASHINGTON WATER POWER COMPANY'S TRANSMISSION SYSTEM

The WWP alternatives depend, to some degree, upon which BPA plan is selected. Alternatives 1 and 4 could be developed independently of BPA plans. Alternatives 2 and 3 would require connection with proposed BPA facilities.

8/ Figures equal the reduction in transmission line energy losses compared to not building the project. Based on January 1988 power flow case studies.

9/ PNW (Pacific Northwest)--includes FCRPS and other utilities in Oregon, Washington, northern Idaho, and parts of western Montana.

10/ Includes Montana Power Company and Idaho Power Company which are not in the PNW figures.

ALTERNATIVE 1: THOMPSON FALLS PLAN 11/

This plan involves constructing a Thompson Falls 230-kV switching station (about 6 acres) near the existing Hot Springs-Noxon No. 2, 230-kV line near Thompson Falls, Montana; constructing a six-acre 230/115-kV substation at Wallace, Idaho; and constructing a 48-mile 230-kV line from the Thompson Falls switching station to the Wallace Substation and then to the Pine Creek Substation (fig. 2.2). This plan could be built with BPA Plans A (Hot Springs), B (Plains), C (Taft), or with BPA No Action. 12/

The Thompson Falls-Wallace-Pine Creek line would be single-circuit steel to Wallace Substation (figs. 2.2, 2.3, 2.4, table 2.1). From Wallace to Pine Creek Substation, the line would be built on wood pole structures, following an existing WWP right-of-way. The Wallace-Pine Creek part of the route is common to all WWP construction alternatives.

The following comparisons are based on information in tables 2.2, 2.3, and 2.7. The Thompson Falls plan has the highest potential impact in every resource category, partially because it would be the longest route. In terms of natural systems, this route would encounter significant erosion hazards where it would parallel the existing line in the Canyon Creek area. It would also encounter potential threatened and endangered species habitat in that area where grizzly bears have been sighted, and occupied habitat near Thompson Falls (bald eagle). It would cross the greatest amount of municipal watersheds (12.3 miles) and would significantly affect visual, recreational, and cultural values in an area in Glidden Gulch managed as roadless by the Forest Service.

11/ The Washington Water Power Company has concluded that the Thompson Falls Plan and the Eagle Creek Plan should be removed from further consideration based on their review of environmental, technical, and cost factors. Letter, D. L. Olson, Senior Vice President-Resources, The Washington Water Power Company, to Marvin Klinger, Assistant Administrator for Engineering and Construction, Bonneville Power Administration (January 19, 1983).

12/ Bunker Hill mining operations shut down in 1982, creating uncertainty about future energy demands in the area. Since that time, new owners of the mine have implemented plans to return the facility to operation. The Washington Water Power Company still considers the need to provide additional transmission capacity to the Coeur d'Alene area mining loads in order to maintain reliable service as one of the underlying reasons for their proposed project: "The shutdown of the Bunker Hill load in 1982 reduced the mining area load by 60 average megawatts. However, the new Bunker Hill operation has asked our company to assure sufficient capacity for the resumption of essentially full operation, which is planned for by not later than 1986. Thus, all the needs which were shown in the Draft EIS for the WWP 230-kV project, are still fully applicable today to justify this project." Letter, D. L. Olson, Senior Vice President-Resources, The Washington Water Power Company, to Marvin Klinger, Assistant Administrator for Engineering and Construction, Bonneville Power Administration (January 19, 1983).

Socioeconomic impacts are generally not as significant an issue for the WWP alternatives as for the BPA alternatives; nevertheless, the Thompson Falls route would have the greatest effect on those resources. It crosses the most land in private ownership, much in valley bottoms, and encounters the most urban/residential land. About 600 acres of forest land would be affected. One mile of agricultural land would be crossed.

Much of the route would be highly visible in sensitive scenic areas. The Prospect Creek drainage, where transmission lines already exist, would suffer additional visual intrusion.

Mitigation

Measures Common to All Plans

The Washington Water Power Company will employ the following mitigation measures:

Self-supporting transmission structures or towers instead of guyed towers will be used to reduce impact on land use.

Locating the transmission structures on private land will be discussed with the landowner to minimize the disruption to farming or other activities.

Right-of-way clearing will be restricted to the minimum necessary for safe construction and operation of the line. The choice of equipment and construction methods will be the responsibility of the contractor with the following restrictions on clearing operations:

-- Clearing to mineral soil will be avoided; if it should be necessary, soil will be stabilized as soon as possible.

-- Only tree species which grow tall enough to interfere with the lines, including danger trees (any tree close enough to the power line to create damage if it falls) will be removed.

-- Low-growing trees, shrubs, herbs, grasses, and the topsoil will be protected during construction.

-- Only clearing necessary to string a line across canyons will be done.

-- Removed vegetation will be disposed to the satisfaction of the landowner. Local fire and air pollution regulations will be followed if slash is burned.

-- Location of access routes will be discussed with the landowner/land manager. Where necessary, the use of helicopters will be considered as an alternate to the construction of access roads.

-- Tower sites and staging areas disturbed during the construction sequence will be restored.

-- Landowners will be compensated for the use of their land according to individual agreements.

-- Construction activities will be scheduled as much as possible for the time of year when the least amount of damage would be done to soil, vegetation, and crops.

These right-of-way maintenance activities will be followed:

-- Only danger trees will be removed, leaving the low-growing trees, shrubs, herbs and grasses intact.

-- Access roads will be reopened only as needed for line maintenance or repair.

-- Compensation will be paid for crop damage.

-- WWP will cooperate with landowners and governmental agencies in allowing recreational or other uses of the right-of-way which are compatible with the transmission of power.

-- Agricultural practices such as farming and grazing will be encouraged within the transmission right-of-way.

ALTERNATIVE 2: EAGLE CREEK PLAN 13/

This plan involves tapping BPA's proposed line and constructing a six-acre 500/230-kV substation at Eagle Creek; constructing a six-acre 230/115-kV substation at Wallace, Idaho; and constructing a 230-kV line from Eagle Creek Substation to the Wallace Substation and then to the Pine Creek Substation. The existing Noxon-Pine Creek 230-kV line would be rebuilt and reconductored on single-circuit steel towers from Noxon to the Eagle Creek area, where it would connect into and out of the substation using double-circuit towers. Transmission line construction involves about 26 miles of teardown-rebuild and about 37 miles of new route. This plan could be built with BPA Plans A (Hot Springs) or B (Plains).

The following comparisons are drawn from tables 2.2, 2.3, and 2.7. This alternative would have less impact than the Thompson Falls plan and slightly more than the Taft or Noxon alternatives. Effects on some resources would be mitigated by using existing corridor where possible. The most adverse impacts associated with this route would occur in the area of Eagle Creek, where new route (about 9.5 miles) and a new substation would be required. Impacts would involve primarily recreational, natural, cultural, and socioeconomic/land use resources. About 500 acres of forest land would be affected.

13/ See footnote #11.

Mitigation

See Thompson Falls Plan discussion.

ALTERNATIVE 3: TAFT PLAN (ENVIRONMENTALLY PREFERRED)

This plan involves constructing a 230-kV line from the proposed BPA Taft Substation to the Wallace Substation and then to the Pine Creek Substation; developing 230-kV interconnecting terminal facilities at Taft Substation; and constructing a six-acre 230/115-kV substation at Wallace, Idaho. This WWP plan could be built with BPA Plan C.

The 36-mile Taft-Wallace-Pine Creek line would involve 230-kV steel line north and west out of a proposed Taft Substation north of the South Fork of the Coeur d'Alene River, parallel to BPA routes in Plan C into Wallace Substation (fig. 2.2). The last 2 miles would parallel an existing WWP line.

The following comparisons are based on information in tables 2.2, 2.3, and 2.7. Impacts on most resources for the Taft plan would be similar to those for the Eagle Creek and Noxon plans. Generally, significant impacts would occur <u>in fewer areas</u>. Of the WWP plans, this plan would be the least disruptive of recreation and cultural resources, and would have the lowest overall impact on land use, socioeconomic, and forestry resources (affecting about 450 acres of forest land) of all WWP plans. It would, however, cause significant visual conflicts in the Lookout Pass area.

Mitigation

See Thompson Falls Plan discussion. [Also under consideration would be building BPA and WWP lines on a set of double-circuit towers to reduce clearing and associated impacts. <u>Note: This is not considered to be a viable mitigation measure by The Washington Water Power Company for technical reliability and economic reasons. (Personal communication, Marshall Brammer, WWP, January 26, 1983)] Single-circuit 230-kV steel towers of similar physical appearance and spacing as BPA's 500-kV single-circuit towers for the section of line where BPA and WWP lines would be parallel and adjacent to each other is being considered.</u>

ALTERNATIVE 4: NOXON PLAN (<u>PREFERRED BY WWP</u>)

This plan involves constructing a six-acre 230/115-kV substation at Wallace, Idaho; constructing a double-circuit 230-kV line to replace part of the existing line between Noxon switchyard and Wallace Substation; and constructing a new line from Wallace Substation to Pine Creek Substation.

The routing of this plan resembles that of Alternative 2, which entails rebuilding the existing WWP Noxon-Pine Creek line and constructing on a new route. However, under this alternative, the line would be rebuilt to double-circuit 230-kV lines on steel towers and would extend farther south. After crossing the Coeur d'Alene River, it would follow an existing line up Beaver Creek, and on to Wallace Substation. The line extends from Wallace Substation on to Pine Creek Substation, as described under Alternative 1. This plan could be built with BPA Plans A (Hot Springs), B (Plains), C (Taft), or No Action.

Impacts along most of the Noxon plan would be similar to those for the Eagle Creek Plan, as the two plans traverse basically the same area. However, this plan would avoid the Eagle Creek area, using the Beaver Creek drainage instead. As a result, it avoids possible land use, socioeconomic, and cultural problems associated with this area. As a tradeoff, however, it would have more adverse effects on recreation (owing to proximity to the North Fork of the Coeur d'Alene). Double-circuit towers (as opposed to single-circuit for the Eagle Creek plan) would be more visible, but would probably have few effects on other resources, as the present right-of-way would not be expanded. Among WWP plans, it would have the second lowest effect, after the Taft plan, on land use and socioeconomic resources. It would affect about 450 acres of forest land. However, it rates slightly better for impact on natural systems, principally owing to the use of existing corridor. (See tables 2.2 and 2.7 for more information.)

Comparing the WWP Taft and Noxon Plans leads to the following conclusions:

From an environmental standpoint, the WWP Taft Plan would have less overall environmental impact than the Noxon Plan. But the difference between the two plans is slight; both plans are environmentally good alternatives. While the two plans are similar in total extent of impacts, impacts differ between them as to types of resources affected and duration and significance of the effects.

The Taft Plan (35.7 miles of line) would result in less initial and short-term construction disturbance than the Noxon Plan (61.9 miles of line). However, the Taft Plan would add a parallel 230-kV steel tower line to the BPA 500-kV line. The cumulative visual effects of these lines on area residents, recreationists, and travelers could be significant in the Lookout Pass/Mullan area.

Most of the Noxon Plan involves rebuilding to 230-kV double-circuit steel towers on existing right-of-way located in relatively untraveled areas. Where new line would be built, it would be 230-kV wood pole. The line would affect the recreational value of the Coeur d'Alene River in the two places it crosses the river (one of which would be a new crossing). The new portion of the line would also be within view of residents along Beaver Creek and of a few surrounding towns and historic towns.

Both the Noxon and the Taft Plans provide reliable service 14/ to WWP's Kellogg/Wallace area loads. The electrical performance of the plans is slightly different. Each plan shows some minor performance advantages.

14/ BPA, 1980. Reliability Criteria and Standards; WSCC, 1973. Reliability for System Design.

The Noxon Plan is slightly more efficient in operation (lower losses) than the Taft Plan; however, the Noxon Plan has higher investment costs. Overall, when the value of losses is included, the cost of the Noxon Plan is slightly less than that of the Taft Plan.

BPA considers the differences between the plans to be of no significance to the Federal Columbia River Transmission System and, therefore, has no preference for a plan. WWP feels that the Noxon plan offers advantages to operation of their system and, therefore, prefers the Noxon alternative.

Mitigation

See Thompson Falls Plan discussion.

NO ACTION

Under the No Action alternative, the WWP facilities proposed to reinforce the electric service to the Wallace-Kellogg mining area would not be constructed. WWP would then be unable to provide strong reliable service to critical mining operation loads. The No Action alternative may result in lengthy outages under several possible single-contingency situations. Outages of the 230-kV or 115-kV busses or of the 230/115-kV transformer at Pine Creek would require dropping significant portions of the area load. The potential for such outages currently exists for 2 to 6 months a year and would increase to 4 to 9 months per year (WWP 1980).

The 230/115-kV transformers at Pine Creek would become less able to support the area load. With no additional 230-kV support, outages of BPA's proposed 500-kV system west of Hot Springs or Plains would force the additional Colstrip generation over the already-stressed 230-kV system in the Noxon-Cabinet area, causing severe overloads, especially during high generation periods. Although the likelihood of such outages may be low, the potential threat to safe mining operations is significant. Without reinforcement to this area, mine operators may have to seek backup generators, which would most likely be oil- or gas-fired (WWP 1980).

Under No Action, the environmental impacts associated with reinforcing the WWP 230-kV transmission system would not occur or would at least be deferred if the project were to be built at another time. Since a new or rebuilt transmission line would not be developed, capital expenditures, materials (wood poles, tower steel, aluminum, ceramics, and fuels), labor and other resources (primarily forest productivity) would not be committed. Short- and long-term impacts associated with the line, the right-of-way, substation facilities, and access road system would not occur.

ALTERNATIVES ELIMINATED FROM DETAILED DISCUSSION

OTHER PLANS/ROUTES

The Hot Springs-Bell 500-kV Transmission Project was introduced and evaluated in the planning and location supplements to the Bonneville Power Administration's environmental impact statement (EIS), Fiscal Year 1976 and 1977 Proposed Programs. The Hot Springs plan and two other alternative plans, four alternative route locations, and the alternative of nonconstruction (No Action) were considered (Bonneville Power Administration, 1975).

The Colstrip Project, including transmission system alternatives, was evaluated in an environmental impact statement (Colstrip Project EIS, 1979). Twelve major transmission alternatives were analyzed, and a Federally approved corridor was selected. The choice was announced in a Record of Decision on September 21, 1979. Corridors analyzed in the Colstrip Project EIS and found to have decidedly higher impacts, such as the corridor through Jocko Pass, are not re-examined within this document. 15/

Route analysis for the present Garrison-Spokane EIS (expanded in scope from the original Hot Springs-Bell project) involved reviewing existing routes from Garrison Substation to Bell Substation, identifying potential new routes, and assessing potential environmental impact of all routes. Consequently, some new routes have been identified (and are evaluated in this document), and other routes have been eliminated or modified because of high potential environmental impact.

As part of the environmental study process, several interdisciplinary team meetings were held to evaluate and compare alternative transmission line routings (July 1980, September 1981, November 1981, September 1982). The focus of one part of these meetings was to eliminate from further consideration those route segments with very high total impact where alternatives of substantially less impact are available. Figure 4.1 shows the routes and segments evaluated in preparing the environmental statement, including those eliminated from further consideration.

APPENDIX A: METHODOLOGY discusses the route analysis process in detail and documents the results of the interdisciplinary team evaluations and comparisons. Figures and tables are included to show relative rank order for various resource topics.

15/ For a detailed discussion of the history of the project, see Background of Project, in Chapter I. The Montana Department of Natural Resources and Conservation recently reviewed the Jocko Pass corridor and found its impacts substantially higher than those of the Taft Plan.

CONSERVATION

The scope and effectiveness of conservation as an alternative to providing new generation by thermal plants is frequently debated. The Colstrip Project EIS (Vol. 2, 1979) concluded that, even with significant conservation efforts, the Colstrip project was necessary. A subsequent forecast predicting energy deficits, even with the completion of planned thermal plants, supports this conclusion (Bonneville Power Administration 1980d). Table 1.1 and figures 1.2 and 1.3 illustrate forecasts for electricity demand and resources available to meet that demand. Two types of conservation are included in these forecasts: (1) conservation which is achieved by consumers on their own for a variety of reasons including concern about increasing energy costs; and (2) conservation attributable to existing and approved conservation programs sponsored by governments, utilities, and BPA. Care has been taken to avoid double-counting the electric energy savings from these two types of conservation. A third type of conservation is not included in these forecasts: energy savings which might be achieved through conservation programs which governments, utilities, or BPA might intitiate in the future. Other studies (Cavanagh, 1980) contend that conservation is a viable alternative to new thermal plants, including Colstrip Units 3 and 4. However, since the State of Montana issued a certificate of need for the plants and since they are now under construction, the issue of conservation as an alternative to the production of Colstrip power is considered to have been resolved.

Although conservation is not an alternative to the transmission line project, the issue of conservation as a resource is central to the evaluation of this project. Saving energy is one of the purposes of the proposal (see PURPOSE OF AND NEED FOR ACTION) and conservation is a subject in the ENVIRONMENTAL CONSEQUENCES chapter.

The Colstrip power plants are under construction (about 60 percent completed and on schedule) and are scheduled to be interconnected with the Federal Columbia River Power System (FCRPS). If the transmission line facilities are not built, much of the Colstrip energy could still be transmitted to the end users (see No Action). 16/ However, the energy could not be transmitted efficiently or reliably. Energy losses could be 58 MW higher for the interconnected transmission system serving the states of Oregon, Washington, Idaho, and Montana.

OTHER UTILITIES PROVIDING TRANSMISSION FACILITIES

Other utilities could build, own, and operate the proposed transmission facilities. If there were clear and distinct technical, environmental, or cost advantages to this option, it would be vigorously pursued. However, there are no such advantages compared to developing the proposal under the "one utility" concept.

16/ This assumes that the Colstrip transmission system would be connected to MPC's and BPA's existing 230-kV systems at Garrison, but that BPA would not reinforce the 500-kV system west to Spokane.

Under the "one utility" concept, potential power transmission needs are studied without regard to individual ownership, so that the most efficient technical plan can be developed and so that the impacts of building duplicate (unnecessary) lines are avoided. Efforts are made to avoid costly duplication of facilities and to accommodate the system plans of other utilities in the region.

For the Garrison-Spokane 500-kV transmission project, reinforcing and extending the BPA regional power grid allows the utilities participating in the Colstrip Project to share generation output. It also produces a more efficient power transmission system at a lower total cost and with less environmental impact than if each utility were to provide solely for its own needs. BPA costs are recovered by transmission line use rates paid by the participating utilities.

Thus, the alternative of individual utilities' provision of these transmission facilities is eliminated from further detailed discussion, since joint planning review under the "one utility concept" accommodates the technical needs of all, results in lower overall cost, and avoids potential impacts of redundant or unneeded facilities.

MITIGATION NOT INCLUDED IN THE PROPOSAL

Eight new impact mitigation measures were identified as a result of a joint interagency review and re-evaluation of route alternatives for the project. 17/ These measures stem from public and agency comment on the draft Environmental Impact Statement and State of Montana review of the project. They have been recommended by the Garrison-Spokane steering committee for consideration by the Project decisionmakers.

1. The Washington Water Power Company Alternative Plans: The draft EIS evaluated transmission facilities proposed by Bonneville Power Administration and a proposal by The Washington Water Power Company (WWP) to reinforce electrical service in northern Idaho. In areas where WWP and BPA construction would be parallel, the tower design, spacing, right-of-way clearing and access road requirements would be coordinated to reduce potential impacts.

2. Visual: There would be a cooperative Federal/State review of project mitigation plans to determine the effectiveness of visual impact reduction measures. The review would: (1) determine whether to designate additional sections of the route for tower darkening; (2) identify potential centerline or tower placement to reduce visual impacts; and (3) monitor to determine the effectiveness of the measures.

17/ A joint State-Federal interagency team meeting comprised of resource specialists and expert consultants was held November 15-19, 1982, in Helena, Montana.

3. Wildlife: There would be cooperative review of project mitigation plans by State and Federal wildlife specialists to determine the effectiveness of wildlife impact reduction measures. The review would further determine methods to reduce potential impacts on wildlife. Areas of principal concern include: (1) location, standards, and management of access roads in critical areas; (2) recommended construction timing to reduce impacts on wildlife; (3) evaluation of tower placements in critical wildlife habitat; (4) development of a program to monitor the implementation and effectiveness of the measures above in reducing potential impacts on natural ecosystems.

4. Roads: A cooperative team of State and Federal specialists would review project mitigation plans to determine the feasibility of reducing new access road construction and to manage closure of access roads to protect wildlife, visual values, and other resources.

5. Right-of-way near areas with potential for future residential development: BPA should work with city/county planning agencies to establish local policies for reducing future land use conflicts along the right-of-way, especially those that would preclude paralleling.

6. Maintenance and repair of access road facilities: BPA should work with landowners to maintain and repair cattle guards, fences, and gates installed by BPA.

7. Worker's impact on communities: At least 30 days before the start of construction, BPA representatives and the construction contractor should meet with officials of affected communities and local businss representatives to discuss the size and timing of predicted temporary increases in population, provisions for housing workers, and possible demands on local services. This action is intended to reduce community concerns about construction period impacts and to allow time to prepare for anticipated stresses on local services.

8. Insulators: BPA would work with cooperating agencies to select insulator colors that would reduce visual impacts.

Other mitigation measures were also considered but not adopted as part of the proposal by the interdisciplinary study team. Route alternatives were considered to mitigate impacts (by avoiding them) in four environmentally sensitive areas: Maxville, Potomac, Blue Mountain, and St. Regis. Interdisciplinary team analysis found that the alternatives for the first three, while lessening impacts on certain resources and land uses, would increase impacts on others. Overall, the alignments originally proposed in the draft EIS were judged to be the most suitable. These options were not selected as part of the preferred route for the plans involved. The fourth option, near St. Regis, was preferred over the original routing and is part of the proposed Taft Plan. In the Maxville area, the study team is continuing to work with Maxville residents to identify additional mitigation measures, including possible centerline adjustments. (Also see Volume II, Parts IV. B, Maxville/Hall; IV. E, Potomac; IV. I, Lolo/Miller Creek/Blue Mountain; and IV. N, St. Regis.)

Helicopter construction is being considered in certain areas to reduce access road construction. Possible areas currently identified include the crossing of Rock Creek (segment 135), and the Clark Fork River crossing near St. Regis (segment 92). Construction using helicopters still requires that some roads be built and may not be feasible in some areas.

If there is a chance that local air quality particulate standards could be exceeded during slash disposal, procedures such as chipping or forced burning at high temperatures to reduce emission would be considered.

For Washington Water Power Alternative 3 (Taft Plan), building both BPA and WWP lines on a set of double-circuit towers would be considered to reduce clearing and associated impacts. [Note: This is not considered to be a viable mitigation measure by WWP for technical reliability and economic reasons. (Personal communication with Marshall Brammer, WWP, January 26, 1983)]

Portions of this transmission line have been studied for the potential for undergrounding (see APPENDIX E). An excerpted discussion follows.

Portions of a transmission line can be placed underground where it is feasible for environmental, economic, and engineering reasons. For example, where a sensitive bottleneck occurs, and many lines cross through a constricted area, the greatly increased cost of an underground line may be justified by the need for reliable operation. Although some facilities have to remain above-ground (terminal stations, cooling pumps, pressurization systems, and manhole openings), the burial of lines in trenches can substantially eliminate visual and related socioeconomic and urban-residential impacts of the more usual overhead lines. Such an option would also remove the potential for weather-related failures and would suppress any electrical field. Undergrounding is being considered as possible mitigation of the types of problems above in sensitive or constrained areas. Undergrounding the line across such places as the Rattlesnake Creek residential area (segment 116) and down Miller Creek and across the Bitterroot River (segment 139) are two specific sites which have been studied in depth (see Appendix E: UNDERGROUND TRANSMISSION SYSTEMS). However, at these two sites--and possibly similar sites in this study area--the tradeoffs for reduced social and esthetic effects involve greatly higher costs and technical feasibility problems due to geological stability problems, as discussed in greater detail below.

Undergrounding of a 500-kV line could be considered only in special circumstances, because there is a tremendous increase in cost over the more usual overhead design and because experience with underground cables of this size and voltage is very limited. A 500-kV underground line costs between 12 and 15 times as much as an overhead line. For the double-circuit design, this may be as much as 12-15 million dollars per mile. In addition, there is less than 10 miles of 500-kV underground line operating in the world. Most of it is for special applications and has less than 10 years of operating history (Pachot 1981, personal communication). Although operating history has generally been good, the long-term reliability is unknown.

Impacts on social, natural, and cultural resources would occur with undergrounding. A major positive social impact would occur through the absence of visible transmission lines and through the reduction of numbers of aboveground towers. Visual exposure would be reduced, particularly where no tree clearing would be involved. The primary visual impacts of underground transmission lines are related to above-ground support facilities. Although they could be visually imposing in both developed and rural areas, they are fewer in number and more easily screened. Areas of natural beauty would appear relatively undisturbed to many viewers; areas already compromised by urban clutter or by existing transmission lines would be less positively affected. There would be short-term visual disturbance during construction which would be equivalent to that for a pipe-laying project involving trenching.

However, trenching would create more temporary disruption in settled areas than would construction of overhead lines. Digging equipment and blasting, should rock be encountered, would create additional noise during construction. There may also be temporary interruptions of utility services and delays to vehicle traffic and pedestrians.

Prehistoric and historic sites could be far more seriously disrupted by undergrounding than by conventional above-ground construction. Any sites which could not be avoided would have to be salvaged, as trenching would destroy any artifacts encountered.

Construction and presence of the line, as well as potential failures of the system, could seriously affect the surrounding natural environment. Trenching removes all vegetation, including roots, from the underground cable right-of-way. Steep or rocky terrain must be substantially regraded, further destroying vegetation and wildlife habitat. The trench must often be refilled with special material that will conduct heat away from the line; such material often contains less oxygen and thus would affect the number and kinds of plants able to reestablish footholds in the disturbed area, as well as the speed of recovery (Dames and Moore 1981). The heat from the cable may also have minor stressful effects upon returning vegetation. No trees or deep-rooted plants can be permitted to grow in the right-of-way.

Water resources such as rivers, wetlands, or floodplains can experience significant environmental damage from an underground system. Where cable is laid in river bottoms, substantial sediment disturbance may occur from trenching and backfilling techniques, with a strong negative effect on aquatic ecology (particularly on spawning grounds). Heat from cables may be easily dissipated in free-flowing water, but through standing water (i.e., wetlands), the heat would stress vegetation (Dames and Moore 1981).

Damage may also be sustained if the cable should suffer a slow oil leak which may continue undetected for some time. Although most oils used in underground cables are biodegradable, leaked oil could smother vegetation, coat waterfowl, and impair fish respiration. Oil pressure is maintained at 15-60 pounds per square inch in the self-contained, oil-filled cable. Spills might then range from 1 to 150 gallons per hour (Pachot, 1981). Although the risk of oil spills is generally low, it is somewhat greater in developed settings where workers are more likely to be digging. These are the settings with the greatest potential for esthetic impact from a spill. Repair work could also result in temporary visual disturbances (Dames and Moore 1981). The dangers of such leaks are increased by the relatively greater amount of time needed to find and repair failures in underground than in overhead systems.

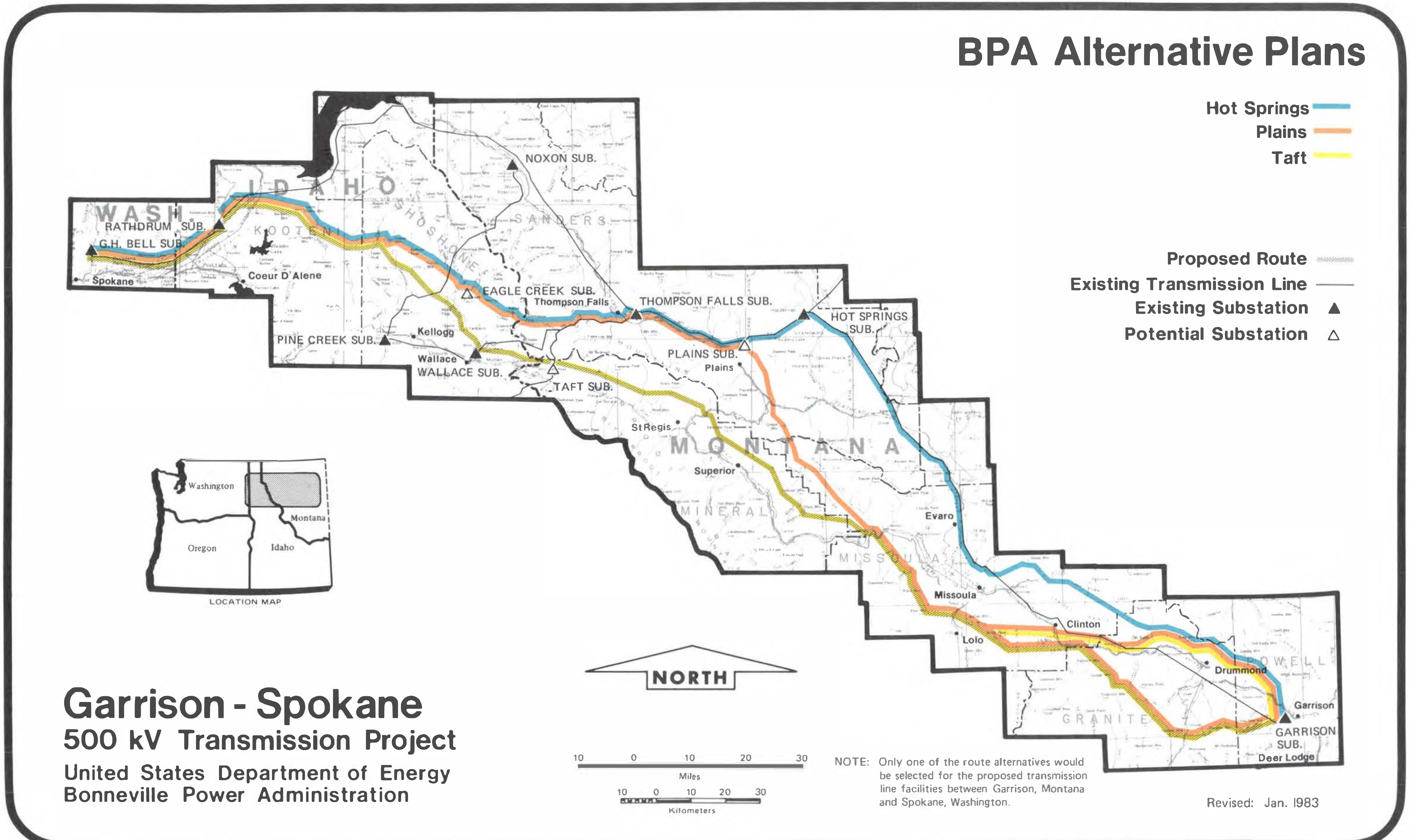
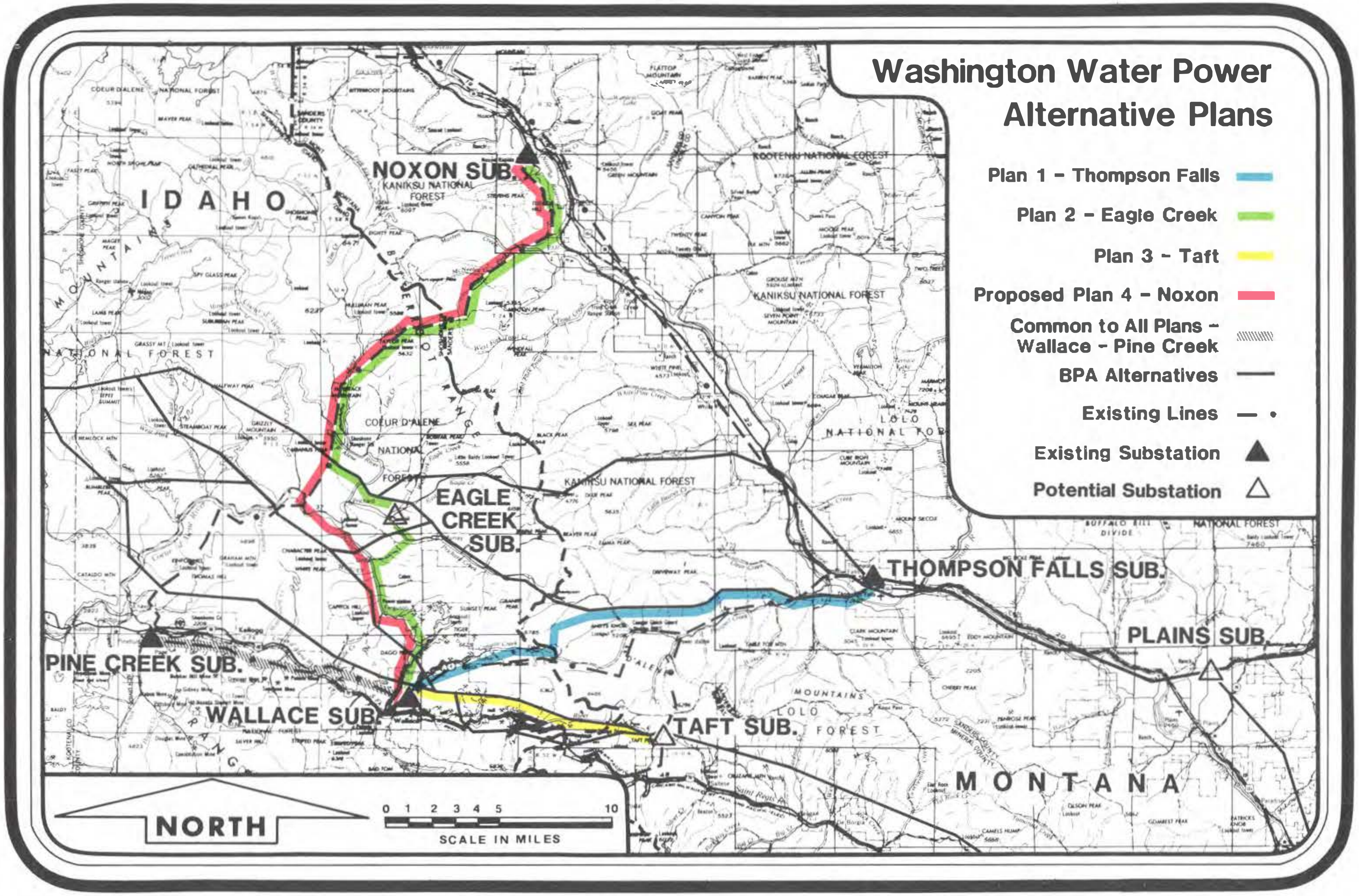


Figure 2.1
Garrison - Spokane Project



Revised: Jan. 1983

Figure 2.2
Garrison - Spokane Project
76-6

Tower Designs

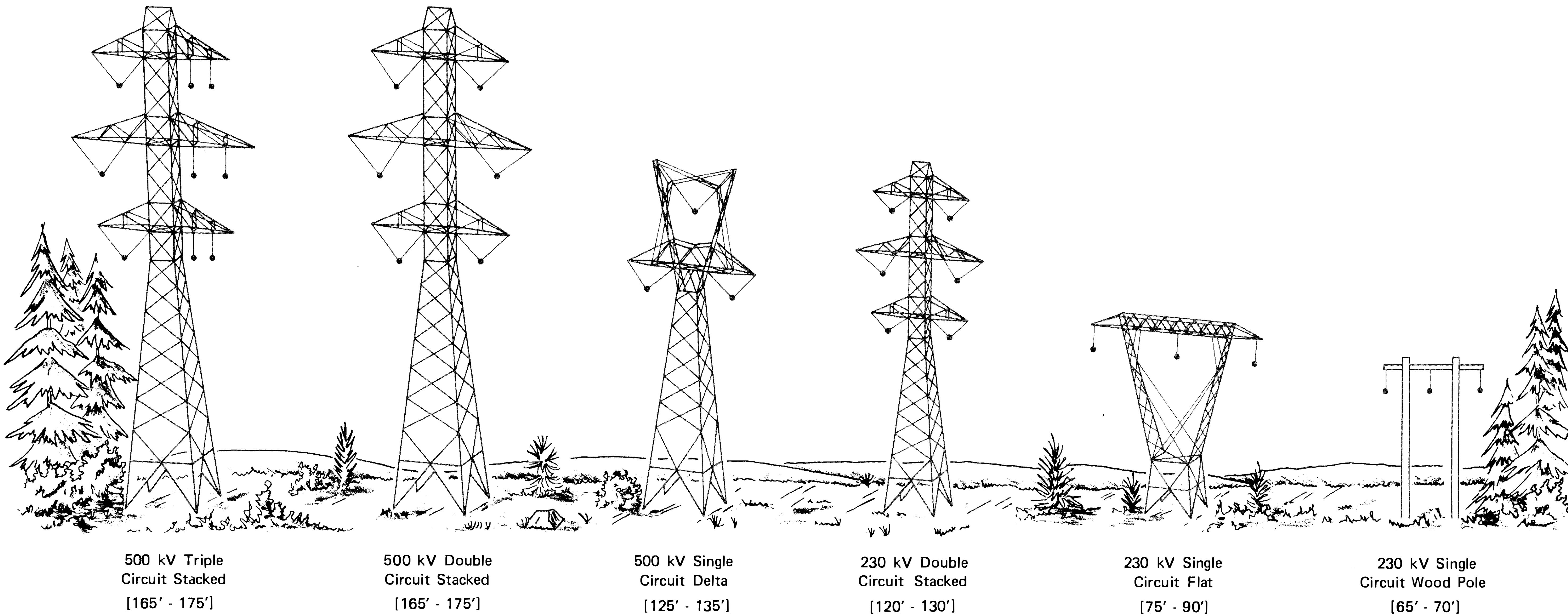


Figure 2.3
Garrison-Spokane Project
76-6

IMPROVED APPEARANCE
500- kV DESIGN CONCEPTS

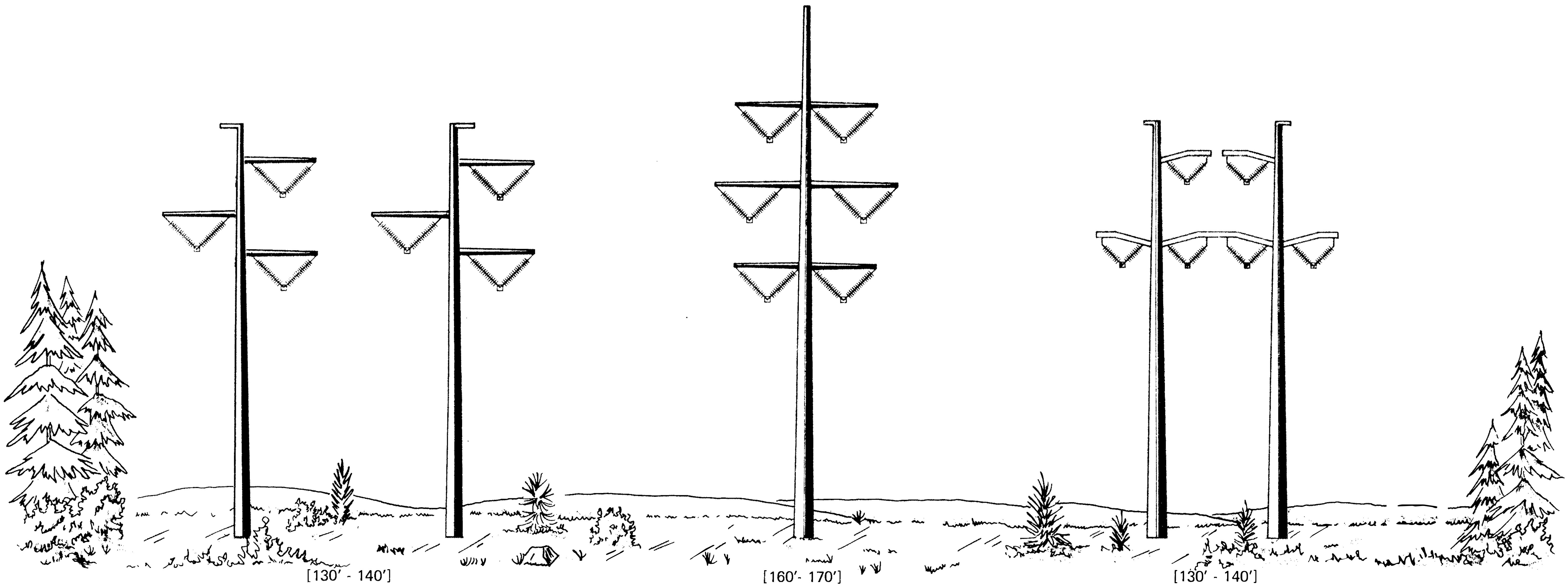


Figure 2.3
Garrison-Spokane Project
76-6

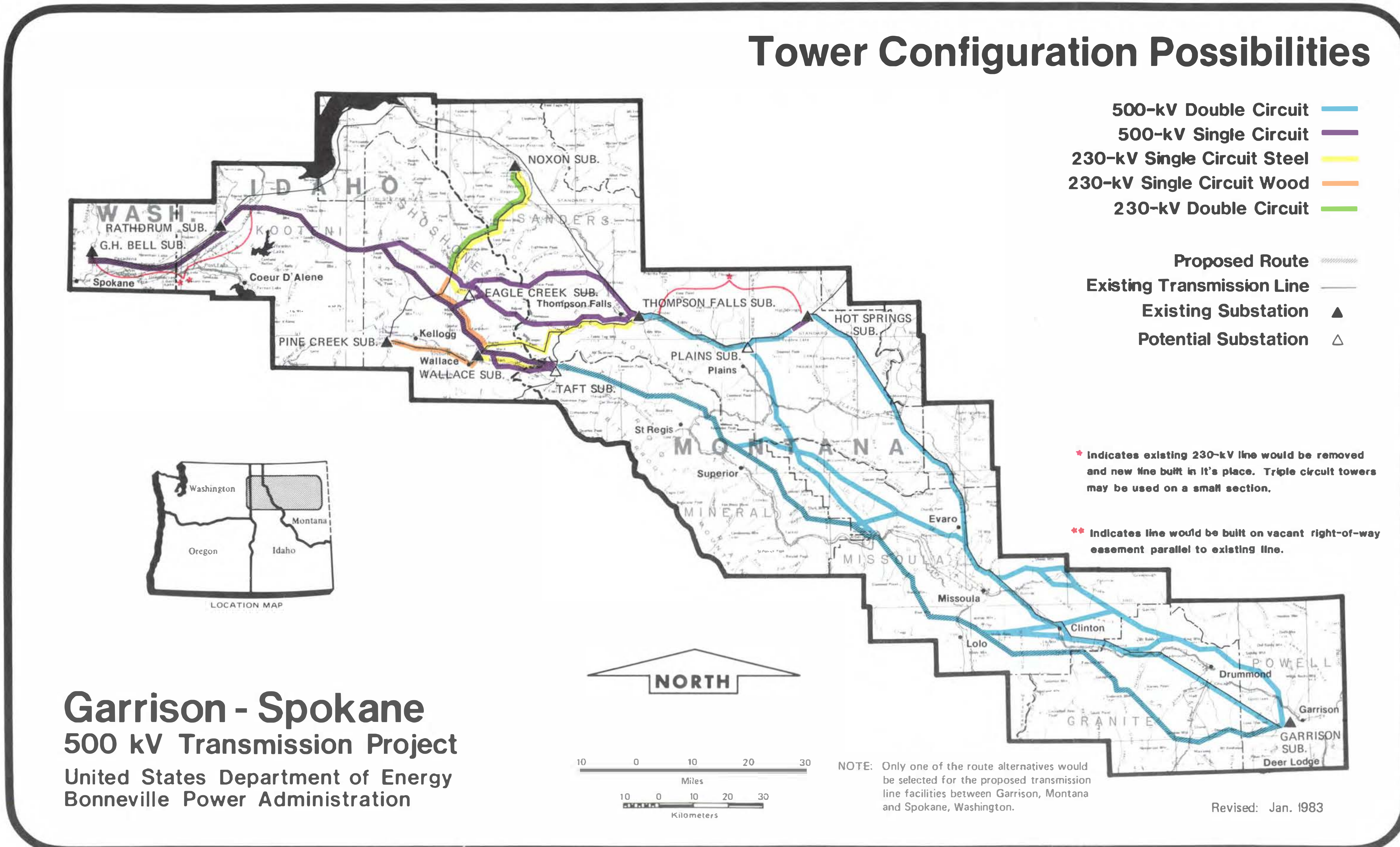
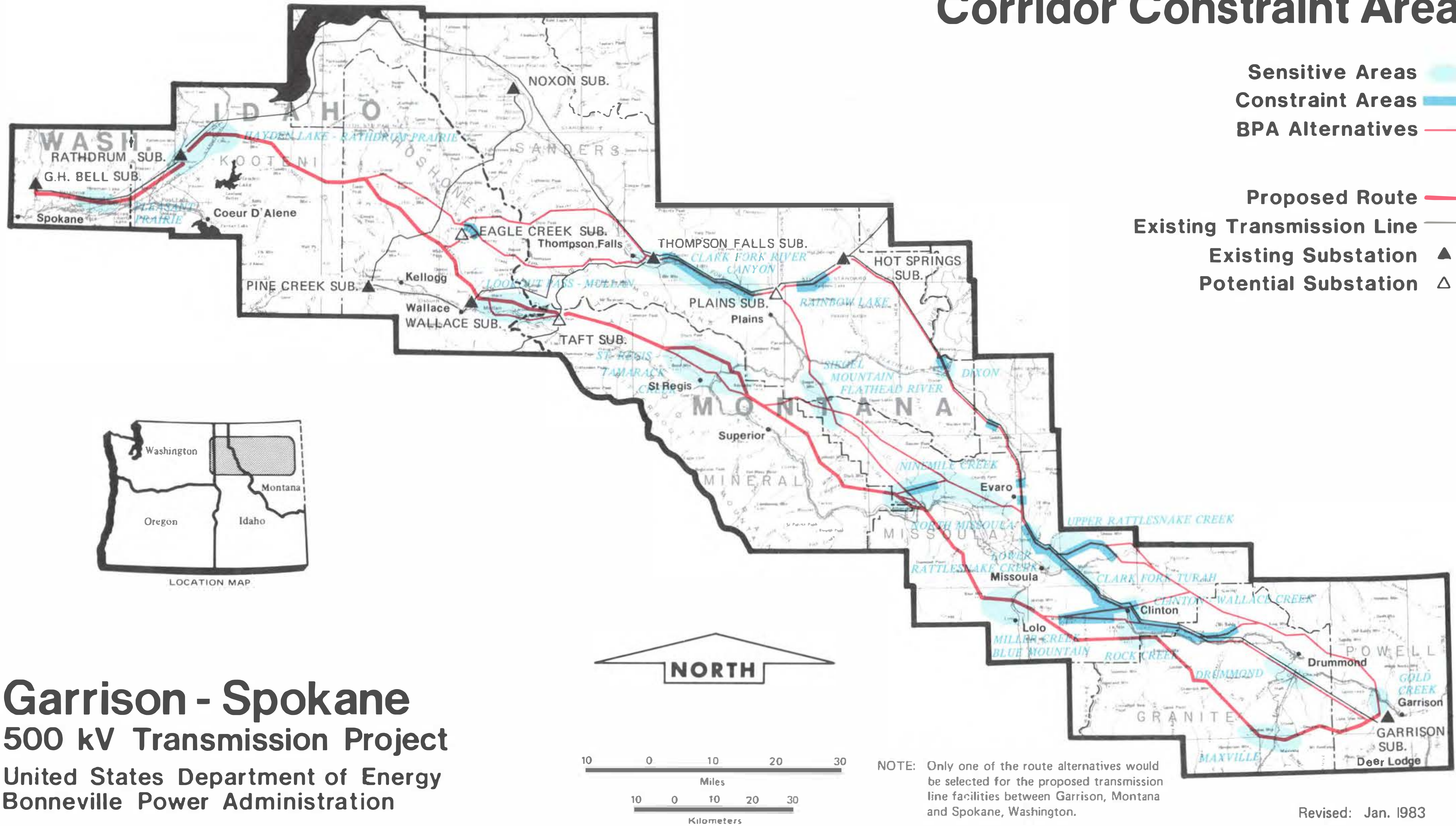


Figure 2.4
Garrison - Spokane Project
76-6

Environmentally Sensitive and Corridor Constraint Areas



Garrison - Spokane

500 kV Transmission Project

United States Department of Energy
Bonneville Power Administration

NOTE: Only one of the route alternatives would be selected for the proposed transmission line facilities between Garrison, Montana and Spokane, Washington.

Revised: Jan. 1983

Figure 2.5
Garrison - Spokane Project

Affected Environment

AFFECTED ENVIRONMENT

This chapter succinctly describes the resources that could be affected by the proposed transmission lines between western Montana and Bell Substation, northeast of Spokane, Washington. The ENVIRONMENTAL CONSEQUENCES chapter and APPENDIX C: MAP VOLUME contain additional resource information.

The study area extends west from Powell County, Montana, and includes portions of Granite, Missoula, Mineral, Lincoln, Sanders, and Lake Counties. It encompasses parts of Bonner, Shoshone, and Kootenai Counties in Idaho, and Spokane County in Washington (fig. 3.1). The area lies entirely within the northern Rocky Mountains, and contains some of the major viable east-west corridors through the mountains for such linear facilities as railroads, highways, pipelines, and transmission lines.

Plans and laws guiding and governing land use development exist at the Federal, State, and local level within the study area. Lands administered by the National Forest System and by the Bureau of Land Management fall under provisions of the National Forest Management Act and of the Federal Land Policy and Management Act. The Forest Service Northern Region Plan (1980) states that the objective of the land use part of the program is to ensure that National Forest Service land can be used for transporting the nation's energy resources (such as electricity or oil) as well as communications and general transportation. The proposed transmission line is consistent with this objective. The proposed action could also be accomplished within land use plans of the Bureau of Land Management.

At the State level, both Washington and Montana have laws governing the siting of major facilities such as transmission facilities. The States have sought to require that BPA transmission line projects be subject to these Acts. BPA, however, under the current court interpretations, is prohibited under the U.S. Constitution from being bound by these provisions without Congressional authorization. The lack of Congressional authorization was reaffirmed by two Federal court decisions after the draft EIS was issued. (For further discussion of this concern, see "Recent Issues" in Background of the Project, Chapter I. APPENDIX B also contains an index correlating environmental features of Siting Acts with analyses contained in this document.) The Washington Water Power Company, a private concern, would not be exempt from the provisions of these Acts.

At the local level, only Spokane County, in its Generalized Comprehensive Plan, directly addresses the siting of utility corridors. The Spokane Plan, with those of the other affected counties, primarily addresses land uses such as agriculture, forestry, recreation/scenery/open space, and future residential development (see table 4.1). Although Mineral County has completed a land capability study, that study does not present any land use goals or objectives. Such goals and objectives in other plans generally specify that attributes of that particular type of land use--such as agriculture or forestry--are to be protected, their continuation encouraged, and/or their diminishment discouraged. These goals correlate very closely with the evaluation criteria developed for this proposal (see Chapter I). As such, the proposed action would be developed in a manner consistent with the land use plans as much as possible.

The landscape of the study area is one of major mountain ranges dissected primarily from northwest to southeast by the valleys of the Clark Fork, Coeur d'Alene, Flathead, Bitterroot, St. Regis, and Blackfoot Rivers and their numerous tributaries. Rugged mountains, broad and narrow valleys, lakes, and rivers offer unique, high quality visual experiences in the study area. (Figures 3.2-3.3 offer photographs of characteristic landscapes--mountains, rivers, and valleys--and of specific areas such as Kellogg, the Clark Fork Valley, and the Rathdrum Prairie; fig. 3.4 presents sketches of what transmission lines might look like in some of these landscapes. See also figure 4.9 in ENVIRONMENTAL CONSEQUENCES for maps indicating variations in visual quality.) 1/

The Clark Fork, largest of the several rivers, forms a highly scenic valley dramatically defined by steep, rugged rock walls along the lower portion and by broad open basins along the upper portion. The upper reaches of the Coeur d'Alene River, designated in a potential State of Idaho Wild and Scenic River System, is narrower and much more primitive. The North Fork of the Coeur d'Alene, listed in a Nationwide Rivers Inventory, may become part of the National Wild and Scenic River System. (For extent and locations of recreational facilities within the study area, see figure 4.5 in ENVIRONMENTAL CONSEQUENCES.)

The Rattlesnake drainage, north of Missoula, has been designated in part as a National Recreation Area administered by the Forest Service (Lolo National Forest), protecting it against non-recreational development. Plans for its administration are not expected to be completed for two years; transmission lines are not specifically prohibited by the law establishing the Rattlesnake National Recreation Area and Wilderness. Part of the Rattlesnake, a scenic portion of the Rock Creek drainage, and the Welcome Creek drainage have also been designated as Wilderness areas. The Hoodoo Mountain and Gallagher Creek areas are currently under study for classification as Wilderness also. Other mountainous areas, extensively logged, are less scenic. However, they offer striking backdrops to Pend Oreille, Coeur d'Alene, and Hayden Lakes, three of the largest and most beautiful in the study area.

1/ Maps bound into the body of the EIS are selected from an extensive MAP VOLUME APPENDIX (APPENDIX C). They illustrate a variety of resource measures discussed above and evaluated in Chapter IV, ENVIRONMENTAL CONSEQUENCES. Such resources include topography (including elevation), areas of geologic difficulty, special water features, vegetation, big game habitat, endangered and threatened species habitat, waterfowl concentrations and other special wildlife features, land use and land cover (including agriculture and forestry), recreation features, historic and archeologic resources, transportation and utilities, land ownership, urban and residential development, land productivity, and measures of visual quality, visual compatibility with the line, and viewer sensitivity.

Far more heavily disturbed is the Kellogg Valley, with its sparse tree cover. Intensive mining and smelting activities in the Kellogg area (fig. 3.3) have dominated most of the usable land. The narrow valley also includes much residential development, transmission lines, and a stretch of the Coeur d'Alene River.

Major cultural and service centers within the study area include Missoula, Montana (pop. 38,844), Spokane, Washington (pop. 175,000), and Coeur d'Alene, Idaho (pop. 17,879), which account for 40 percent of the population. Cities such as Kellogg, Idaho, with a population of over 1,000, are generally concentrated along U.S. Interstate 90, which runs southeast to northwest, from Deer Lodge through Missoula and Coeur D'Alene to Spokane. Smaller communities or individual residences account for 47 percent of the population, and are found within intermountain basins and along valley bottoms.

The area's population grew significantly in the last two decades (see table 3.1). Population increased seven percent in the 1960's, to 450,253. Growth occurred almost exclusively around the major trade centers. Population growth in the seventies (25 percent; to 562,074) was both greater and more widespread. Almost half of that growth occurred in the last three years. This accelerated growth can be partially attributed to new job opportunities and to the area's scenic beauty and consequent desirability as a destination for retirees.

Land ownership and land uses vary from west to east across the study area (each measure is depicted in figures 4.2 and 4.3). Most land in the western portion is publicly owned: the Forest Service oversees the majority (three million acres), and States and counties own smaller tracts. The Bureau of Land Management administers additional lands in the study area. Private lands, other than timber company property, are primarily restricted to river valley bottoms. The Confederated Salish and Kootenai Tribes and individual Indians own lands in trust status within a large tract (the Flathead Indian Reservation) in the north-central part of the study area. Such trust lands fall under jurisdiction of the Bureau of Indian Affairs. Non-Indian land ownership accounts for approximately one-half of the Reservation land.

In 1980, 10 National Forest units accounted for 45 percent of the study area's land use. Such units typically encompass mountainous areas and are managed for timber production, watershed, rangeland, wildlife, and recreational land uses. Forest productivity is generally high in the western portion of the study area, except in the drier westernmost edge; it diminishes to low in the east. Figure 4.4 illustrates areas of high, low, and moderate forest productivity.

Toward the eastern portion of the study area, the amount of public land decreases and private ownership, particularly for timber tracts and agriculture, increases. Agricultural land, consisting of dry and irrigated cropland and rangeland, occurs primarily along wider valley bottoms such as the Clark Fork and Flathead and on Rathdrum Prairie. Small-scale irrigation is most prominent in the Rathdrum Prairie, in the Hot Springs, Dixon, and Arlee vicinities on the Flathead Indian Reservation, near Missoula, and in the

Drummond and Deer Lodge areas to the east of Missoula. Although only a small portion of land is agricultural cropland, it is highly important to the farming/ranching enterprise. Agricultural managers are sensitive to any development that removes land from production or interferes with agricultural practices and improvements. Of particular concern is irrigated cropland, as transmission line placement could make overhead irrigation systems impractical or could make a redesign of the system necessary.

Urban and residential land uses have historically been confined to areas near cities but have recently expanded into several intermountain valleys in the study area. While rural residential development occasionally takes the form of concentrated subdivisions, most of it occurs in 5- to 20-acre parcels that have been sold from larger agricultural or forestland holdings.

Economic activity across most of the study area is strongly related to the natural resource base, which supplies opportunities for agriculture, timber harvesting, and mining, and to the land ownership and related management goals and policies of Federal, State, or private owners. Powell County, which incorporates large portions of timber and grazing land, has seen reduced economic activity with the closings of rail centers in Deer Lodge and of the Cominco American Phosphate mine. The timber industry, though depressed, still strongly supports the County economy, along with agriculture. Granite County, which also includes some mining activity, depends for 37 per cent of its total earned income on agriculture, especially on cattle ranching.

Missoula County, with a regional trade center in the city of Missoula, depends on manufacturing, particularly of wood products from surrounding timberland, for 23 per cent of its earned income. Construction, trade, and service sectors are also important for the area. Lake County, incorporating much forestland and a substantial percentage (18 percent) of mostly irrigated cropland, is preeminent in agriculture, although lumber/wood products are important and tourism has increased growth in both trade and service sectors.

Federal or State sources own 55 per cent of Sanders County, primarily in forest lands. Its economy is dependent upon agriculture and the wood products industry. With portions of the County (12.7 percent) administered by the Federal Government as a Reservation for the Confederated Salish and Kootenai Tribes, and 11.3 percent owned by private corporations, little of the county is in individual ownership.

In heavily forested Mineral County, nearly half of the earned income was from the wood products industry. However, the Clark Fork Valley with its transportation corridor has seen an increase in trade (especially related to tourism) and in government employment (accounting for 31 percent of 1979 employment).

Shoshone County, similarly comprised of forested mountains interrupted by the Coeur d'Alene River valley corridor, is heavily dependent upon mining and the wood products industry. Kootenai County, by contrast, has experienced an increase in population and corresponding increases in a greater variety of employment sectors, particularly in services, trade, industries, and tourism

TABLE 3.1 - Population and Labor Force Characteristics

County	Population 1960	Population 1970	Population 1980	Area (Sq. Miles)	1980 Population Density (Persons/Sq. Mile)	1980 Labor Force Characteristics: Labor Force	Participation Rate 1/ (percent)	Employment	Unemployment Rate (percent)
Montana									
Powell	7,002	6,660	6,958	2,336	3.0	3,328	47.8	3,131	5.9
Granite	3,014	2,737	2,700	1,733	1.6	1,138	42.1	1,052	7.6
Missoula	44,663	58,263	76,016	2,612	29.1	36,177	47.6	33,666	6.9
Lake	13,104	14,445	19,056	1,494	12.8	7,965	41.8	7,398	7.1
Sanders	6,880	7,093	8,675	2,778	3.1	4,029	46.4	3,655	9.3
Mineral	3,037	2,958	3,675	1,222	3.0	1,787	48.6	1,600	10.5
Idaho									
Shoshone	20,876	19,718	19,226	2,609	7.4	8,061	41.9	7,639	5.2
Kootenai	29,556	35,332	59,770	1,249	47.9	27,178	45.5	24,860	8.5
Bonner	15,587	15,560	24,163	1,733	13.9	10,092	41.8	9,002	10.8
Washington									
Spokane	278,333	287,487	341,835	1,758	194.4	146,600	42.9	135,400	7.6
REGIONAL TOTAL	422,052	450,253	562,074	19,524	28.8	246,355	43.8	227,403	7.7

Sources: U.S. Department of Commerce, Bureau of the Census, Census of Population, 1960, 1970, 1980; Idaho Employment Security Division, Bonner, Kootenai, and Shoshone Counties Labor Force Information, 1980; Montana Employment Security Division, Montana Employment and Labor Force, 1981; Washington Employment Security Division, Annual Average Washington State Resident Labor Force and Employment by Labor Area, 1980.

1/ Proportion of the population in the labor force.

in the lake region. Elsewhere, the more traditional reliance on agriculture and wood products industries is seen.

Bonner County, also growing in population, is shifting from dependence on timber and agricultural sectors to manufacturing, which represented 35 percent of total earned income in 1979. Spokane County, a regional trade center, similarly relies heavily on trade and manufacturing for economic activity, as agricultural land around the growing city of Spokane is gradually being transformed into suburban, semi-rural, and commercial land uses.

The 1980 labor force in the study area was 246,355 persons. Average unemployment rate was 7.7 percent, although unemployment rates vary substantially among the counties, from 5.2 percent in Shoshone County, where the economy is heavily dependent on mining, to over 9 percent in Sanders, Mineral, and Bonner Counties, where the economies are dependent on the timber industry. 2/ In 1979, per capita incomes in the study area ranged from $5,782 to $8,435. Table 3.1 presents population and labor force characteristics.

In the agricultural sector, the number of farm proprietors has been declining slowly over the 1970's, paralleling the national trend toward fewer, larger, and more productive farms. Montana's agriculture is its largest single business. Although employment of farm laborers and agricultural service workers increased slightly overall, total agricultural employment declined by 2 percent from 1975 to 1979 (when the 7,324 agricultural workers represented 3 percent of total employment) because numbers of farm owners declined. The study area's primary agricultural products are wheat, hay, alfalfa, barley, and beef cattle.

Manufacturing is diversified in Spokane and Kootenai Counties, but the timber industry is almost the sole manufacturing activity in the remaining counties. That industry typically accounts for 10 to 15 percent of total county employment, yet its relatively high-paying jobs frequently account for 20 to 30 percent of the counties' total earned income. Timber industry employment is generated by logging camps and contractors and by lumber mills and wood-processing plants that produce lumber, pulp and paper, plywood, laminated beams, paneling, wood chips, and a variety of other wood products.

Mining employment exists in several of the study area counties but is dominant only in Shoshone County, Idaho, where it accounts for 28 percent of total employment and 50 percent of total earned income. Shoshone County's mining sector produces lead, silver, and zinc and is important to the study area because many of its employees live in adjacent counties.

In the late 1970s, the study area's population-serving sectors also realized significant employment increases. Construction, spurred by residential demand, grew by 53 percent between 1975 and 1979. In 1979, it accounted for 5 percent

2/ Employment in these counties tends to depend on market conditions for the commodity produced; the recent shutdown of Bunker Hill mining operations, for example, will continue to affect the unemployment rate in Shoshone County.

of total employment and about 10 percent of total earned income. The region's employment in the trade and service sectors experienced 31 and 24 percent growth, respectively, over the 1975 to 1979 period. By 1979, these two sectors accounted for a combined share of 40 percent of total study area employment. This large share is due primarily to local demands for goods and services, but it also results from the region's popularity as a tourist area.

A substantial attraction of the area is its range of opportunity for outdoor recreational activity. Three large lakes and many smaller lakes, rivers, and streams provide opportunity for recreational water sports and fishing. Several campgrounds, parks, boat ramps, and ski areas exist within the study area. The forest provides opportunities as well for hiking, hunting, berry-picking, snowmobiling, and cross-country skiing. The Rattlesnake National Recreation Area, Rock Creek, and the Blackfoot Recreation Corridor offer particularly important recreation opportunities within the study area.

Social conditions in the areas are characterized by four important factors: (1) the small town and rural environment in which nearly half of the population resides; (2) the scenic qualities of much of the area; (3) the importance of agricultural and forest resources and recreation activities; (4) the presence of the Confederated Salish and Kootenai Tribes, Federally recognized Tribes vested with important land use controls, including access to or right-of-way across the Reservation.

There is a strong local interest in preserving the rural lifestyle and scenic values of the countryside. Such environmental awareness comes from long-term agricultural residents of the area who perceive development as a threat to agricultural lifestyles, from long-term local residents who have committed themselves to the area despite economic downturns, and from new residents who have moved to the area because of its scenic beauty, attractive climate, and variety of recreational opportunities.

Many individuals cherish their somewhat remote environment and are concerned about the visual effects, land value impacts, and long-term implications of development. These concerns are most evident in western Montana. Special interest groups have formed to resist or attempt to influence development. Some groups are organized around concern over development impacts on residential or agricultural land uses in a particular area. Others, like the Clark Fork Basin Protective Association, represent a variety of interests.

Natural resources which could be affected in the study area include wildlife, vegetation, air quality, water, and soils. Wildlife species highly concentrated in certain areas or with restricted habitat are most likely to be significantly affected by transmission line facilities. (Figure 4.6 indicates geographical concentration of waterfowl and big game and habitats of bald eagle, grizzly bear, and osprey; figure 4.7 indicates special game management areas and high value fishery streams.) Osprey have specific habitat requirements; waterfowl, protected by Federal- and State-designated areas for their management, also require a specific habitat. The upland sandpiper is of importance, as the only known nesting colony in the Pacific Northwest occurs near the community of Moab, Washington. The bald eagle (Endangered species) and grizzly bear (Threatened) are important because of low population levels (Endangered Species Act, 1973) and specific habitat requirements. A BPA Biological Assessment had determined that this project will cause no adverse effects on these species; the U.S. Fish and Wildlife Service has concurred with these findings (February 18, 1982; May 25, 1982).

Big game species such as bear, elk, deer, and moose, as well as many non-game species, occupy a variety of habitat types throughout the project area. Sensitive areas (e.g., elk and deer critical winter range) are defined by slope, aspect, cover, available forage, and freedom from disturbance. Bighorn sheep and mountain goat occur in isolated groups and have more geographically restricted habitat. Their distribution is further limited by low population levels.

Study area vegetation is mixed conifer forest on mountainous or sloping terrain, grading into open land (range or cultivated) on valley bottoms and plains in the eastern portions of the study area. Agriculture occupies relatively little land. Certain soil units in the Rathdrum Prairie and in the Missoula, Drummond, and Deer Lodge areas have been classed as Prime Farmland or Farmland of Statewide Importance (Washington, Montana).

No listed Endangered or Threatened plant species appear in the study area. One candidate species, Silene spaldingii (Spalding's campion), is known to occur in the Hot Springs area but has not been found along the route corridors. Phlox missoulensis (phlox; wild sweet-william), Trisetum orthochaetum (trisetum), Tofieldia glutinosa (western tofieldia), and Steironema laevigatum (fringed loosestrife), are also important because of their low numbers, but are not candidate or listed species.

Water resources may also be affected by the proposed project. Most sensitive to potential impact from temporary sedimentation during construction would be streams rated high in value as fishery resources, and streams within municipal watersheds. The Hayden Creek drainage has been identified as important spawning habitat for westslope cutthroat trout. Numerous floodplains occur within the area, but few would be subject to the effect of any development. (Figure 4.14 shows the location of such floodplains and potential location of transmission towers near or within them.) Localized wetland areas, generally associated with many rivers and streams, have not yet been inventoried by the U.S. Fish and Wildlife Service. The Idaho Department of Fish and Game manages one area along the Coeur d'Alene River, southeast of Lake Coeur d'Alene, for waterfowl production.

Air quality in forested areas is generally high. Eastern and east central portions of the study area have received Class I Air Quality designations for maintenance of unusually pristine air conditions. Other areas are under consideration for such designation.

Physiographically, the study area consists of mountains separated by broad intermontane valleys. The geology is extremely complex, giving rise to a broad range of bedrock types, parent materials, and soils, and thus to corresponding problems with erosion or mass movement hazards. Soils developed on glacial lake deposits and those having a high clay content are particularly susceptible to these hazards. Deposits of these materials are present on foothills and terraces throughout the study area. Extensive areas of these problem soils occur in the foothills north of the Clark Fork River, from East Missoula to Ninemile Creek, in the Douglas Creek and Potomac areas, and in the lower Flathead and Little Bitterroot Valleys. Extensive problem areas also exist near Gold Creek, where soils have developed on extrusive volcanic deposits.

Much of the high mountainous portions of the study area represents terrain barriers. The high mountains (Bitterroot Range) bordering the Clark Fork south of Superior and St. Regis and the mountains from the confluence of the Flathead and Clark Fork Rivers toward the northwest of the Montana-Idaho border (Cabinet and Coeur d'Alene Ranges) are all terrain barriers. (Figure 4.8 shows all gradations of elevation within the study area.) Terrain in these areas is typically rugged, with steep slopes and exposed bedrock. Erosion and slope instability problems are possible wherever there are unconsolidated deposits and deeply weathered limestone or granitic bedrock in these mountainous areas.

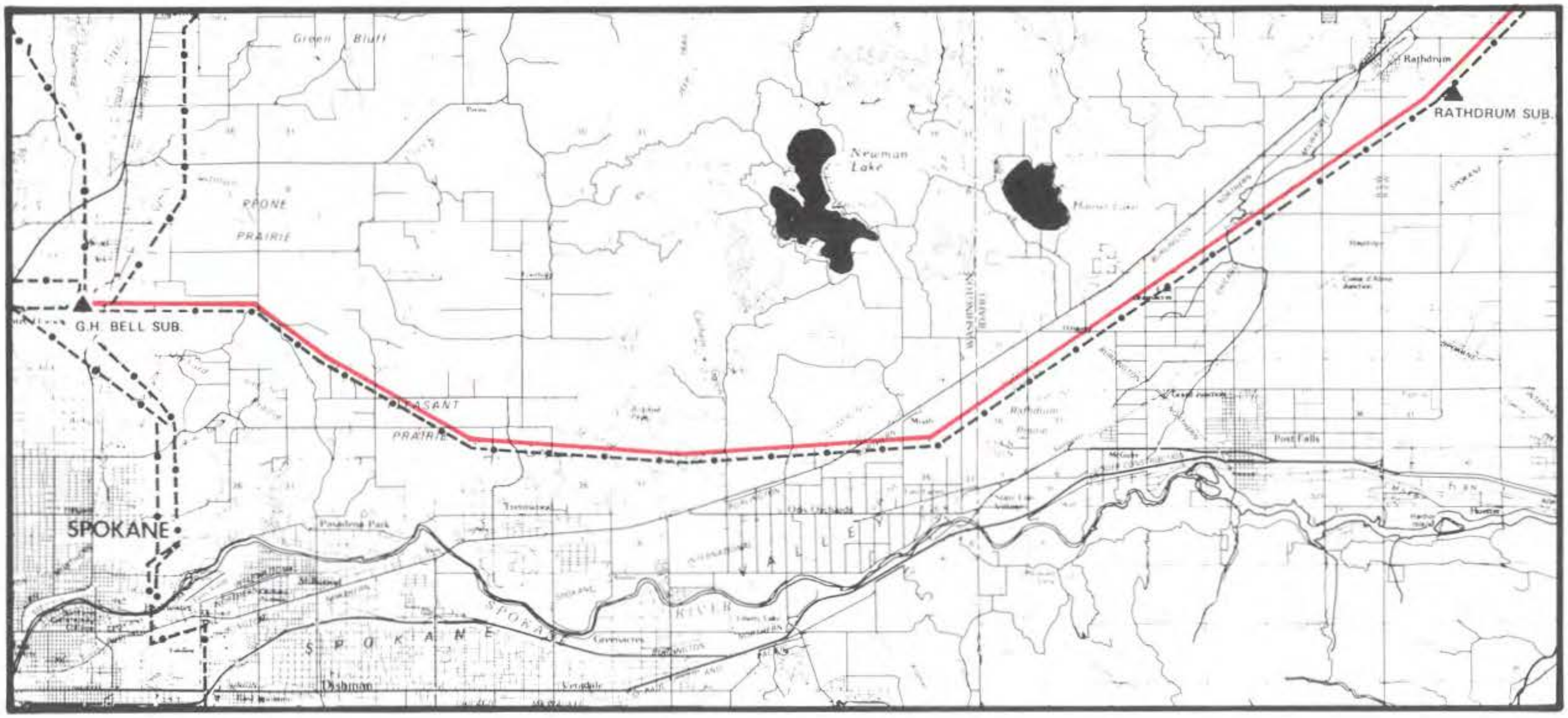
Very little of the study area has been inventoried for prehistoric resources: only a few small sections of the Clark Fork, Little Bitterroot, Flathead, and Coeur d'Alene Valleys have been examined. However, potential for sites can be predicted based on proximity to known use areas, known aboriginal land and resource use practices, and knowledge of the area's geology, soils, and ecology. Clusters of sites are expected to occur in the lower Flint Creek Valley; near the Garnet range summit and southwesterly along Camas Prairie and the Blackfoot River; in the Rattlesnake area; just north of Miller Creek; in the Bitterroot Valley; in the Flathead Valley above the mouth of the Jocko River; in the Clark Fork Valley near Gold Creek, between Superior and St. Regis, and between Paradise and Thompson Falls, part of the Coeur d'Alene Valley above Cataldo, and the Lookout Pass area. (Figure 4.5 identifies the locations of important cultural resources.) Potential for cultural sites is also good in other valleys, passes, or divides within the study area.

Historic sites--places associated with people or events important in the history of the nation, region, or local area--are associated primarily with mining and settlement activities in the region. Ranger stations, fur trading posts, historic trail remnants, mining ghost towns, and Indian camping grounds have been identified within the study area.

Study Area

Proposed Route —
Existing Transmission Lines -·-
Existing Sub ▲

NOTE: The proposed route parallels an existing utility right-of-way from the vicinity of Chilco, Idaho, into Bell Substation. The line would be built adjacent to a BPA transmission line on an unused vacant right-of-way easement.



NORTH

0 1 2 3 4 5
SCALE IN MILES

Revised: Jan. 1983

Figure 3.1
Garrison-Spokane Project

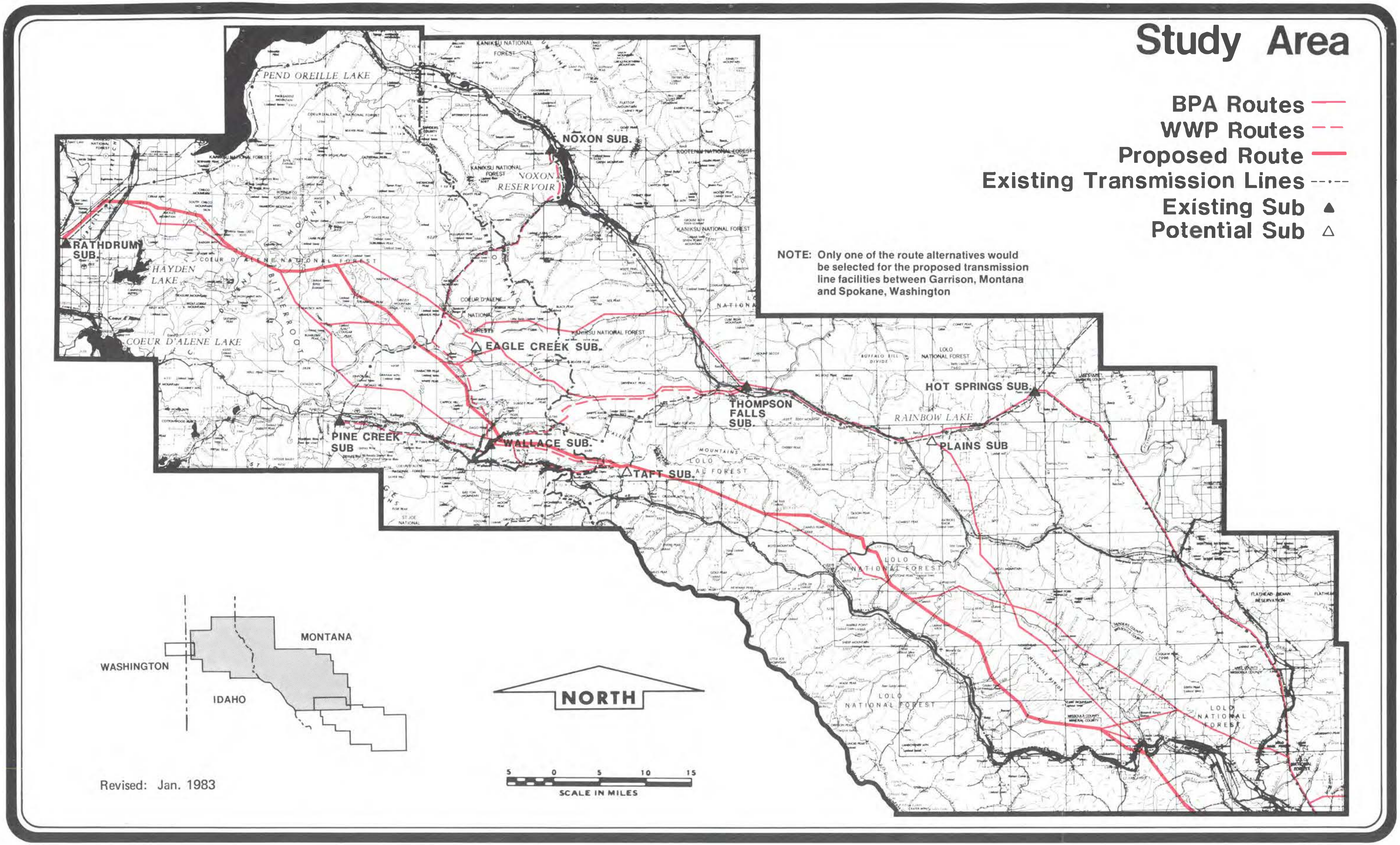


Figure 3.1
Garrison-Spokane Project
76-6

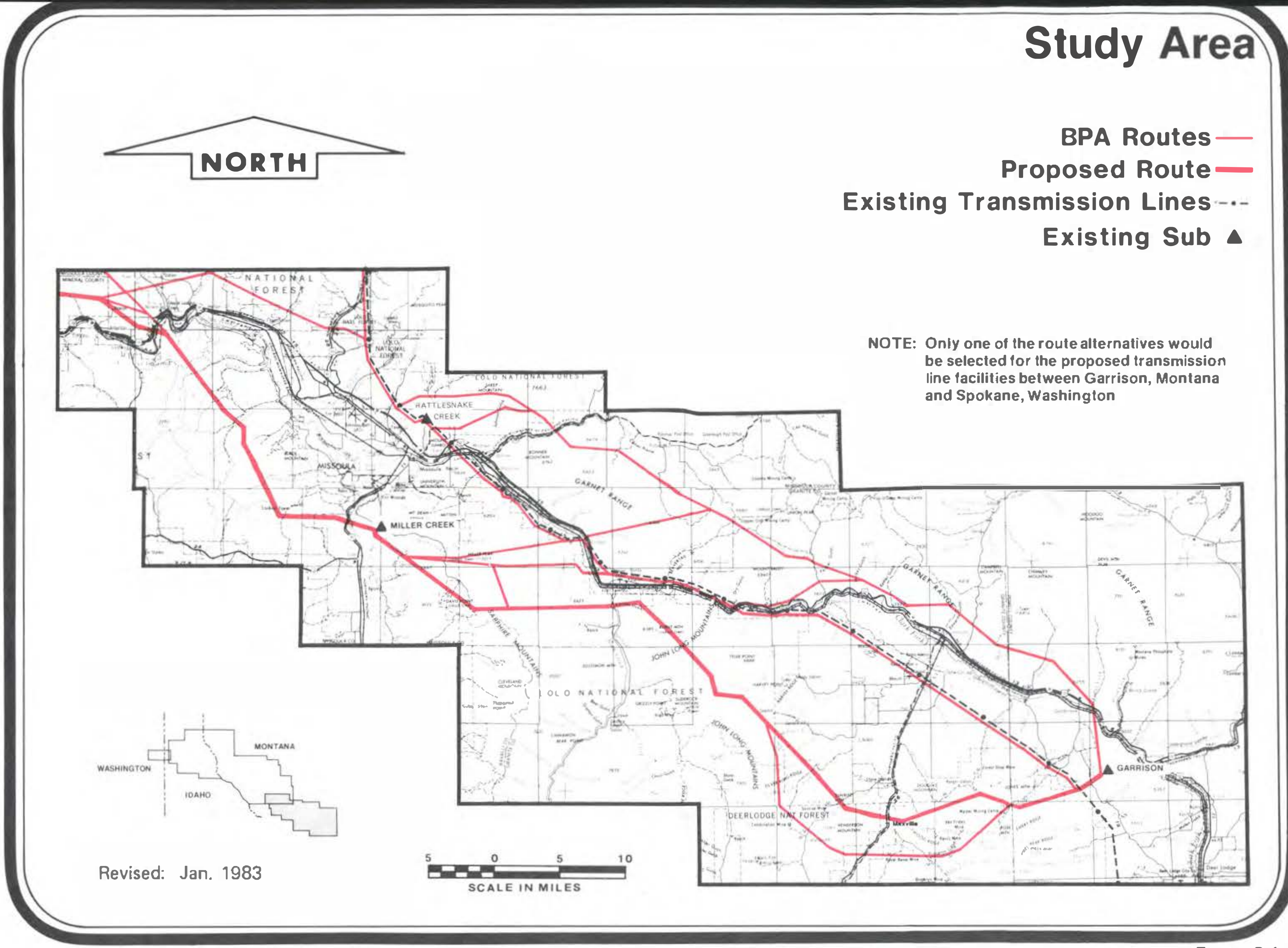
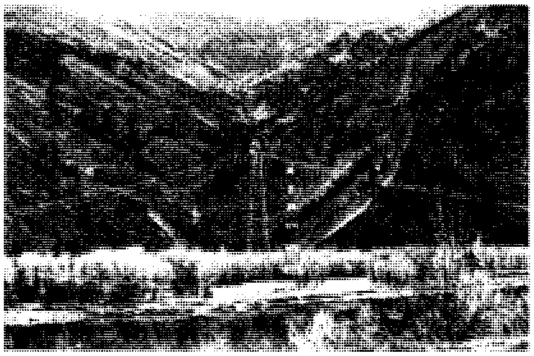


Figure 3.1
Garrison-Spokane Project
76-6



River Crossing

Mountains

Broad Valley

Rolling Grasslands

Forest Land

Mountain Valley

Figure 3.2

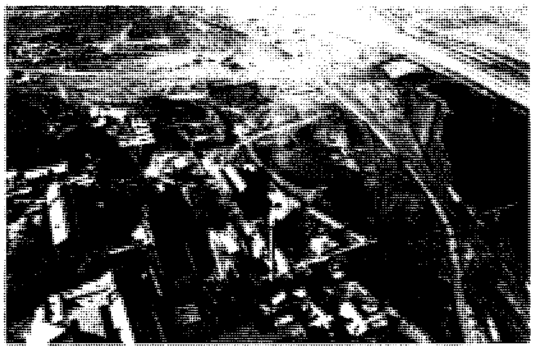
Characteristic Landscapes

Plains

Hot Springs - Ravalli

Clark Fork River Valley

Coeur D'Alene Mts.

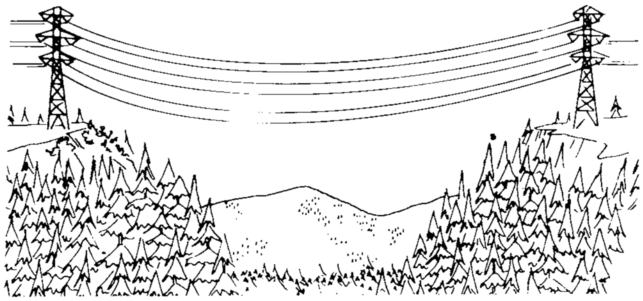


Kellogg

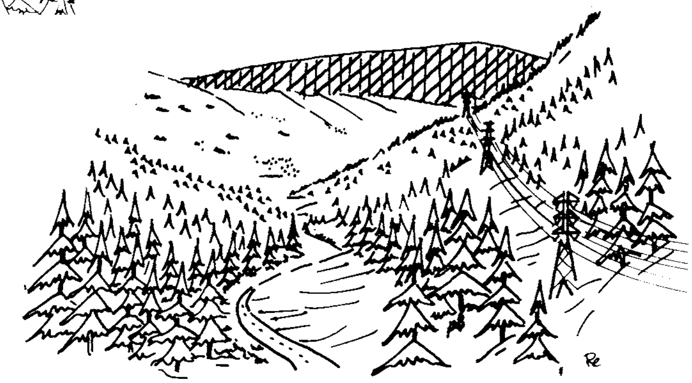
Rathdrum Prairie

Figure 3.3

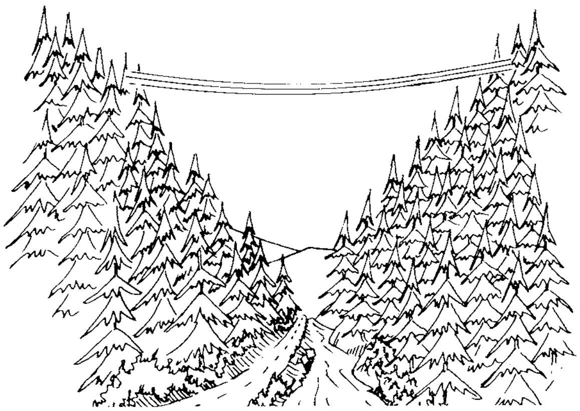
Representative Areas



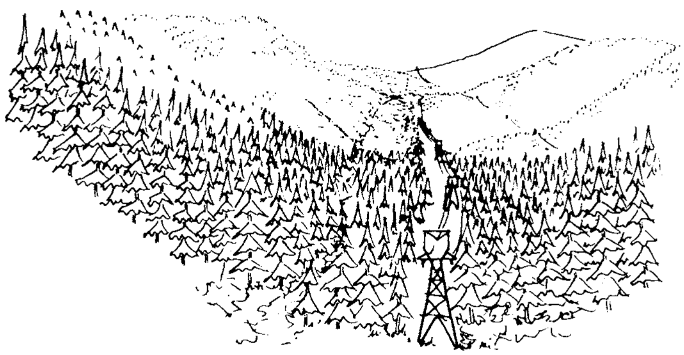
When conductor clearance is sufficient clearing will not be required across canyons.



Deflection in right-of-way alignment allows views along transmission lines for only a short time.



Vegetation will be left at road and stream crossings to provide visual screening and erosion control.



Right-of-way cleared using staggered edges to reduce straight edge (swath) effect.

Figure 3.4

Transmission Lines in Typical Study Area Landscapes

Environmental Consequences

ENVIRONMENTAL CONSEQUENCES

This chapter identifies and discusses the environmental impacts of all considered alternatives. It is divided into three parts. The first part (Introduction of Topics) discusses, by topic, the general nature of impacts to be expected where a transmission line is built. In the second part (Section Discussions), we geographically divide each plan into two major sections and identify noteworthy impacts--those impacts with more serious or notable consequences--and the specific segments where they might occur. Each plan has an eastern section from Garrison to the plan's intermediate substation (Hot Springs, Plains, or Taft), and a western section from that substation to Bell Substation near Spokane. The last part (Consultation, Review, and Permit Requirements) reviews BPA's obligations for consultation and coordination required by law with other agencies for conformance with Executive Orders, permits, licenses, or other environmental requirements.

The chapter uses tables and maps to show statistical and visual data substantiating the narrative. Figure 4.1 diagrams all variations of corridors, routes, and segments for the study area. Other maps (figs. 4.2 - 4.10) illustrate the geographic distribution of resources in relation to the proposed facilities. Table 4.2 indicates activities that may result in impacts and also the likelihood, timing, and duration of those impacts; table 4.3 gives information on the proposed facility types and the amounts of resources they will encounter.

Each plan (A, B, or C) is made up of a group of segments which, in different combinations, allow for a variety of routes between Garrison and Bell. Where noteworthy impacts arise on any segment, they are discussed in part 2 of this chapter. Where a given segment is not mentioned in any resource discussion, no noteworthy problems are expected to occur.

This chapter forms the basis for comparison of the route of least environmental impact for each plan. These routes are composed of the segments listed below and are geographically illustrated, by segment, in figure 4.1. All figures are found at the end of the chapter.

Plan A
Segments: 101, 102, 107, 108, 109, 110, 111, 113, 115, 116, 117, 5, 16, 18, 22, 34, 35, 43, 47, 50

Plan B
Plains South 1/
Segments: 118, 129, 130, 132, 134, 135, 137, 138, 139, 142, 143, 144, 147, 148, 14, 18, 22, 34, 35, 43, 47, 50

1/ Between Garrison and the Miller Creek area (Plains and Taft Plans) are two route variations very similar in overall impact. These are called Plains South and Plains North and Taft South and Taft North. The segments above are underlined to show changes from the original draft EIS material.

Plains North
Segments: 101, 102, 107, 108, 120, 121, 127, 128, 138, 139, 142, 143, 144, 147, 148, 14, 18, 22, 34, 35, 43, 47, 50

Plan C
Taft South 2/
Segments: 118, 129, 130, 132, 134, 135, 137, 138, 139, 142, 143, 145, 10, 15, 92, 26, 28, 32, 37, 41, 43, 47, 50

Taft North
Segments: 101, 102, 107, 108, 120, 121, 127, 128, 138, 139, 142, 143, 145, 10, 15, 92, 26, 28, 32, 37, 41, 43, 47, 50

However, alternate routes (with higher environmental impact) could also be constructed within each plan, by using some of those segments listed above and some from the lists below:

For Plan A 3/: 114, 118, 119, 120, 121, 122, 123, 124, 125, 29, 33, 37, 40, 41, 45

For Plan B: 109, 110, 111, 113, 114, 115, 116, 117, 119, 122, 123, 124, 125, 126, 4, 1, 6, 29, 33, 37, 40, 41, 45

For Plan C: 109, 110, 111, 113, 114, 115, 116, 117, 1, 4, 6, 119, 122, 123, 124, 126, 146, 147, 148, 13, 7, 25, 31, 40, 45

INTRODUCTION OF TOPICS

LAND USE

Plans

The building and presence of a transmission line could conflict with, or, in some cases, foster, the goals of county land use plans (see table 4.1; see also AFFECTED ENVIRONMENT). It could temporarily disturb and remove from production some agricultural lands; it could permanently remove small amounts of land (at tower sites) from production. The line could interfere with existing or planned irrigation systems.

The line and access roads would remove forest land from production, and could pose problems for timber management practices resulting from increased public access, as they might interfere with logging operations. At the same time, the access roads would, in certain locations, facilitate those operations.

2/ Part of segment 15 in the St. Regis area has been realigned to the north in the Tamarack Creek drainage. The realigned portion has been labeled segment 92. Also see Volume II, Part IV.N.

3/ Two route options in the Rattlesnake Creek drainage were originally proposed for the Hot Springs and the Plains Plans. The option across the Rattlesnake National Recreation Area has been dropped from the preferred route alternative for Plan A and for Plan B.

Table 4.1 - Goals and Objectives of County Plans 1/

Plans		Land Use Categories					
County	Year	Utility Corridors	Agriculture	Forestry	Recreation & Scenery	Future Residential Development	Open Space
Powell	1978						X
Granite	1974		X		X	X	X
Missoula	1975		X	X	X	X	X
Lake	1979		X	X	X	X	X
Sanders	1979		X	X			
Shoshone	1976		X	X	X	X	X
Kootenai	1977		X		X	X	X
Spokane	1980	X	X		X	X	X

Source: Mountain West Research, Inc., 1981

x = goal is addressed in the plan

1/ Mineral County does not currently have a land use plan

The line, as an "urban" symbol, could also conflict with the rural/open space goals and atmosphere of local communities, where scenic views are important both to residents and to recreationists. It could also provide recreational opportunities and access to recreation less dependent on scenic values. Finally, the line would have adverse impacts on both visual and developmental resources for a community. It may even have a perceived or actual effect on residential values. (See discussion under Socioeconomic Considerations in this Volume and in Volume II, Part II. J.)

Urban/Residential

The routes cross predominantly public land in the National Forest System; however, some private lands are crossed (fig. 4.2). As much of the area is sparsely populated, the routes generally avoid urban and built-up areas (fig. 4.3). Displacement of existing buildings or dwellings, a "worst case" significant direct impact, would not occur.

Visual impacts for the life of the line would occur to some nearby residents and developed land. Radio and television reception could also be affected near the line. During construction, the noise, dust, smoke, and presence of construction personnel will affect nearby residents temporarily. The construction site would also present a potential safety hazard, particularly to children attracted by construction activities. Residents could be disturbed by maintenance activities on the right-of-way, and by unauthorized use of the right-of-way by motorcyclists or others. (See also the discussion on Electrical and Biological Effects.)

Transmission routes would limit property use within the right-of-way, e.g., the building of barns or sheds or the erection of TV antennas. The routes may conflict with developed land uses (i.e. subdivisions) around existing transmission facilities and vacant right-of-way, and may affect future urban/residential development patterns (tables 4.2 and 4.3).

Forestry

Forest site productivity [the capability to grow wood fiber in terms of cubic feet per acre per year (fig. 4.4)] and forest management would be directly affected by clearing for access roads, rights-of-way, and substations. Intensive management practices such as planting and thinning would be discontinued in the right-of-way, except where Christmas tree farms are involved. The use of specialized harvesting techniques required on steep slopes and sensitive soils may be constrained in some places by the presence of the towers and conductors, especially on ground requiring cable logging systems. Forest productivity is generally high (potentially more than 85 cubic feet per acre per year) in the western portion of the study area except in the Rathdrum Prairie vicinity, but is much lower in drier areas of the eastern portion.

Soil disturbance, mixing, and compaction from construction activities, as well as maintenance of the roads and cleared right-of-way, would reduce productivity. Generally, the higher the forest productivity, the higher and more significant the impact (table 4.2).

Clearing of the right-of-way and the associated roads would have some indirect effects on forestry activity in other portions of some drainages. New openings would increase water yields and change wildlife forage/cover relationships. This could affect the amounts and timing of later timber harvest in these drainages.

Impacts would generally be long-term and adverse. Direct impacts would generally be local, as primary processing of forest products is done locally. A short-term increase of forest products would result from harvesting timber to clear right-of-way. However, future productivity would be reduced for the life of the line on right-of-way land.

Agriculture

When transmission lines, substations, and associated access roads are built across farm or ranchland, farming or ranching operations may be affected in several ways.

Land occupied by tower bases (0.05 to 0.3 acre per mile) and by substations is removed from production, and land used for access roads is disturbed or removed from production for at least a short time. Weeds may accumulate at tower bases and may infest adjacent farmland. Future soil productivity may be reduced due to compaction, removal of topsoil, or erosion. Present irrigation practices or placement of future systems may be impaired; farm equipment movement may be impaired, possibly resulting in equipment damage. Grazing patterns may be disturbed during the construction period. Other problems may also occur, such as fence and gate damage resulting in livestock dispersal; breaking away of bolts and other small objects that could remain on the ground and be ingested by animals, resulting in "hardware disease"; increased access by the public, with attendant nuisances; and similar "nuisance" impacts.

Impact intensity depends on a number of factors, including soil productivity, crop types, cropping patterns, differences in farming practices and equipment, structure location, and line orientation to the field (USBPA 1977; Gustafson et al. 1979a).

As with effects on other land uses, changes in the quality of the human environment resulting from crossing farmland are controversial in this area. However, agricultural impacts involve only a small portion of a transmission line right-of-way (see fig. 4.3) and are significant primarily to the affected interests and localities where they occur. Impacts on specially designated farmland (Prime Farmland or Farmland of Statewide Importance) are potentially significant (see Consultation, Review, and Permit Requirements). A very small amount of such farmland would be affected by towers, but remaining lands within the right-of-way would not be converted to other land uses.

Table 4.2

Potential Impacts:[1] Source, Duration, Likelihood

KEY

DURATION[2]	LIKELIHOOD
□ Long Term	Low
■ Long Term	High
○ Short Term	Low
● Short Term	High

RESOURCE OR CONCERN / IMPACT / IMPACT SOURCES[3]

Phase	Facility	Impact Source	GEOLOGY/SOILS – SOILS: Physical Characteristics	GEOLOGY/SOILS – SOILS: Erosion Susceptibility	GEOLOGY/SOILS – LANDFORMS: Mass Movement Potential	WATER RESOURCES – LAKES/RESERVOIRS: Water Quality Changes	WATER RESOURCES – STREAMS/RIVERS: Water Quality Changes	WATER RESOURCES – MUNICIPAL WATERSHEDS: Water Quality Changes	VEGETATION – FOREST: Form/Structure	VEGETATION – FOREST: Species Composition	VEGETATION – FOREST: Density	VEGETATION – FOREST: Productivity	VEGETATION – RANGE: Form/Structure	VEGETATION – RANGE: Species Composition	VEGETATION – RANGE: Density	VEGETATION – RANGE: Productivity	VEGETATION – WETLANDS: Form/Structure	VEGETATION – WETLANDS: Density	VEGETATION – WETLANDS: Productivity
CONSTRUCTION	TRANSMISSION LINES	Access Road Construction	■	■	○	○	●	●	■	■	■	■	■	■	■	■	□	□	□
CONSTRUCTION	TRANSMISSION LINES	Right of Way Clearing	●	●	○	○	○	○	■	■	■	■	●	□	●	●	○	○	○
CONSTRUCTION	TRANSMISSION LINES	Timber Use and Slash Disposal	●	○			○	○											
CONSTRUCTION	TRANSMISSION LINES	Tower Foundation Construction	■	●			○	○											
CONSTRUCTION	TRANSMISSION LINES	Tower Assembly and Erection	●	●															
CONSTRUCTION	TRANSMISSION LINES	Conductor Stringing, Tensioning	●	●									●	○	○	●	○	○	○
CONSTRUCTION	TRANSMISSION LINES AND SUBSTATIONS	Presence of People, Material, Equipment[4]				○	○	○											
CONSTRUCTION	SUBSTATIONS	Clearing, Grading or Substation Site, Entrance Road	■	●	○		○		■	■	■	■	■	■	■	■			
CONSTRUCTION	SUBSTATIONS	Foundation Construction	■	○															
CONSTRUCTION	SUBSTATIONS	Electrical Facility Installation					○												
MAINTENANCE[5]	TRANSMISSION LINES	Aerial/Ground Inspection																	
MAINTENANCE[5]	TRANSMISSION LINES	Broadcast Aerial Spraying				○	○	○	■	■	■	■					□	□	□
MAINTENANCE[5]	TRANSMISSION LINES	Selective Ground Spraying					○	○	■	■	■	■					□	□	□
MAINTENANCE[5]	TRANSMISSION LINES	Access Road Maintenance	■		○		○	○	■	■	■	■	■	■	■	■	□	□	□
MAINTENANCE[5]	SUBSTATIONS	Soil Sterilant Application to Switchyard					○												
OPERATION	TRANSMISSION LINES	Electric, Magnetic Field (Nuisance Shocks)																	
OPERATION	TRANSMISSION LINES	Corona Effects (noise)																	
OPERATION	EXISTENCE OF LINE/SUBSTATION	Presence of Facilities																	

Phase	Facility	Impact Source	WILDLIFE – BIG GAME: Habitat Loss/Gain	WILDLIFE – BIG GAME: Disturbance	WILDLIFE – BALD EAGLE/OSPREY: Collision Potential	WILDLIFE – GRIZZLY BEAR: Human/Bear Conflicts	WILDLIFE – WATERFOWL: Habitat Loss/Gain	WILDLIFE – WATERFOWL: Disturbance	WILDLIFE – WATERFOWL: Collision Potential	WILDLIFE – REFUGE/MGMT. AREAS: Management Conflicts	WILDLIFE – REFUGE/MGMT. AREAS: Habitat Loss	LAND USE – EXISTING LAND USE: Conflicts or Disturbance	LAND USE – FORESTRY: Productivity Loss	LAND USE – FORESTRY: Disruption of Mgmt. Practices	LAND USE – AGRICULTURE: Productivity Loss	LAND USE – AGRICULTURE: Disruption of Farm Practices
CONSTRUCTION	TRANSMISSION LINES	Access Road Construction	■	□		○	□	○		■	■	■	■	■	●	■
CONSTRUCTION	TRANSMISSION LINES	Right of Way Clearing	■	●		○	□	●				■	■	■		
CONSTRUCTION	TRANSMISSION LINES	Timber Use and Slash Disposal	○	●		○	○					●	○			
CONSTRUCTION	TRANSMISSION LINES	Tower Foundation Construction		●						●	●	■			■	■
CONSTRUCTION	TRANSMISSION LINES	Tower Assembly and Erection	○	●						○		●			●	●
CONSTRUCTION	TRANSMISSION LINES	Conductor Stringing, Tensioning	○	●	□				□	○		●			●	●
CONSTRUCTION	TRANSMISSION LINES AND SUBSTATIONS	Presence of People, Material, Equipment[4]		●		○		●		●		●			●	●
CONSTRUCTION	SUBSTATIONS	Clearing, Grading or Substation Site, Entrance Road	■	●								■	■	■	■	■
CONSTRUCTION	SUBSTATIONS	Foundation Construction														
CONSTRUCTION	SUBSTATIONS	Electrical Facility Installation		○					○							
MAINTENANCE[5]	TRANSMISSION LINES	Aerial/Ground Inspection		○		○				○						
MAINTENANCE[5]	TRANSMISSION LINES	Broadcast Aerial Spraying	■	●		○	□	○				■	○			
MAINTENANCE[5]	TRANSMISSION LINES	Selective Ground Spraying	■	●		○	□	○				○	□			
MAINTENANCE[5]	TRANSMISSION LINES	Access Road Maintenance	■	■		□	□	○		■	■	●	■	□		
MAINTENANCE[5]	SUBSTATIONS	Soil Sterilant Application to Switchyard														
OPERATION	TRANSMISSION LINES	Electric, Magnetic Field (Nuisance Shocks)												□		□
OPERATION	TRANSMISSION LINES	Corona Effects (noise)														
OPERATION	EXISTENCE OF LINE/SUBSTATION	Presence of Facilities		○	□				■			■	■	■	■	■

Phase	Facility	Impact Source	SOCIOECONOMIC – DEMOGRAPHY: Effects on: Population	SOCIOECONOMIC – ECONOMICS: Employment	SOCIOECONOMIC – ECONOMICS: Income	SOCIOECONOMIC – SOCIAL: Private Services	SOCIOECONOMIC – SOCIAL: Public Services	SOCIOECONOMIC – SOCIAL: General Social Effects[6]	VISUAL RESOURCES – VISUAL QUALITY/COMPATIBILITY: Visual Alteration	VISUAL RESOURCES – VIEWER CHARACTERISTICS: Viewer Response Changes	CULTURAL – PREHISTORIC SITES: Physical Damage/Loss	CULTURAL – HISTORIC SITES: Physical Damage/Loss	CULTURAL – HISTORIC SITES: Visual Intrusion	PUBLIC SAFETY AND COMFORT: Safety	PUBLIC SAFETY AND COMFORT: Radio/TV Interference	PUBLIC SAFETY AND COMFORT: Annoyance
CONSTRUCTION	TRANSMISSION LINES	Access Road Construction							■	■	■	□	■	○		●
CONSTRUCTION	TRANSMISSION LINES	Right of Way Clearing							■	■	■	□	■	○		●
CONSTRUCTION	TRANSMISSION LINES	Timber Use and Slash Disposal							●	●	□			○		●
CONSTRUCTION	TRANSMISSION LINES	Tower Foundation Construction							○	○	□	□		○		●
CONSTRUCTION	TRANSMISSION LINES	Tower Assembly and Erection							■	■			■	○		●
CONSTRUCTION	TRANSMISSION LINES	Conductor Stringing, Tensioning							■	■	□		■	○		●
CONSTRUCTION	TRANSMISSION LINES AND SUBSTATIONS	Presence of People, Material, Equipment[4]	●	●	●	●	●	●	●	●	□	■	○			
CONSTRUCTION	SUBSTATIONS	Clearing, Grading or Substation Site, Entrance Road							■	■	□	□	■	○		○
CONSTRUCTION	SUBSTATIONS	Foundation Construction							●	●	□	□				
CONSTRUCTION	SUBSTATIONS	Electrical Facility Installation							■	■			■			○
MAINTENANCE[5]	TRANSMISSION LINES	Aerial/Ground Inspection				■	■	●								●
MAINTENANCE[5]	TRANSMISSION LINES	Broadcast Aerial Spraying						■	●	○						
MAINTENANCE[5]	TRANSMISSION LINES	Selective Ground Spraying						■	○	○						
MAINTENANCE[5]	TRANSMISSION LINES	Access Road Maintenance							●	●	□		■			
MAINTENANCE[5]	SUBSTATIONS	Soil Sterilant Application to Switchyard														
OPERATION	TRANSMISSION LINES	Electric, Magnetic Field (Nuisance Shocks)						■						□		□
OPERATION	TRANSMISSION LINES	Corona Effects (noise)						■							○	■
OPERATION	EXISTENCE OF LINE/SUBSTATION	Presence of Facilities						■	■	■	□		■	□		■

1 Assumes standard construction techniques and mitigation measures.

2 Short term impacts are changes that result from activities related to the proposed action. The impact generally would last for the duration of that activity and revert to prior conditions at or within a few years of the conclusion of the activity.
Long term impacts are changes that result from the proposed action which would substantially remain for the life of the project and/or beyond.

3 Impacts, including their duration and likelihood, are identified by their initial source. Although subsequent activities may increase those impacts, such activities are not identified unless they would be prime causes.

4 The element of *Presence* does not imply a work activity. It is used here to mean people, material, and equipment being on the construction site and in the study area.

5 Activities which occur intermittently. Although impacts from a single occurrence may be short-term, impacts could occur at regular intervals over the life of the line.

6 Includes social well-being concerns and perceptions of the project and its effects

Table 4.3

Potential Impacts: Resource Considerations (Miles)

SEGMENTS	* = lowest impact routes	MILES	GEOLOGY/HYDRO-LOGY: Slope 30+%	GEOLOGY/HYDRO-LOGY: Municipal Watersheds	WILDLIFE: Big Game	WILDLIFE: Bald Eagle	WILDLIFE: Osprey	WILDLIFE: Grizzly Bear	WILDLIFE: Waterfowl	WILDLIFE: Game Refuge–Mgmt Areas	LAND USE - LAND COVER: Residences Within 1/2 Mile	LAND USE - LAND COVER: Agricultural Land	LAND USE - LAND COVER: Forest Land	LAND USE - LAND COVER: Rangeland[2]	LAND USE - LAND COVER: Wetlands	AGRICULTURE: Irrigated	AGRICULTURE: Non-Irrigated	AGRICULTURE: Prime Farmland	AGRICULTURE: Additional Farmland of Statewide Importance	Roadless Area[3]	LAND OWNERSHIP: Federal	LAND OWNERSHIP: State	LAND OWNERSHIP: Indian Reservation	LAND OWNERSHIP: Private	Undeveloped Subdivided Land	FOREST PRODUCTIVITY: High	FOREST PRODUCTIVITY: Moderate	FOREST PRODUCTIVITY: Low	VISUAL RESOURCES: High Visual Quality	VISUAL RESOURCES: Low Visual Compatibility	VISUAL RESOURCES: Viewer Sensitivity: High	VISUAL RESOURCES: Viewer Sensitivity: Moderate	VISUAL RESOURCES: Viewer Sensitivity: Low	VISUAL RESOURCES: High Viewer Exposure	CULT. RES.: Areas of High Sensitivity to Impact
HOT SPRINGS PLAN 500-kV Transmission; **GARRISON-HOT SPRINGS[4] ROUTES**	101,102,107,108,109,110,111,113,114,117.5	122.1	11.7	6.4	59.9	4.4	0	1.9	2.1	0	124	11.4	52.3	57.7	.7	2.2	9.2	5.2	.3	4.1	12.5	3.9	13.4	92.3	4.1	4.8	28.1	20.0	38.6	51.8	54.8	10.1	55.9	36.1	17.0
	*101,102,107,108,109,110,111,113,115,116,117.5	122.5	11.3	2.8	60.6	4.4	0	1.9	2.1	0	231	11.3	50.6	59.9	.7	2.2	9.1	5.2	.3	0	8.4	3.9	13.4	96.8	4.5	2.7	30.6	17.9	35.3	50.6	52.6	9.7	58.9	38.1	17.0
	101,102,107,108,109,110,122,124,125,116,117.5	123.3	10.2	2.7	63.1	14.8	0	1.9	13.5	0	451	12.1	47.6	61.7	.7	3.0	9.1	6.1	1.9	0	10.3	4.4	13.4	95.2	6.0	2.7	27.0	.5	23.0	48.5	66.1	9.7	46.2	52.1	17.0
	101,102,107,108,120,121,123,124,125,116,117.5	123.9	18.7	2.7	79.2	21.7	0	1.9	14.7	0	495	13.8	40.8	67.3	.7	4.6	9.2	6.4	1.5	0	7.6	5.2	13.4	97.7	7.3	1.4	15.8	24.2	4.4	43.4	83.3	9.6	29.7	68.7	15.5
	118,119,121,123,124,125,116,117.5	120.3	15.1	2.7	71.4	19.7	0	1.9	17.3	0	499	22.9	36.8	58.7	.7	11.6	11.3	9.6	3.1	0	6.4	5.2	13.4	95.3	8.4	1.4	16.5	19.5	12.4	45.6	78.8	10.7	30.8	59.5	14.0
HOT SPRINGS-BELL ROUTES	*16,18,22,34,35,43,47,50	145.5	32.9	7.6	28.5	16.2	3.7	0	18.8	.9	879	44.6	96.9	2.9	.4	16.0	28.6	26.8	8.7	2.7	70.3	4.6	5.8	64.8	3.2	75.7	26.9	14.0	59.9	75.7	84.7	24.1	36.7	56.0	9.0
	16,18,29,35,43,47,50	146.6	31.8	7.1	22.2	13.6	2.1	0	20.4	.9	866	52.0	90.6	2.9	.4	16.4	35.6	31.7	8.7	2.6	66.8	3.6	5.8	70.4	3.5	64.4	31.9	14.0	66.4	70.4	74.8	24.1	47.7	64.0	5.5
	16,18,22,33,37,41,43,47,50	147.4	33.1	7.6	30.6	16.2	3.7	0	18.8	.9	865	44.6	98.8	2.9	.4	16.0	28.6	26.8	8.7	2.7	71.4	5.4	5.8	64.8	3.2	79.2	25.3	14.0	53.7	77.6	90.2	27.1	30.1	56.0	9.0
	16,18,22,33,37,40,45,47,50	147.4	36.7	7.6	29.5	16.2	3.7	0	18.8	.9	865	44.6	98.8	2.9	.4	16.0	28.6	26.8	8.7	2.7	70.9	5.9	5.8	64.8	3.2	78.8	25.7	14.0	56.9	77.6	94.5	26.6	26.3	56.0	9.5
PLAINS PLAN 500-kV Transmission; **GARRISON-PLAINS[4] ROUTES**	101,102,107,108,109,110,111,113,114,117,1,6,14	126.7	32.6	6.4	77.1	5.5	1.8	0	1.3	0	67	2.3	92.2	32.2	0	.7	1.6	.9	.3	6.6	51.1	5.1	0	70.5	4.5	10.5	61.9	20.4	82.7	76.1	43.1	17.5	64.8	28.3	10.5
	101,102,107,108,109,110,111,113,115,116,117,1,6,14	127.1	32.2	2.8	77.8	5.5	1.8	0	1.3	0	174	2.2	90.5	34.4	0	.7	1.5	.9	.3	2.5	47.0	5.1	0	75.0	4.9	8.4	64.4	18.3	79.4	74.9	40.9	17.1	67.8	30.3	10.5
	101,102,107,108,109,110,122,124,125,116,117,1,6,14	127.9	31.1	2.7	80.3	15.9	1.8	0	12.7	0	394	3.0	87.5	36.2	0	1.5	1.5	1.8	1.9	2.5	48.9	5.6	0	73.4	6.4	8.4	60.8	18.9	67.1	72.8	54.4	17.1	55.1	44.3	10.5
	101,102,107,108,120,121,123,124,125,116,117,1,6,14	128.5	39.6	2.7	96.4	22.8	1.8	0	13.9	0	438	4.7	80.7	41.8	0	3.1	1.6	2.1	1.5	2.5	46.2	6.4	0	75.9	7.7	7.1	49.6	24.6	48.5	67.7	71.6	17.0	38.6	60.9	9.0
	101,102,107,108,120,121,127,128,138,139,142,143,144,147,148,14	131.5	50.2	0	84.0	17.1	1.8	0	7.4	0	56	5.6	89.7	36.2	0	2.1	3.5	2.3	1.5	2.5	52.0	6.5	0	73.0	1.9	12.1	49.6	28.0	54.7	83.7	53.4	12.0	64.8	44.8	3.5
	*118,129,130,132,134,135,137,138,139,142,143,144,147,148,14	131.6	38.1	0	64.9	7.9	1.8	0	4.6	0	57	3.7	110.4	17.5	0	.3	3.4	.5	1.5	2.5	81.0	6.2	0	44.0	.3	15.2	72.4	22.8	101.7	104.4	23.5	9.9	98.2	14.4	3.0
	118,119,121,123,124,125,116,117,1,6,14	124.9	36.0	2.7	88.6	20.8	1.8	0	16.5	0	442	13.8	76.7	33.2	0	10.1	3.7	5.3	3.1	2.5	45.0	6.4	0	73.5	8.8	7.1	50.3	19.9	56.5	69.9	67.1	18.1	39.7	51.7	7.5
PLAINS-BELL ROUTES	*18,22,34,35,43,47,50	132.6	32.9	7.6	20.4	16.2	3.7	0	18.8	.9	869	41.8	88.3	1.4	.4	16.0	25.8	23.3	8.7	2.7	69.3	4.6	0	58.7	2.8	75.7	21.3	11.0	50.4	69.5	71.8	24.1	36.7	43.1	9.0
	18,29,35,43,47,50	133.7	31.8	7.1	14.1	13.6	2.1	0	20.4	.9	856	49.2	82.0	1.4	.4	16.4	32.8	28.2	8.7	2.6	65.8	3.6	0	64.3	3.1	64.4	26.3	11.0	56.9	64.2	61.9	24.1	47.7	51.1	5.5
	18,22,33,37,41,43,47,50	134.5	33.1	7.6	22.5	16.2	3.7	0	18.8	.9	855	41.8	90.2	1.4	.4	16.0	25.8	23.3	8.7	2.7	70.4	5.4	0	58.7	2.8	79.2	19.7	11.0	44.2	71.4	77.3	27.1	30.1	43.1	9.0
	18,22,33,37,40,45,47,50	134.5	36.7	7.6	21.4	16.2	3.7	0	18.8	.9	855	41.8	90.2	1.4	.4	16.0	25.8	23.3	8.7	2.7	69.9	5.9	0	58.7	2.8	78.8	20.1	11.0	47.4	71.4	81.6	26.6	26.3	43.1	9.5
TAFT PLAN 500-kV Transmission; **GARRISON-TAFT[4] ROUTES**	101,102,107,108,109,110,111,113,114,1 7,1,6,13,15[7]	152.4	36.9	15.6	88.6	4.2	0	0	1.6	0	59	.8	123.1	28.5	0	.7	.1	.9	.3	5.1	80.3	4.9	0	67.2	5.6	28.4	74.6	20.7	96.9	95.1	37.5	21.7	91.9	24.8	15.0
	101,102,107,108,109,110,111,113,115,116,117,1,6,13,15	152.8	36.5	12.0	89.3	4.2	0	0	1.6	0	166	.7	121.4	30.7	0	.7	0	.9	.3	1.0	76.2	4.9	0	71.7	6.0	26.3	77.1	18.6	93.6	93.9	35.3	21.3	94.9	26.8	15.0
	101,102,107,108,109,110,122,124,125,116,117,1,6,13,15	153.6	35.4	1 .9	91.8	14.6	0	0	13.0	0	386	1.5	118.4	32.5	0	1.5	0	1.8	1.9	1.0	78.1	5.4	0	70.1	7.5	26.3	73.5	19.2	81.3	91.8	48.8	21.3	82.2	40.8	15.0
	101,102,107,108,120,121,123,124,125,1 6,117,1,6,13,15	154.2	43.9	11.9	107.9	21.5	0	0	14.2	0	430	3.2	111.6	38.1	0	3.1	.1	2.1	1.5	1.0	75.4	6.2	0	72.6	8.8	25.0	62.3	24.9	62.7	86.7	66.0	2 .2	65.7	57.4	13.5
	118,119,121,123,124,125,116,117,1,6,13,15	150.6	40.3	11.9	100.1	19.5	0	0	16.8	0	434	12.3	107.6	29.5	0	10.1	2.2	5.3	3.1	1.0	74.2	6.2	0	70.2	9.9	25.0	63.0	20.2	70.7	88.9	61.5	22.3	66.8	48.2	12.0
	101,102,107,108,109,110,122,124,126,138, 39,142,143,145,10,15	156.6	50.2	8.7	86.7	8.5	0	0	5.9	0	97	2.2	127.4	27.0	0	.7	1.5	.8	3.1	4.7	79.9	8.6	0	68.1	3.4	24.8	79.4	23.2	68.3	108.6	33.5	14.4	107.4	27.8	7.5
	101,102,107,108,120,121,127,128,138,139,142,143,145,10,15	156.2	59.5	8.7	101.5	15.7	0	0	7.5	0	48	3.7	120.0	32.5	0	2.1	1.6	1.9	1.5	4.7	78.0	8.4	0	69.8	3.9	21.9	67.5	30.6	50.2	104.1	49.0	12.1	93.8	42.6	6.0
	118,119,121,127,128,138,139,142,143,145,10,15	152.6	55.9	8.7	93.7	13.7	0	0	10.1	0	52	12.8	116.0	23.9	0	9.1	3.7	5.1	3.1	4.7	76.8	8.4	0	67.4	5.0	21.9	68.2	25.9	58.2	106.3	44.5	13.2	94.9	33.4	4.5
	*118,129,130,132,134,135,137,138,139,142,143,145,10,15	156.3	47.4	8.7	82.4	6.5	0	0	4.7	0	49	1.8	140.7	13.8	0	.3	1.5	.1	1.5	4.7	107.0	8.1	0	41.2	2.3	25.0	90.3	25.4	97.2	124.8	19.1	10.0	127.2	12.2	5.5
	101,102,107,108,109, 10,122,124,126,138,139,142,143,144,146,10,15	156.6	48.9	8.7	86.1	8.6	0	0	6.1	0	98	2.6	127.0	27.0	0	.7	1.9	1.2	3.1	4.7	79.5	8.6	0	68.5	3.5	24.8	78.7	23.5	67.1	108.4	31.7	14.4	109.2	27.1	7.0
	101,102,107,108,120,121,127,128,138,139,142, 43,146,10,15	156.2	58.2	8.7	100.9	15.8	0	0	7.7	0	49	4.1	119.6	32.5	0	2.1	2.0	2.3	1.5	4.7	77.6	8.4	0	70.2	4.0	21.9	66.8	30.9	49.0	103.9	47.2	12.1	95.6	41.9	5.5
	118,119,121,127.128.138,139,142,143,144,146,10,15	152.6	54.6	8.7	93.1	13.8	0	0	10.3	0	53	13.2	115.6	23.9	0	9.1	4.1	5.5	3.1	4.7	76.4	8.4	0	67.8	5.1	21.9	67.5	26.2	57.0	106.1	42.7	13.2	96.7	32.7	4.0
	118,129,130,132,134,135,137,138,139,142,143,144,146,10,15	156.3	46.1	8.7	81.8	6.6	0	0	4.9	0	50	2.2	140.3	13.8	0	.3	1.9	.5	1.5	4.7	106.6	8.1	0	41.6	2.4	25.0	89.6	25.7	96.0	124.6	17.3	10.0	129.0	1 .5	5.0
	101,102,107,108,109,110,122,124,126,138,139,142,143,144,147,148,13,15	157.6	45.2	9.2	80.7	8.6	0	0	6.1	0	97	2.6	128.0	27.0	0	.7	1.9	1.2	3.1	1.0	83.1	6.5	0	68.0	2.5	32.9	74.2	20.9	87.0	07.2	32.3	18.5	105.5	26.5	9.5
	101,102,107,108,120,121,127,128,138,139,142,143,144,147,148,13,15	157.2	54.5	9.2	95.5	15.8	0	0	7.7	0	48	4.1	120.6	32.5	0	2.1	2.0	2.3	1.5	1.0	81.2	6.3	0	69.7	3.0	30.0	62.3	28.3	68.9	102.7	47.8	16.2	91.9	41.3	8.0
	118,119,121,127,128,138,139,142,143,144,147,148,13,15	153.6	50.9	9.2	87.7	13.8	0	0	10.3	0	52	13.2	116.6	23.9	0	9.1	4.1	5.5	3.1	1.0	80.0	6.3	0	67.3	4.1	30.0	63.0	23.6	76.9	104.9	43.3	17.3	93.0	32.1	6.5
	118.129,130,132,134,135,137,138,139,142,143,144,147,148,13,15	157.3	42.4	9.2	76.4	6.6	0	0	4.9	0	49	2.2	141.3	13.8	0	.3	1.9	.5	1.5	1.0	110.2	6.0	0	41.1	1.4	33.1	85.1	23.1	115.9	123.4	17.9	14.1	125.3	10.9	7.5
TAFT-BELL ROUTES	25,28,32,37,41,43,47,50	102.8	32.6	7.9	4.7	0	0	0	0	.9	883	24.1	77.4	.3	0	13.3	10.8	19.0	8.7	1.4	57.6	2.2	0	43.0	1.3	60.3	13.8	5.8	14.8	65.0	44.4	26.7	31.7	29.6	1.0
	25,28,32,37,40,45,47,50	102.8	36.2	7.9	3.6	0	0	0	0	.9	883	24.1	77.4	.3	0	13.3	10.8	19.0	8.7	1.4	57.1	2.7	0	43.0	1.3	59.9	14.2	5.8	18.0	65.0	48.7	26.2	27.9	29.6	1.5
	25,28,31,45,47,50	102.6	36.4	9.0	5.0	0	0	0	0	.9	847	24.1	77.1	.3	0	13.3	10.8	19.0	8.7	0	56.8	3.9	0	41.9	1.3	60.2	13.6	5.8	16.4	62.0	58.5	23.6	20.5	35.4	0.5
	*26,28,32,37,41,43,47,50	101.4	28.5	7.9	4.4	0	0	0	0	.9	835	23.9	76.2	.3	0	13.3	10.6	19.0	8.7	1.4	56.0	1.9	0	43.5	1.3	60.5	12.3	5.8	15.8	64.2	44.8	26.7	29.9	24.5	1.0
	26,28,32,37,40,45,47,50	101.4	32.1	7.9	3.3	0	0	0	0	.9	835	23.9	76.2	.3	0	13.3	10.6	19.0	8.7	1.4	55.5	2.4	0	43.5	1.3	60.2	12.7	5.8	19.0	64.2	49.1	26.2	26.1	24.5	1.5
	26,28,31,45,47,50	101.2	32.3	9.0	4.7	0	0	0	0	.9	799	23.9	75.9	.3	0	13.3	10.6	19.0	8.7	0	55.2	3.6	0	42.4	1.3	60.5	12.1	5.8	17.4	61.2	58.9	23.6	18.7	30.3	0.5
WASHINGTON WATER POWER PLANS 1-4: 230-kV Reinforcement	Route 1	48.4	21.5	12.4	11.9	2.0	1.6	3.9	1.8	0	4.7[6]	1.5	40.7	1.5	0	0	1.0	0	0	4.4	22.9	1.0	0	24.5	.5	25.3	10.6	.6	12.5	29.2	32.5	2.2	13.7	19.4	9.4
	Route 2[1]	36.7	5.6	4.5	4.5	0	0	0	0	0	3.9[6]	0	31.3	1.5	0	0	0	0	0	1.9	18.6	0	0	18.1	.3	26.7	.4	0	7.1	23.8	27.2	8.7	.8	15.8	21.0
	*Route 3 North	35.7	16.8	4.4	3.0	0	0	0	0	0	3.3[6]	0	30.9	1.5	0	0	0	0	0	0	16.7	0	0	19.0	0	22.3	4.4	0	12.4	23.1	27.0	0	8.7	25.1	3.0
	Route 3 South	31.9	14.2	3.3	3.7	0	0	0	0	0	3.0[6]	0	27.4	1.5	0	0	0	0	0	0	14.4	0	0	17.5	0	21.9	1.3	0	.6	18.6	31.9	0	0	30.8	11.0
	Route 4[1,5]	33.4	6.5	4.5	3.0	0	0	0	0	0	3.6[6]	0	28.3	1.5	0	0	0	0	0	0	15.3	0	0	18.1	0	23.7	.4	0	2.8	20.5	25.1	8.3	0	15.8	16.9

1 Does not include rebuilding between Noxon and the Eagle Creek area (26.9 miles for Eagle Creek, 28.5 miles for Noxon Plan.

2 Between Rathdrum and Bell (Segment 50) and between Wallace and Pine Creek (Common to all WWP plans) "barren" land crossed is classified under Rangeland.

3 Included in this category are both RARE II areas (as of December, 1980) and areas managed for the unroaded condition under Planning Unit management plans. Management objectives for RARE II lands have been resolved and some of the areas have since been returned to multiple-use management.

4 These summaries do not include data for segments analyzed as local routing alternatives (LRA's). LRA tables and maps appear in Volume II, Part IV.

5 Preferred by The Washington Water Power Company.

6 Data on number of residences within 1/2 mile was not available for WWP routes. The numbers shown above refer to miles of urban/residential land and dispersed development crossed.

7 The original alignment of the Garrison-Taft section included segment 15. The data shown above is for that segment. After further studies, the actual routing now includes parts of segment 15 and an adjustment to it (segment 92). Also see Volume II, Part IV, N.

Crossing irrigated or potentially irrigable land is also a strong concern, as the line or towers may interfere with irrigation systems or with safety considerations (Gustafson et al. 1979a; Stetson et al. 1979). Varying amounts of land, depending upon the width and orientation of the right-of-way, could be removed from irrigation. Center pivot irrigation systems would sometimes be impractical unless the right-of-way were to parallel a field boundary or pass through the middle of a field, permitting dual semi-circular irrigation.

Recreation

Impacts on recreational users vary with an area's setting and the activity, and are primarily indirect, involving reduction in the visual quality of the user's surroundings. The type of recreational activity influences, to a certain extent, viewer sensitivity and the degree of impact. Although normally a transmission line adds a discordant element to the landscape, transmission facilities may blend in or be less obtrusive in some landscapes than in others. They are generally more compatible with recreational activities in developed areas than in areas with fewer man-made elements (fig. 4.5).

A transmission line passing near or through an existing or potential recreation area may limit land use, may affect an area's recreation designation or classification, or may intrude visually on recreational users. Although such features as unroaded areas, trails, wild or scenic rivers, and intensive recreation areas (e.g., campgrounds or parks) are susceptible to such impacts, mitigation measures can often reduce impact intensity. Changes in these resources from transmission line construction could affect the unique characteristics of the area and have related effects on the quality of the human environment.

Corridor Development / Long-Range Plans

Corridor development is a significant regional issue. The study area contains some of the major viable east-west corridors through the northern Rocky Mountains for such linear facilities as railroads, highways, pipelines, and transmission lines. Alternative corridors, routes, and segments for this project are shown in figure 4.1. By building a line through the northern Rocky Mountains, it is somewhat more likely that a future line through this geographic area would follow the route of this proposal. Although no new corridor development is planned for the foreseeable future (that is, within the next decade), the last criterion in Evaluation Criteria (table 2.3) measures the relative ability of each plan to absorb a parallel line within the corridor.

Although BPA policy is to use existing corridors wherever possible, further development of an existing corridor can have both beneficial and adverse impacts. Many negative construction impacts can be mitigated, and maintenance activities can be consolidated, minimizing their impact. However, multiple lines in a single corridor may create or intensify local land use or resource conflicts, outweighing in certain locations the benefits of paralleling existing facilities.

Creation of a new transmission corridor can have more intense impacts on natural resources and land uses than parallel construction. However, some benefits may accrue if there is a recognized need for additional utility facilities in the future. From Garrison to the intermediate substation, the line may be built with the potential for convertibility to d.c. (direct current) transmission, efficient only over long distances.

NATURAL RESOURCES

Wildlife

A wide range of wildlife species, including waterfowl, upland birds, birds of prey, fish, big game species, and a variety of non-game species could be affected by the project (fig. 4.6). Primary impacts are created by modification of habitat: physical changes in ground cover from clearing, physical presence of the line, increased human access to habitat, or disturbance of wildlife through introduction of workmen and construction equipment (tables 4.2 and 4.3).

Specific habitat requirements and low population levels make certain species more easily affected and the effects more significant. Species listed under the Endangered Species Act (bald eagle, peregrine falcon, grizzly bear) occur in the study area (see INDEX and discussion under Consultation, Review, and Permit Requirements). Habitat essential to the survival of these species would not be adversely modified.

The ecological and recreational importance of osprey and waterfowl makes them moderately vulnerable to changes in habitat. Waterfowl collision hazards are created where overhead wires cross river flyways (Meyer 1978; James and Haak 1979; Meyer and Lee 1981). However, these river crossings would not cause biologically significant levels of bird mortality because they are not in areas of large bird concentrations.

Moose, elk, deer, bighorn sheep, and mountain goats are found within the study area. Extent and significance of impacts on big game habitat vary with type of habitat (critical winter or summer range), species type, and relative abundance of habitat in a particular area. In general, big game habitat would be only moderately and temporarily affected by construction where there is much cover and where access roads presently exist adjacent to the right-of-way. However, in areas where thermal cover is sparse, particularly in the eastern portion of the study area or on some river islands, impacts could be much higher. Impact could also be higher in calving and fawning areas during May and June, when the young are more vulnerable to natural predators and to human disturbance.

Vegetation

The proposed action would change the form, composition, diversity, and productivity of plant communities. Changes in these would, in turn, indirectly affect other natural resources. Forests are directly affected by right-of-way and access road clearing. Individual trees that may interfere with line operation are removed during maintenance.

Rangeland vegetation may be removed or disturbed for access roads or tower sites. Soil compaction during construction and maintenance could result in reduced productivity for the short term.

The effects of clearing and disturbance from activities associated with transmission line construction are significant primarily for localized plant communities that have been previously undisturbed, are slow to recover, or are sensitive to impact, such as those growing on steep or erosion-prone slopes, in unroaded areas, or at high elevations. Forest clearing is significant only in this local context, as clearing from past timber harvests has reduced the extent of additional clearing required for rights-of-way and access roads.

Although wetlands occur in the study area, the proposed action would not destroy or significantly affect any wetlands by construction activities (see Consultation, Review, and Permit Requirements). Wetlands crossed by the proposal would be spanned, with no access roads directly crossing these areas. Short-term indirect impacts may result from siltation, but wetlands should return to normal after construction is completed.

Generally speaking, herbicides are not applied aerially in the State of Montana, including the Garrison-Spokane project area. Aerial applications are a possibility under certain circumstances; however, the most likely means of vegetation control would be hand cutting and hand spraying of herbicides in selected areas, primarily (1) to control deciduous trees along access roads and tall growing species within the rights-of-way; (2) to control all plant growth in substation yards; and (3) to eradicate weeds in ornamental plantings and noxious weeds on rights-of-way. BPA uses only those herbicides registered with the Environmental Protection Agency, and uses established controls to prevent pollution (see Water Resources). No present evidence indicates that any harmful effects to humans or animals have occurred from exposure to herbicides in BPA's vegetation management program (also see Mitigation Measures in Chapter II).

Water Resources

The proposal could affect water resources through: 1) erosion of cleared areas, causing temporary sedimentation of streams; and 2) traffic across streams and rivers, temporarily increasing turbidity or altering stream channels. There is also a small chance of applied herbicide runoff into the local drainage system. BPA's herbicide residue monitoring program shows this to be negligible. Likelihood and intensity of impact depends on the degree of slope, vegetative cover, timing of construction, and susceptibility of watersheds to erosion. Surface runoff rates are increased by compaction, removal of vegetation cover, and loss of soil humus. Indirect or secondary impacts from the clearing for a transmission line right-of-way, such as a rise in water temperature from increased exposure to sunlight after tree clearing or increased turbidity, are generally not significant.

Most other water resource impacts are short-term, and of low significance.

Air Quality

Air quality is affected by activities which introduce gases, particles, or odors into the air. Transmission systems discharge barely detectable amounts of ozone into the air. New substations and maintenance buildings, heated and cooled with electricity, would not pollute the air. However, certain key substations, communication facilities, and control stations have emergency power capability fueled by propane or diesel. Except during emergencies, these generators are test-operated for very short periods of time.

Construction activities would reduce visibility and pollute the air through slash burning, dust from disturbed soil, vehicle and equipment exhaust emissions, and fumes and odors from miscellaneous operations. Such emissions would disperse rapidly, however, so that impacts on air quality would be localized and temporary, and would not adversely affect the health of nearby residents.

BPA would cooperate with the local airshed group and would follow State Smoke Management Plans by burning during periods of good smoke dispersal (see Consultation, Review, and Permit Requirements).

The routes do not cross those lands Federally designated as Class I air quality areas (Clean Air Act, Section 169A), where no significant deterioration is allowed. The Tribal Council of the Flathead Indian Reservation has applied for such status for the Reservation, but the Reservation has not been so designated. The type of pollutants from construction activities, their very small-scale and localized occurrence, and the nature of the areas crossed (primarily rural, low in population density, minimally industrialized) make impacts on air quality in these areas short-term and not significant.

Soils/Geology

Ground disturbance during access road construction and tower site preparation increases risk of soil erosion and mass movement, and may change soil productivity and physical characteristics. These impacts are generally minor and short-term (table 4.2). However, impacts may become locally significant in sensitive areas, involving extensive rill and gully erosion, large mass failures, cut-fill sloughing, rock falls, and high volumes of sediment moved off-site. Steepness of terrain (see color coding in fig. 4.8) and/or substantial amount of access road construction can make these problems worse and may increase the risk of topsoil being eroded to surrounding areas, as well as lowering on-site productivity.

Sensitive areas often are found on less stable rock types such as erodible glacial deposits, intrusives, and lacustrine deposits (U.S. Forest Service 1976). Soils containing a high proportion of swelling clays are particularly sensitive to mass movement and erosion. Shrinking and swelling and low soil strength can adversely affect the quality of roadbeds and road surfaces on these soils. Unsurfaced roads may become rutted when wet and dusty when dry. Low infiltration rate and high runoff also create a high erosion hazard on these soils. Excavation for roads can expose material which is highly susceptible to erosion; revegetation would be difficult due to extremely low fertility in many of these materials.

ESTHETICS

Towers, conductors, spacers, and the right-of-way would have long-term visual impacts on the frequently high visual quality of the area (fig. 4.9). Degree of impact depends on the line's compatibility with its surroundings (fig. 4.10), available screening, tower configuration, and access road construction, as well as number and proximity of viewers, and their sensitivity (table 4.2).

Factors that create high viewer impacts generally become significant when they appear in combination, close to the viewer, against the sky, or in sharp contrast to viewer expectations. Perspective sketches (figs. 4.11 - 4.13) illustrate how the transmission facilities might appear in typical study area landscapes. Highly scenic or viewer-sensitive areas such as scenic overlooks and highways, parks, rivers, and trails, are disrupted by trans-mission lines, which are foreign to the setting. Parallel lines also draw attention to themselves when they are strung from towers of different sizes or shapes or when towers are spaced differently. They are more obvious when they are silhouetted on the top of a ridge ("skylined") or when they take up a major part of the viewed landscape. They also draw attention when they occur in multiples. Scars from access roads, cut and fill operations, and swaths cut through forests create major visual contrasts with their settings. Where a line is out of proportion with its surroundings or where it cuts across prevailing landscape patterns, it appears incongruous and therefore becomes visually significant. Urban areas and small valleys are typically too small in scale to absorb a transmission line visually.

SOCIAL AND ECONOMIC CONSIDERATIONS

The social and economic impacts of this project can be divided into two categories. The first category includes primarily economic and demographic effects. The size of these impacts is about the same for each plan, but their occurrence depends on which route is selected for construction. This impact category includes those employment, demographic, and fiscal effects the construction work force would have on local communities.

The second category is dominated by social impacts that would result from the project's interference with land use patterns and local residents' quality of life. These types of impacts are associated with personal perceptions and values. They would vary by plan and are highly correlated with other resources such as agriculture, recreation, and esthetics. These social impacts are more important than the economic impacts to local residents and are far more useful for differentiating the overall socioeconomic impact of the alternative plans. Below is a discussion of economic, demographic, and social impacts, excerpted from the comprehensive socioeconomic study in APPENDIX D.

Economic and Demographic Impacts

Property Values

As part of the socioeconomic impact assessment of the Garrison-Spokane 500-kV Transmission Project, Mountain West Research, Inc. carried out a detailed review of previous research literature about the effect of transmission lines on property values. In principle, the cost of the encumbrance and inconvenience caused by a transmission line right-of-way crossing a particular land parcel is established by appraisal and compensated through the right-of-way acquisition payment. Beyond these costs, however, the literature is not conclusive about whether or not property values are adversely affected by transmission lines and, if so, by how much, under what conditions, and for which kinds of property. Much of the literature reports that transmission lines have little or no effect on property values; a smaller number of studies report reduced values for residential property. Among this latter group are those that were judged to be the best designed from a scientific research point of view (Mountain West Research, Inc. 1981). Because the findings in the literature are contradictory, it is not possible to predict whether or in what magnitude property value effects would occur.

Employment

Work on the transmission line would be divided into approximately six construction schedules, each 30-50 miles long. Workers would assemble each morning at a reporting station in a nearby community, and then fan out for work. The locations of these reporting stations would remain fixed throughout construction, and would have significant influence on the residential patterns of non-local construction workers. Table 4.4 displays important characteristics of the six construction schedules that have been assumed for this project.

Mostly local workers (about 75 percent) would be employed for clearing work. Such jobs would last about eight months and would employ about 200 local workers. Additional local employment would likely result from construction of right-of-way access roads. Specialized skills not locally available will be required for critical portions of transmission line and substation construction. These include such work as footings placement, tower erection, and conductor installation. Between 100 and 300 jobs over a period of 12 to 24 months could still be filled by local workers. Overall, approximately 20 to 40 percent of construction personnel could be hired locally. This could increase near the Spokane area where skilled specialists are more readily available.

Tourism

Many local residents believe that the project's adverse visual effects would have a negative influence on recreationists and tourists. If any of these visitors choose not to come to the project area or choose to spend their vacation dollars elsewhere, then the project could have an indirect but very important adverse impact on commercial establishments that depend on tourist business.

Very little research has been done on undesirable visual features and their effects on tourism. Hence, it would be too speculative to predict accurately the lines' potential impacts on tourist-related employment and income in the project area.

Demographics

For every 100 non-local workers employed on the line, about 67 other family members (spouses and children) would accompany them during summer months. In winter, many of the workers' children attend school and would live at their permanent residences. Non-local workers and their families are expected to live primarily in travel trailers/campers/RV's or in motels within 30 miles of their reporting stations. Their choice of campgrounds and communities will reflect a desire to minimize travel time to reporting stations and a desire to have restaurants, stores, and other amenities easily available. Table 4.5, which takes these factors into account, presents estimated peak population influxes in communities along the line for each plan.

Housing

Such influxes could have positive effects on available rental housing or motel space. However, they could also create a shortfall of available housing for non-local workers, and could conflict with demands for lodging by business travelers, summer tourists, and hunters. Lodging shortfalls are expected to very limited, but are likely to occur under all three plans. Lodging shortfalls of about 16 persons per night in the Deer Lodge-Drummond area are likely to occur no matter which plan is selected. They are forecast to occur from June - November 1984 and from June - September 1985.

The Hot Springs and Plains plans are likely to cause shortfalls of about nine persons per night in the Plains-Thompson Falls area from June - November 1984, as construction workers' needs would coincide with those of summer tourists and fall hunters. The Taft plan would cause greater shortfalls in the St. Regis-Superior area (35 persons per night) between June and November 1985.

Facilities/Services

Because only some of the non-local workers will be accompanied by family members, the influx of people associated with construction of the line will not have a significant adverse effect on local public services and facilities. In fact, when combined with local purchases by construction contractors, the temporary presence of construction workers is likely to have a net positive impact on communities due to the injection of income into local economies from expenditures on such items as gasoline, food, and lodging.

Income Effects

Positive income impacts from the construction of this line would occur from the spending of construction worker salaries in local communities and from contractors' purchase of local materials and services. Total payroll for any of the three plans would be approximately $28 million. Projected local and non-local worker payrolls by plan and county of worker residence are presented in table 4.6. While local workers are likely to spend a high proportion of their income locally, non-local workers are estimated to spend an average of 40 percent of their income in local and regional trade centers. When workers spend these wages to acquire personal goods and services, they "induce" income for businesses in local and neighboring counties. Table 4.7 shows the amount of induced income expected by county. The project's total income effect under any of the three plans would be approximately $32 million.

Although most construction materials would be procured from outside suppliers, BPA's construction contractors would be likely to purchase fuel, concrete, lumber, small tools, and vehicle parts and services from local suppliers. It is estimated that about five percent of total project cost would be spent on such purchases. The actual amount would depend on total cost and location of the route to be constructed, but would range between $12 and $14 million.

Total income effect for the project, which would include both contractor local purchase and payroll effects, varies by plan as follows:

Plan	Total Income Effect
Hot Springs	$44,277,000
Plains	$44,404,000
Taft	$46,546,000

The income effects, tax effects, and revenues foregone analyses were based on 1981 project cost estimates that are approximately 24 percent below the cost estimates presented in table 2.1. Since this increase would be the same for any of the three plans, the social and economic rankings of the route alternatives would not change.

Agriculture and Forestry Productivity

The line will affect both short- and long-term production on private agriculture, forestry, and rangeland. Economic impacts overall would be negligible because (1) total amounts of agricultural and forest land affected are not large (table 4.2), and (2) in principle, right-of-way acquisition payments and land purchases made by BPA would fully compensate owners for productivity losses and inconveniences.

Short-term economic effects on forestry would be caused by removal of timber for a 125-foot right-of-way and for access roads. Compensation for current

Table 4.4 - Construction Schedule Estimates

BPA Alternatives

Schedule Number	Construction Period		A: Hot Springs Plan		B: Plains Plan		C: Taft Plan	
	Clearing	Construction	County(s)	Reporting Station	County(s)	Reporting Station	County(s)	Reporting Station
1	March 1984 - October 1984	March 1984 - September 1985	Powell Granite	Drummond	Powell Granite	Drummond	Powell Granite	Drummond
2	March 1984 - October 1984	March 1984 - September 1985	Missoula	Missoula	Missoula	Missoula	Missoula	Missoula
3	March 1984 - September 1984	March 1984 - September 1985	Missoula Lake	St. Ignatius	Missoula	Missoula	Missoula	Missoula
4	March 1984 - October 1984	April 1985 September 1986	Lake Sanders	Thompson Falls	Sanders	Thompson Falls	Mineral	St. Regis
5	March 1984 - October 1984	April 1985 - June 1986	Shoshone	Kellogg	Shoshone	Kellogg	Shoshone	Kellogg
6	March 1984 - October 1984	May 1985 - June 1986	Kootenai Spokane	Coeur D'Alene	Kootenai Spokane	Couer D'Alene	Kootenai Spokane	Couer D'Alene

WWP Alternatives

Activity	Pine Creek-Wallace (common to all plans)		1 - Thompson Falls Plan	2 - Eagle Creek Plan	3 - Taft Plan	4 - Noxon Plan
Transmission Line	Pine Creek-Wallace		Thompson Falls-Wallace	Eagle Creek-Wallace	Taft-Wallace	Noxon-Wallace
Clearing	June 1983 - August 1983		June 1985 - August 1985	June 1985 - August 1985	June 1985 - August 1985	May 1984 - October 1984
Construction	April 1984 - July 1984		April 1986 - July 1986	April 1986 - July 1986	April 1986 - July 1986	May 1984 - October 1984
Substation	Wallace	Pine Creek	Thompson Falls	Eagle Creek	Taft	Noxon
Site Preparation	July 1982- June 1983	(existing site)	July 1984- June 1985	July 1984- June 1985	(same as BPA)	(existing site)
Construction	July 1983- June 1984	March 1984- June 1984	July 1985- June 1986	July 1985- June 1986		March 86- June 1986

Source: Mountain West Research, Inc.

Table 4.5 - Peak Population Influx (Numbers of People)

BPA Alternatives

Community	A-Hot Springs Plan	B-Plains Plan	C-Taft Plan
Drummond*	68	68	68
Phillipsburg	8	8	8
Deer Lodge	25	25	25
Garrison	20	20	20
Missoula*	95	190	190
St. Ignatius*	40	--	--
Ravalli	20	--	--
Ronan	18	--	--
Polson	18	--	--
Arlee	15	--	--
Thompson Falls*	75	75	--
Trout Creek	5	5	--
Paradise	6	6	--
Noxon	6	6	--
Plains	35	32	--
Haugan	--	--	13
St. Regis*	--	--	78
Superior	--	--	15
Kellogg*	41	41	44
Wallace	10	10	13
Mullan	4	4	5
Osborn	10	10	10
Smelterville	10	10	10
Pinehurst	12	12	12
Coeur d'Alene*	99	99	99
Spokane	23	23	23

WWP Alternatives

Community	Pine Creek-Wallace (Common to all plans)	1-Thompson Falls Plan	2-Eagle Creek Plan	3-Taft Plan	4-Noxon Plan
Thompson Falls	--	33	--	--	--
Noxon	--	--	13	--	23
Kellogg	18	--	--	--	--
Wallace	26	15	27	18	15
Prichard-Murray	--	--	8	--	--
Mullan	--	--	--	10	--
Pinehurst	15	--	--	--	--

Source: Mountain West Research, Inc., 1981.

*Reporting station.

Table 4.6 - Estimated Payroll by County of Worker Residence
(Thousands of 1981 Dollars)

BPA Alternatives

County	A-Hot Springs Plan			B-Plains Plan			C-Taft Plan		
	Local	Non-Local	Total	Local	Non-Local	Total	Local	Non-Local	Total
Granite	707	2,551	3,258	707	2,551	3,258	707	2,551	3,258
Powell	212	1,227	1,439	212	1,227	1,439	212	1,227	1,439
Missoula	918	2,543	3,461	1,721	5,986	7,707	1,721	5,986	7,707
Lake	803	3,443	4,246	-	-	-	-	-	-
Mineral	-	-	-	-	-	-	1,386	3,831	5,217
Sanders	1,386	4,082	5,468	1,386	4,082	5,468	-	-	-
Shoshone	1,070	3,220	4,290	1,070	3,220	4,290	1,070	3,620	4,690
Kootenai	1,404	3,561	4,965	1,404	3,561	4,153	1,404	3,561	4,965
Spokane	66	592	658	66	592	658	66	592	658
TOTAL	6,566	21,219	27,785	6,566	21,219	27,785	6,566	21,368	27,934

WWP Alternatives

County	1-Thompson Falls Plan			2-Eagle Creek Plan			3-Taft Plan			4-Noxon Plan		
	Local	Non-Local	Total	Local	Non-Local	Total	Local	Non-Local	Total	Local	Non-Local	Total
Sanders	47	782	829	-	-	-	-	-	-	47	343	390
Shoshone 1/	142	1,381	1,523	189	2,163	2,352	189	1,113	1,302	142	1,381	1,523
Mineral	-	-	-	-	-	-	-	-	-	-	-	-

Source: Mountain West Research, Inc., 1981.

1/ No workers would be residing in Mineral County.

Table 4.7 - Estimated Induced Income Effect of Construction Worker Expenditures (Thousands of 1981 Dollars)

BPA Alternatives

County	A-Hot Springs Plan			B-Plains Plan			C-Taft Plan		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Granite	1,727	829	2,556	1,727	829	2,556	1,727	829	2,556
Powell	703	337	1,040	703	337	1,040	703	337	1,040
Mineral	-	-	-	-	-	-	2,918	1,401	4,319
Sanders	3,091	1,449	4,468	3,091	1,449	4,468	-	-	-
Lake	2,180	1,047	3,226	-	-	-	-	-	-
Silver Bow	-	729	729	-	729	729	-	729	729
Flathead	-	654	654	-	-	-	-	-	-
Missoula	1,935	2,797	4,732	4,115	4,498	8,613	4,115	4,464	8,579
Shoshone	2,358	1,556	3,914	2,358	1,556	3,914	2,518	1,662	4,180
Kootenai	2,828	2,489	5,317	2,828	2,489	5,317	2,828	2,508	5,336
Spokane	303	5,050	5,353	303	5,050	5,353	303	5,087	5,390
TOTAL	15,053	16,937	31,990	15,053	16,937	31,990	15,112	17,017	32,129

WWP Alternatives

County	1-Thompson Falls Plan			2-Eagle Creek Plan			3-Taft Plan			4-Noxon Plan		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Sanders	360	173	533	-	-	-	185	89	274	-	-	-
Missoula	-	122	122	-	-	-	-	63	63	-	-	-
Shoshone	695	458	1,153	634	419	1,053	695	458	1,153	1,055	696	1,751
Kootenai	-	83	83	-	76	76	-	83	83	-	127	127
Spokane	-	472	472	-	254	253	-	328	328	-	422	422
TOTAL	1,055	1,309	2,363	634	749	1,382	879	1,021	1,901	1,055	1,244	2,300

Source: Mountain West Research, Inc., 1981.

market value of the timber, covered in right-of-way payments by BPA, would range from $2.7 to $3.7 million, depending on the route and plan chosen. 4/

Long-term economic effects include reduction of the land's productive capacity for timber growth within the right-of-way and interference with timber management practices. U.S. Forest Service estimates of net present value for high, moderate, and low productivity forest land are $98/acre, $76/acre, and $0/acre, respectively. These net present value figures represent expected revenues from harvests, less expected harvesting and management costs per acre over the next 100 years. As indicated by the $0 figure, the harvesting and management costs on low productivity forest land are expected to exceed the revenues that could be obtained from harvesting it. Net present values of expected timber growth inside the rights-of-way range from $153,000 to $256,000, depending on route and plan. Compensation is not made for these impacts. The sums involved are not large, but would be lowest for the Hot Springs alternative.

Transmission line construction would temporarily render agricultural land unproductive, a short-term effect. In the long term, land would be taken out of production by the installation of tower bases. Right-of-way payments and land purchases made by BPA are to compensate land owners fully for net income losses caused by the project.

The short-term production values foregone on cropland were determined by assuming crop value per acre for irrigated ($415) and nonirrigated ($235) crops. The production values foregone assume that productive cropland is taken out of its present use for one complete growing season and that 5 percent of all cropland is in fallow and therefore unproductive during the construction period.

The total value of production foregone would range from about $119,000 to $317,000, depending upon plan selected. The sums implied by this analysis are not large, but production losses would be lowest for the Taft alternative.

Transmission line towers would remove about 0.05 to 0.3 acres of productive land per mile of line. For the Hot Springs route, which would cross the greatest amount of productive agricultural land, the annual loss in production value would be about $4,860 for the entire length of the line. This "worst case" example is relatively insignificant when compared to short-term effects. Economic effects on rangeland are negligible and are lowest for the Taft alternative.

The economic effects that would result from transmission line interference with irrigation or other agricultural activities such as seeding, harvesting,

4/ Total estimated value of timber in the rights-of-way for each plan are:

Hot Springs Plan	$3,225,000
Plains Plan	$3,435,000
Taft Plan	$3,682,000

or weed control would vary on a site-specific basis and are thus too speculative to estimate. Therefore, although these effects could be more important than those noted above, they cannot be accurately quantified in this analysis.

Fiscal Impacts: Revenues Foregone

Another unavoidable long-term impact would occur because BPA is a tax-exempt government agency and does not pay property taxes on its facilities. If the lines were constructed by a private taxable entity, local counties would receive tax revenues. Because BPA is tax-exempt, "revenues foregone" are perceived as an unavoidable adverse impact.

Revenues foregone, calculated on the basis of cost of the system and distributed among the three states crossed, are shown in table 4.8 for the first year. If the Garrison-Spokane Transmission Project were sponsored by a private utility, total first-year property tax liabilities would range between $3.88 million for the Hot Springs plan and $5.45 million for the Taft plan.

If the line were not a tax-exempt facility, its effects would be greatest if the Taft plan were built through Granite and Mineral Counties, where first-year county revenues would be 25 percent and 77 percent over 1979 levels, respectively. Long-term, cumulative revenues foregone by all counties would range from $68.4 million for the Hot Springs plan to $103.6 million for the Taft plan. Overall, the Hot Springs plan would have the lowest revenues foregone. (For a more complete discussion of tax revenues, see Chapter 4 in APPENDIX D.)

Social Impacts

The social impacts of the project are more noteworthy than the economic/demographic impacts and serve better to differentiate the route alternatives' potential effects on the human environment. The social effects are best understood in light of the study area's social conditions, which include: (1) the small town and rural environment in which nearly half of the area's population resides; (2) the scenic qualities of much of the area; (3) the importance of agricultural and forest resources; and (4) the importance of outdoor recreation activities. Based upon interviews with previously affected landowners and with those landowners who could be affected by this project, several general conclusions regarding social impacts can be drawn.

During the preconstruction period, local landowners would realize social effects in the form of concern and uncertainty over the process of route and final centerline selection and right-of-way acquisition. Their concerns stem from anticipated participation in a negotiation process and from the permanence of the siting decision. When a right-of-way has not been established, many landowners are expected to view its acquisition and establishment as an intrusion on their private property rights. Their feelings may be complicated by the potential for eminent domain which would make it difficult for them to refuse to negotiate. Local landowners have also expressed great concern about the lines' potential effects on their property values. Whether or not this

Table 4.8 - First Year Property Tax Revenues Foregone
(Thousands of 1980 Dollars)

County	1979 County Revenue	BPA Alternatives A-Hot Springs Plan	B-Plains Plan	C-Taft Plan
Powell	$ 5,499	$ 416 a/	$ 429 a/	$ 375 a/
Granite	2,867	365	390	730
Missoula	88,822	909	1,452	1,280
Lake	20,731	129	-	-
Sanders	9,465	1,660 b/	1,320 c/	-
Mineral	3,442	-	-	2,637 d/
Shoshone	13,832	110	109	137
Kootenai	26,055	144	144	144
Spokane	102,070	147 e/	147 e/	147 e/
TOTAL	$272,763	$3,800	$3,991	$5,450

Source: Mountain West Research, Inc., 1981.

Note: County revenue and trust agency revenue included in all figures. Substation costs included as follows:

a/ $228,000 - Garrison, Phase II
b/ $221,000 - Hot Springs
c/ $241,000 - Plains
d/ $689,000 - Taft
e/ $ 83,000 - Bell expansion

devaluation occurs, the simple fact that so many individuals are concerned makes the possibility of property devaluation an important social impact.

During the construction period, farmers and ranchers are most concerned about potential damage that construction activitiy could do to existing land and roads. They are also concerned about construction effects on livestock and the general stress of coping with the inconvenience posed by the construction process. Homeowners' concerns are focused on the potential disagreeable esthetic aspects of the construction process, such as noise, dust, loss of privacy, and on the difficulty of accepting the line's existence on or near their property.

During the operations period, evidence suggests that the project would have different social effects on homeowners, farmers, ranchers, and users of public land. Homeowners are most concerned about the project's visual effects and remain highly uncertain about its potential health and property value effects. Farmers are most concerned about the project's potential interference with irrigation and farm machinery, and about its effect on their ability to develop or subdivide the land in the future. Ranchers are most concerned about the potential, but unproved, biological effects of a transmission line on their stock and about access road gate management problems. Both farmers and ranchers are concerned about the physical safety of working around a high voltage line and about the potential trespassing problems that could result from new access roads. Some recreationists who use public land may object to the project for visual reasons, but others may appreciate the fact that new access roads would open up new areas and therefore increase recreational opportunities.

Although it is difficult to combine and compare the social effects of the project, the summary impact measures discussed above clearly indicate that the Taft Plan would have less social impact. The route would cross significantly fewer miles of private and Reservation land and would cause less total inconvenience by land use type. The route would also minimize crossings of areas that are sensitive because of their regional or national importance. Consequently, because it minimizes social impacts, the Taft route is preferred from a socioeconomic standpoint. Of the Washington Water Power Company plans, their two Taft variations rank slightly better than the others from a socioeconomic perspective. Of the two, the Taft South route is slightly more preferable from a socioeconomic perspective. The Noxon Plan is a close second.

Route-Specific Impacts

Unavoidable socioeconomic impacts on landowners, land use patterns, and local quality of life are likely to occur even though route alternatives have been located to avoid high population concentrations, private land, and important land uses wherever possible. Below are several areas of social concern used to measure the impacts of this project.

Land Ownership

Locating the proposed line on public land, where possible, instead of on private land would have different and generally lesser effects. Siting the line on private land would substantially increase the number of people directly affected by the line through negotiations for rights-of-way, dealings with construction and maintenance crews, daily exposure to the presence of the line, and disruption or constraint of land use options.It would also raise a greater level of concern over health and safety effects. In this respect, the amount of private and Reservation land crossed by the Taft alternative is well below the amounts crossed by the Hot Springs and Plains alternatives.

Inconvenience by Land Use Type

In addition to economic impacts on land uses, additional inconvenience impacts will occur. Residents of urban-residential areas and areas of dispersed development may be affected by the views and perceived health effects of the line (see Electrical and Biological Effects). Although these residents have expressed concern over possible adverse effects on property values, such effects have not been conclusively shown to result from line construction.

Even when transmission line towers are carefully placed in agricultural areas, irrigated-cropland farmers and ranchers are likely to suffer some inconvenience if their land is crossed by the line. Similarly, tree farmers and owners of timberland are likely to be inconvenienced if access roads and/or new corridors open their land to increased public access. Impacts in this category would be lowest for the Taft Plan.

New Access Roads

Even when access roads are carefully maintained and managed, they are likely to interfere with agricultural practices in some areas. Also, on both forest land and Federal land, new access roads will facilitate increased public access. Although increased access is seen as a beneficial impact by some, it may not coincide with Federal or company management plans. While new access road requirements would be least for the Hot Springs route, the higher access requirements in the Taft route would affect more public land.

New Corridor Development

The establishment of a new corridor through an area which previously had no other transmission line, road, railroad, or pipeline has negative esthetic and inconvenience effects on adjacent property owners and viewers. These new effects are generally perceived to be worse than the simple incremental effects that would occur if the new line had been placed along an existing corridor. Exceptions to this rule could occur in places like the Plains-Thompson Falls area (Hot Springs or Plains Plan), where one additional transmission line could have a severe impact on the amount of land available for other types of use.

Alienation

Even with a demonstration of need for and benefits of the line, many people would still be opposed to the line as a whole or to particular route segments because of the segments' site-specific impacts. This alienation has emerged in BPA scoping meetings, local newspaper articles, and hearings on the draft EIS, and is likely to increase as the project construction period approaches.

CULTURAL RESOURCES

Mitigation measures and procedures employed to comply with antiquities laws and regulations make the likelihood of direct impacts on cultural resources low. Cultural resources are vulnerable to impacts from surface or subsurface disturbance and from visual intrusion. Structures are vulnerable to tree felling and to movement of heavy equipment. Deposits on or just below the ground can easily be affected by vehicle traffic, dragging of objects, and erosion caused by project activities. Construction work and project-induced erosion can cause minor disturbance or can totally destroy buried deposits. Increased public access to previously isolated areas, an indirect result of the project, may increase likelihood of further disturbance. A line may also intrude visually upon the setting of cultural sites, particularly religious sites, rock art, stone structures, and historic sites with potential as interpretive locations.

The significance of an impact on a specific site varies with the impact's intensity and the site's sensitivity to impact (table 4.2). Sensitivity, in turn, depends on the extent and condition of the site's cultural resource deposits or features and the degree to which it represents a unique or irreplaceable part of the cultural record. Particularly, sites which contain information important to the understanding of history and prehistory, which embody distinctive or unique forms or styles of architecture or artistry, or which are associated with people or events important in the history of the nation, region, or local area in which they occur are highly sensitive. Disturbance of or visual intrusion on such sites or areas could constitute a significant impact.

All of the sites or areas discussed under the specific impact sections (see fig. 4.5) contain or have a high probability of containing significant cultural resources highly susceptible to impact. BPA will comply with the National Historic Preservation Act of 1966 and all other laws and regulations protecting historic and archeologic resources. Procedures include gathering of data, defining specific site locations during the line location phase, and developing of mitigation or avoidance measures with help from the Advisory Council on Historic Preservation and from State Historic Preservation Offices. Where sites cannot be avoided, salvage will be undertaken in consultation with the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and the Secretary of Interior.

Discovery Situations

If a previously unknown resource is discovered late or accidentally during construction, BPA will follow the procedures outlined in 36 CFR Part 66, including:

1. Halting work in the area of impact.

2. Notifying the Secretary of the Interior through the Departmental Consulting Archeologist by telephone that potentially significant resources have been discovered during construction or project implementation. A telegraphic abstract of the conditions resulting in the discovery, the potential significance of the data, the nature and extent of compliance activities and the availability of funds under section 7 (a) of Public Law 93-291 should follow immediately.

3. Arranging with the Departmental Consulting Archeologist for an on-site inspection, if necessary.

4. If required, redesigning the project to avoid the significant resource or undertaking data recovery. The assessment of preservation and data recovery alternatives should be made in accordance with the guidelines previously presented.

5. Seeking the comments of the Advisory Council on History Preservation, if warranted.

BPA will also comply with procedures, regulations, and permit procedures of the Confederated Salish and Kootenai Tribes, should cultural and archeological resources of importance to them be encountered. This includes proper notification, consultation, and obtaining of necessary consents (see Consultation, Review, and Permit Requirements).

ELECTRICAL AND BIOLOGICAL EFFECTS

Electrical properties of 500-kV transmission lines produce corona and field effects. Corona effects include possible radio and television reception interference, audible noise, and production of insignificant amounts of oxidants (e.g., ozone). Electric and magnetic fields induce currents and voltages in objects near a transmission line. This can result in annoying spark discharge shocks. Questions have also been raised about the possible long-term effects of induced body currents below the level of perception. The above types of electrical and biological effects are summarized in this section and discussed in greater detail in two BPA publications incorporated by reference (USBPA 1981, Lee et al. 1982).

Table 4.9 lists representative levels of electrical properties for the proposed Garrison-Spokane 500-kV transmission lines. BPA has considerable

Table 4.9 - Representative Levels of Electric Field Strength and Audible Noise.

Line Type	Conductor Size mm(in)	Electric Field Strength 1/		Audible Noise Levels 2/		
		Max (kV/m)	ROW Edge (kV/m)	Rain L_{50} (dBA) Elevation		L_{dn} (dBA) 3/
				0 ft.	4,000 ft.	4000 ft.
500 kV single circuit line (twin 3/8" OHGH)	3x33.07 (3x1.302)	8.2	2.6	52.1	56.1	52.1
500 kV double circuit line (twin 1/2" OHGH)	3x40.69 (3x1.602)	7.6	1.8	51.8	55.8	51.8
500-kV/230-kV/100-kV Triple Circuit	3x1.302 1x1.302 1x1.302	8.6	1.9	51.4	55.4	51.4

1/ Electric Field Strengths may be lower but will not exceed the values listed, with line at 550 kV.

2/ Audible noise levels are at 60 ft. from centerline, with 500-kV lines operating at 540 kV.

3/ Day/night levels (L_{dn}) are for 5 percent foul weather and 40 dB(A) ambient noise.

operating experience with this voltage. There are over 3,500 miles of BPA 500-kV lines, the first of which began operating in 1967. There are also many thousands of miles of this voltage line operating throughout the United States.

The strength of an electric field at any location is a function of the amount of voltage on the conductor and of the distance from the conductor to a given object. The voltage is not changed when one 500-kV line parallels another. Although the lowest conductor on a single-circuit 500-kV line is the same distance from any given object as the lowest conductor on a double-circuit line, the upper conductors for double-circuit lines are farther from that object than those for single-circuit lines. Thus, effective overall distance from the energized wires is increased. In addition, some of the electric field produced by one phase of a line cancels some of the field produced by other phases. Thus, the maximum electric and magnetic field at ground level for a BPA double-circuit 500-kV line is no stronger than that allowed for a single-circuit line. That is, two 500-thousand-volt circuits do not "add up" (in electric field effects equivalent) to a 1-million-volt line. This is easily verified by measuring the field strength with a hand-held meter. As shown in table 4.9, maximum electric field strength beneath the double-circuit 500-kV line will actually be less than for the single-circuit line.

The maximum electric field strengths shown in table 4.9 occur in a relatively small area on the right-of-way near midspan. This is where the conductors sag closest to the ground. The field strength decreases very rapidly away from the line. The values given are also maximums that would only occur if the lines were at maximum voltage and temperature. Normally, the maximum field would be less than given in table 4.9.

There are no national standards for electric field strength from transmission lines. The U.S. Environmental Protection Agency investigated this subject and found no evidence that existing field strengths posed a health hazard (Janes 1980). Similarly, most states have apparently not found it necessary to establish field strength limits. Exceptions include New Jersey (3 kV/m edge of right-of-way maximum), Oregon (9 kV/m maximum on right-of-way), Minnesota (8 kV/m on right-of-way) and New York (1-2 kV/m edge of right-of-way maximum).

The New York case is unusual in that the 1 kV/m was applied to new 765-kV lines. In that state, 345-kV lines have successfully operated for many years with field strengths at the edge of the right-of-way of around 1.6 kV/m. Thousands of miles of 765-kV lines are successfully operating in other states (and Canada) with edge of right-of-way field strengths of 3 to 4 kV/m.

Field strengths for BPA 500-kV lines are similar to those of the thousands of miles of other 500-kV lines in operation or planned across the United States.

Another point of clarification concerns frequency and wavelength. Electrical energy carried by a 500-kV line alternates at 60 cycles per second (60-Hz). In comparison, television transmitters operate in the 55 to 885-MHz (MHz = million cycles per second) range and microwaves are 1,000 MHz and above. The wavelength at 60-Hz is approximately 3,100 miles, while wavelengths of microwaves are less than one foot long. The shorter wavelengths are absorbed by biological material, and, in the case of microwaves, can produce heating (e.g., microwave ovens). In contrast, the extremely long wavelength at 60-Hz allows the transfer of only a minute amount of energy to objects the size of a person.

Design and mitigation options to minimize adverse electrical effects have been developed from many years of utility operating experience and from numerous studies. For example, the proposed 500-kV lines would use the latest design for minimizing noise production. This consists of using large diameter conductors in bundles of three for each of the line phases. The audible noise is primarily a foul-weather phenomenon. Water droplets on the conductors form corona discharge points which produce a crackling, hissing noise. During snow, a 120-Hz "hum" may be present. Operating experience and research indicates that the amount of audible noise produced by the proposed line would not have any major effect on people.

A study was recently prepared for the Montana State Department of Natural Resources and Conservation (DNRC) which deals specifically with the audible noise impact and electric field levels of BPA's proposed Garrison-Spokane 500-kV transmission project (Dietrich 1982). The Dietrich report verifies studies done by BPA which show that the median (L_{50}) audible noise level predicted during foul weather (for a line at 4,000 feet elevation) is approximately 56 dB(A) at the edge of the right-of-way for both the single- and double-circuit 500-kV designs. However, the calculation of the day/night noise level of 54 L_{dn} given in the report assumed a 10 percent frequency of foul weather. The actual frequency of foul weather for the proposed route through Montana is approximately 5 percent (Climatological Handbook 1968). Using this lower percentage, the L_{dn} level would be 52 dB(A), which is 3 dB below the EPA L_{dn} guideline of 55 dB(A). The Dietrich report acknowledged that foul weather statistics for the proposed line route were not known to the author and that the 10 percent level was a high estimate that overstates the noise impact of the line.

The report suggested that a 5 dB(A) penalty (reduction) be applied to the EPA L_{dn} guideline of 55 dB(A) because of the high frequency components associated with audible noise generated by transmission line corona. Corona-generated noise does contain higher frequency components than some other types of environmental noise. The EPA L_{dn} guideline, 55 dB(A), is by definition a limit to protect health and welfare with an adequate margin for safety and applies to all types of environmental noise regardless of frequency spectra. The EPA guideline does not call for a penalty to be established based on frequency spectra. In fact, the sound of rain, which is one of the most common environmental noises and the instigator of most transmission line audible noise, contains high frequency components similar to corona-generated noise as is stated in the report. Ambient levels of rain in forest areas are approximately 48 dB(A) which is only 8 dB(A) below the 56 dB(A) corona noise at the edge of the right-of-way. It should also be noted that the 1979 EPRI study cited in the report is of limited value because of the small scale of the experiment. The most extensive work done on this subject, by Molino et al.(1979) at the National Bureau of Standards, showed that only a 3 dB(A) penalty should be added to corona noise to give equal annoyance as from other environmental sounds. If a 3 dB(A) penalty is applied to the L_{dn} to account for the high frequency components, the sound level of 52 dB(A) at the edge of the right-of-way does not exceed the EPA L_{dn} guideline of 55 dB(A).

Reference is also made to BPA published experience (Perry 1972) with complaints of transmission line noise annoyance throughout the BPA system as of 1970. These results showed that for lines with median foul weather sound levels of 52.5 dB(A) or less at 100 feet from the centerline, no complaints were received. For levels between 52.5 dB(A) and 59 dB(A), some complaints were received. The median level, L_{50}, for the proposed line at 100 feet from the centerline is 54 dB(A). Hence, the report concludes that the line would produce some complaints from people living very near the edge of the right-of-way. However, this conclusion is not completely applicable because the BPA study (Perry 1972) was done for lines west of the Cascade Mountain Range. In that area, the occurrence of foul weather is very high, approximately 17 percent as compared to 5 percent for the proposed route. In fact BPA has never had a complaint about audible noise from multi-conductor bundle 500-kV lines east of the Cascades where the occurrence of foul weather is much less. In addition, BPA has received no complaints about audible noise from the 3-bundle 500-kV lines (similar to the proposed line designs for Garrison-Spokane) west of the Cascades.

BPA policy is to evaluate complaints about noise and to develop appropriate mitigation for any BPA facility not in compliance with applicable noise regulations. In the 1970's BPA reconductored selected portions of the old single 2.5-inch diameter conductor 500-kV lines, which had audible noise levels of 62 dB(A) (L_{50} foul weather). These lines were the subject of numerous complaints; the problem was alleviated by reconductoring with 3 x 1.2 inch conductor bundles.

The report (Dietrich 1982) also verified calculations by BPA which show that the maximum electric field at the edge of the right-of-way for the double- and single-circuit 500-kV lines will be 1.8 kV/m and 2.6 kV/m, respectively. The report indicates that BPA has optimized the design of the proposed transmission lines for minimum electric field generation. The report also acknowledges that actual electric field levels will generally be less than these maximums because of irregular terrain and the presence of vegetation.

Research has shown that animals show little if any reaction to the noise produced by transmission lines. A study in Idaho found that the noise from a 500-kV line did not deter deer and elk from using the right-of-way. However, the presence of hunters on the right-of-way did cause big game to avoid the right-of-way and other clearings. Animals that are hunted quickly learn to associate the sight and sounds of people with danger. A 5-year-long study of the BPA 1100-kV prototype line further indicates that noise from corona discharge does not adversely affect wildlife.

Corona electrical noise may cause some interference with television and AM radio reception in areas near the line remote from broadcast transmitters. However, if such interference from the line occurs, mitigation would be undertaken by BPA to restore reception. Examples of such mitigation can be found in two reports available from BPA (Loftness 1977, 1980).

Voltages induced on objects near a 500-kV line can result in annoying shocks to people or animals touching the objects. To prevent such shocks, metal objects such as fences are routinely grounded. For moveable objects (e.g., vehicles), lines are designed so that the maximum current a person could receive by touching the object is less than 5 milliamps. This follows requirements of the National Electrical Safety Code. Under BPA policy, currents are normally below 2 mA. More information on ways to prevent shocks is contained in the BPA publication, Living and Working Around High-Voltage Power Lines. Topics covered include handling of irrigation equipment and vehicle refueling near transmission lines.

Induced voltages and currents from a variety of sources may also affect some cardiac pacemakers designed to function by sensing the low-level voltages produced by the heart. Touching an electric tool or appliance or being in an electric field can also cause weak voltages in a person's body. Most pacemaker manufacturers now design their products to block most of these extraneous voltages.

No confirmed reports exist of a BPA transmission line harming a person having a cardiac pacemaker. As a precaution, however, persons with pacemakers should not unnecessarily spend long periods of time beneath transmission lines without checking with their physicians to determine if their types of pacemaker are susceptible to low-level induced voltages.

A person or animal near a 500-kV transmission line will have electrical current induced in his body. For a person six feet tall, a 9 kV/m electric field would cause an imperceptible current flow of up to 0.2 mA through the person. The mean perception level through the hand for a 180-lb. person is around 1.0 mA. For a 120-lb. person, the perception level is about two-thirds of that value. Under certain conditions, some people may be able to sense the electric field from a 500-kV line through slight hair vibration. Induced currents below the level of perception are not unique to a transmission line environment. Standards developed by the American National Standards Institute limit the leakage current for portable appliances (e.g., electric drill, hair dryer) to 0.5 mA.

Questions have been raised about the possibility of biological effects from induced body currents below the level of perception. In the early 1970's, a growing interest developed about possible effects associated with long-term exposure to electric fields such as those produced by transmission lines. This was largely because of reports from the Soviet Union which suggested that workers in electrical substations were adversely affected by electric fields. Such effects, however, have generally not been reported by substation personnel or linemen in the United States or other countries. Recently, the Soviets have also indicated that the expected dangerous effects of electric fields were overestimated (Bourgsdorf 1980).

In 1975, BPA formed a special team to conduct an in-depth review of information on the electrical and biological effects of transmission lines. Results of the review were first reported in a 1975 BPA publication entitled Electrical Effects of Transmission Lines. The review is continuing, and updated editions of the Electrical Effects booklet were completed in June 1977, November 1978, and August 1982. These documents have been widely distributed. We concluded that no valid evidence indicated a health hazard from transmission line electric or magnetic fields.

This conclusion is consistent with most other reviews of this subject done since 1975. The BPA Electrical Effects booklet (Lee et al. 1982) cites over 30 such reviews done by groups in the United States and in seven other countries. This includes reviews by the U.S. Environmental Protection Agency, and several state agencies. These reviews typically conclude that transmission line fields have not been shown to cause harmful effects to people or animals. Only a few persons (e.g., Dr. A. Marino and associates) concluded that such lines have caused or are likely to cause some unspecified adverse effects.

The Montana Department of Natural Resources and Conservation (DNRC) contracted for services to analyze research on electrical and biological effects of transmission lines, and to review the effects of the proposed BPA Garrison-Spokane 500-kV line. A report on the biological effects of high voltage transmission lines was submitted to DNRC by Dr. A. R. Sheppard in January 1983 (Sheppard 1983).

Dr. Sheppard's review covered essentially the same body of research as that described in the BPA Electrical Effects booklet and in this final EIS. His conclusions about the generally low potential for health effects from transmission line electric fields are consistent with those of BPA and most other published reviews. For example, Dr. Sheppard states (page VII-5):

> The foregoing review of research in laboratory animals and the few studies of humans leads to the conclusion that pathophysiological effects in human beings exposed to 60-Hz electric fields at any field strength are unproven and speculative. Similarly, subtle effects on the nervous system that may alter mental state, disrupt normal body rhythmicity, alter libido, increase the frequency or severity of headaches, or lead to effects on digestion or other functions influenced by the central nervous system are not demonstrated by the scientific research to date.

Dr. Sheppard's report is also consistent with BPA's analysis in acknowledging that it will never be possible to demonstrate "zero risk," although further research is needed to clarify mechanisms associated with effects reported in some studies. Dr. Sheppard recommends caution until the full implications of subtle effects are evaluated.

Regarding acceptable electric field strength, the Sheppard report points out there are over 31,000 miles of 345-kV lines in the United States operating with an edge-of-right-of-way field strength of 1-2 kV/m. (The proposed BPA double-circuit 500-kV line would also operate within this range.) Lines of 345-kV have been in operation for around 30 years in the United States and, as Dr. Sheppard points out, there is no evidence for adverse health effects from these lower voltage lines.

Not specifically acknowledged in the Sheppard report is the operating experience with the thousands of miles of 500-kV and 765-kV lines in the United States and Canada. As indicated previously, the largest lines operate with edge-of-right-of-way electric fields that range up to 4 kV/m. As with lower voltage lines, there is no evidence that the larger lines have caused any effects on human health in the approximately 16 years since the first one was energized.

In view of the above, the rationale is unclear for the recommendation in the Sheppard report that maximum electric field at the edge of the right-of-way of the proposed BPA 500-kV line not exceed 1 kV/m. The report does acknowledge, however, that the scientific data do not define a single suitable value for edge-of-right-of-way field strength. The range of uncertainty is given as a factor of two or three [e.g., 1-3 kV/m]. The report indicates there is no need to consider regulation much below 1 kV/m. Dr. Sheppard acknowledges that because of uncertainties associated with a single level, a final decision on edge-of-right-of-way field strength may require considerations of cost and other non-biological factors.

The Sheppard report does not acknowledge that there is apparently no place in the United States where a need has been established for a 500-kV line to operate with an edge of right-of-way field strength that is less than that from lower voltage transmission lines (i.e., 1 kV/m). As referenced in the BPA Electrical Effects booklet, biological effects of electric fields have been addressed in several recent state regulatory proceedings and by the U.S. Environmental Protection Agency. The Sheppard report provides no new information to support the recommendation for such a unique field strength limit for one particular 500-kV line in the state of Montana.

The report by Dr. Sheppard cites a 1975 paper which suggests that field strength at the edge of the right-of-way for 750-kV lines in the U.S.S.R. is 1 kV/m. The report does not acknowledge a more recent (1980) published paper from the U.S.S.R. This 1980 paper states that earlier concerns about expected dangerous effects were overestimated and that electric fields of 3-5 kV/m are safe levels for the edge of the right-of-way of a 750-kV line (see p. 22, BPA Electrical Effects booklet).

Rationale for the 1 kV/m recommendation is also unclear in view of the statement by Sheppard (page VII-12) that "It would be illogical to limit the electric field at the edge of right-of-way to a value lower than that tacitly accepted by persons using electricity in the home." Although electric field strength about the home is generally less than 0.1 kV/m, there are notable exceptions. For example, an electric blanket can induce body currents in a person equivalent in magnitude to those produced by a 1.7 kV/m transmission line electric field. A person can receive even larger subperception body currents when contacting household appliances (leakage currents).

In practical terms, there are no residences within about 1,000 feet of the proposed line route (Taft) in Montana. At this distance, the electric field from the line would normally not be measurable. Even at 250 feet from the line, the maximum field would be comparable to fields experienced from household wiring and appliances. However, trees along the right-of-way would reduce the field to near zero beneath or behind the trees. In addition, inside homes, the transmission line electric field is greatly reduced. It is therefore not clear how the proposed 125-foot wide right-of-way would represent a greater "potential risk" compared to the 160-foot wide right-of-way needed to achieve 1 kV/m at the edge. The maximum electric field on the right-of-way where people may work or recreate would be the same for both right-of-way widths.

In summary, the Sheppard report does not demonstrate any measurable difference in the low potential for effects on public health, between edge-of-right-of-way field strengths of 1 to 3 kV/m. The field strengths as proposed by BPA are, therefore, within the range implied in the report as being unlikely to cause adverse effects to persons chronically exposed.

There are no real technical problems in achieving 1 kV/m at the edge of the right-of-way (i.e., the right-of-way width could be increased). However, this would increase the cost of the project (borne by rate payers) without producing any demonstrable benefits in terms of protecting human health. In addition, establishing a 1 kV/m right-of-way level, based on the possibility of health effects, could be interpreted to indicate that persons using electric blankets, or household appliances, or living near some existing transmission lines in Montana, are exposed to a health hazard.

The growing body of scientific information indicates that there is little reason for concern about the possible existence of long-term health effects from exposure to transmission line electric and magnetic fields. The reader is referred to the BPA booklet referenced above (Lee et al. 1982) for background and a discussion of specific research findings pertaining to both a.c. and d.c. transmission lines. What follows is a summary of the most recent developments involving the subject of biological effects of transmission lines.

In the U.S., most research involving effects of 60-Hz electric fields has been sponsored by the U.S. Department of Energy (DOE) or the Electric Power Research Institute (EPRI). The combined annual budget for these two programs is around $5 million. Research on this subject is also underway in Canada, Sweden, Japan, Germany, Great Britain, Italy, France, and the U.S.S.R.

DOE and EPRI contractors follow strict scientific protocol in designing and conducting the studies. Reports and publications on the research are routinely made available to the public and scientific community. These measures are intended to foster thorough review by interested persons and thus enhance the credibility of the studies, an important consideration when questions involve human health.

When evaluating the results of research, it is important to consider the meaning of the word "effect". For example, if a laboratory animal suddenly hears a strange noise of moderate intensity, several changes (i.e., effects) may occur in the animal. The pulse rate increases, and there may be a change in hormonal secretions to the blood. If the noise stops or is not strong enough to cause continued arousal, the "effect" may disappear. On the other hand, if the noise is very loud, the effects on the animal may include severe stress and impaired hearing. Although both the temporary and severe effects may be reported as statistically significant, temporary effects may have questionable biological significance in terms of impairing the health of the animal.

Table 4.10 summarizes results of research involving electric fields and laboratory animals. Specific studies are referenced in the Electrical Effects booklet. Overall, as indicated in the table, there are no confirmed effects on the health, growth, or reproduction of laboratory animals. Currently under way is followup research to a study which suggested that long-term exposure to a 30 kV/m electric field caused an increase in fetal malformations in swine.

The predominant confirmed "effect" is that laboratory animals perceive the presence of the electric field. This is presumably through surface stimulation, i.e., skin, hair, feathers. In some tests, when given the choice, laboratory animals typically avoid the electric field, but under some conditions they actually prefer to be in the field. In other tests, certain nerves removed from animals showed increased excitability, and certain muscles recovered faster from fatigue. These latter effects and the other confirmed effects may in fact be related to the apparent chronic stimulation produced by the electric field. Most studies involving cell membranes use internal field strengths much stronger than those produced by transmission lines so their results are difficult to interpret. However, this does indicate a possible mechanism for subperception effects.

It is difficult to relate the confirmed effects (which are generally subtle) in laboratory animals to the case of people living or working near transmission lines. Most people normally cannot perceive that they are in an electric field when they are on or near a 500-kV line right-of-way. Also, people are exposed to the fields only intermittently and generally not to the maximum field strength. The electric field is greatly attenuated by such things as buildings, vehicles, and vegetation. In contrast, laboratory animals may be directly exposed to high strength fields (to 100 kV/m) for up to 20 hours per day.

In addition to work with laboratory animals, research on persons who work around electrical transmission facilities is continuing. Michaelson (1979) and Mehn (1979) reviewed research with humans. They concluded that there was no evidence that electric fields produced by transmission facilities were detrimental to human health. They believed that symptoms reported in some cases were most likely due to factors other than the electric field. More recent research in Canada, Sweden, and Germany also indicates no consistent effect of electric fields on people.

Table 4.10 - Summary of Results of DOE- and EPRI-Sponsored Laboratory Animal Research Involving the Biological Effects of 60-Hz Electric Fields.

No Confirmed Effects 1/

Mortality	Morphology	Neonatal Development
Reproduction	Cardiovascular	Hematology
Growth	Bone Growth	Serum Chemistry
Illness	Mutagenesis	Immunology
Metabolism	Chromosomes	Endocrinology

Confirmed Effects 2/

Perception	Faster Muscle Recovery
Increased Activity	Decrease in Bio-rhythum Hormone
Preference/Avoidance	Earlier Neuromuscular Development
Increased Nerve Excitability	Slower Bone Fracture Repair
Trend Toward Decrease in Testosterone	Cell Membrane Functions

1/ Effects not consistently found by a single laboratory or not consistently reported by two or more laboratories. Further research could modify this listing.

2/ Effects consistently replicated by a single laboratory or by two or more laboratories.

Although most human research has involved electric fields, a Colorado study and a Swedish study suggested a magnetic field effect (Wertheimer and Leeper 1979, Tomenius et al. 1982). In these studies, the incidence of cancer patients in homes near highest current-carrying powerlines increased very slightly compared to controls. A similar study done in Rhode Island, however, found no relationship between leukemia and proximity of powerlines (Fulton et al. 1980). A major problem in such studies is the measurement of actual field exposures involved. There is also no evidence from numerous laboratory animal studies that suggests a weak magnetic field may be a carcinogen.

Ecological studies of transmission lines, also continuing, indicate that in most cases if electric field effects exist, they are very subtle and difficult to identify. A recent interim report describes results of the ecological studies conducted at the site of the BPA 1200-kV prototype (Rogers et al. 1982). This study has been underway since 1976. During the first 2 years of study, maximum electric field strengths were essentially the same as for 500-kV lines (i.e., 7 kV/m). No adverse effects of the field were detected on crop growth, wildlife, cattle grazing, or newly established honeybee colonies. Some fir trees purposefully left close to the line experienced some needle and branch tip damage. This has also been reported for trees growing too near a 500-kV line. Normal right-of-way clearing procedures prevent tree growth near conductors.

For two years, from 1979 through 1981, conductors in the 1200-kV test span were lowered to achieve an electric field strength of 12 kV/m. Adverse effects were observed in the honeybee studies. These effects included possible reduced brood numbers, increased mortality, lower colony weights, increased propolization (buildup of a resinous material), and increased bee aggressiveness in established hives near the line as compared to controls.

Similar effects were reported in a study of honeybee colonies in a 7 kV/m electric field beneath a 765-kV transmission line (Greenberg et al. 1978). Effects appear to be related to high current levels induced in tall hives. Results of the two studies indicate that bees experienced mini-shocks within certain types of hives when induced current was sufficiently high. The effects can be easily eliminated by placing grounded wire screens over the hives to shield out the electric field. Grounding a standard metal hive top also mitigated effects.

Thus, it appears that the maximum electric field on the right-of-way of a 500-kV line could affect honeybees in commercial type hives under some conditions. Effects could be mitigated by not placing hives in high field areas on the right-of-way or by use of grounding techniques. The effects are caused by induced current and voltages inside the hive. There is no evidence that bees or other insects are adversely affected by the electric field outside of the hive.

Results of a study involving farm animals were recently reported (Amstutz and Miller 1980). This study involved beef and dairy cattle, horses, hogs, and sheep living near a 765-kV transmission line in Indiana. The overall finding of the study was that neither health and behavior nor performance of livestock was affected by the line. This was based on evaluations by a veterinarian and on information provided by the farm owners. Electric field strengths involved were up to 50 percent stronger than for BPA 500-kV lines.

Another recent study involved dairy farms crossed by a 765-kV line in Ohio (Williams and Beiler 1979). Farmers were interviewed to determine if they had noticed any changes in milk production or in behavior or reproduction of their cattle following construction of the line. Results of the study indicated that operation of the line had caused no adverse effects on dairy cattle. Recent studies in Ohio (Mahmoud and Zimmerman 1982) and in Sweden (Hennichs 1982) further indicate that neither livestock health nor reproduction are affected by transmission lines.

As indicated above, there is abundant evidence that electric fields as produced by the proposed 500-kV transmission lines are unlikely to pose a threat to the health of people or animals. This does not "prove," however, there is zero risk. Probably no amount of research would allow that determination to be made. Such is the case with almost any aspect of our complex technological society.

FIRE HAZARDS

Transmission lines of this size have not been known to cause wildfires or to increase fire hazard. There have been instances where lower voltage lines have caused a fire to start because of conductors coming together in the wind and hot metal dropping to ground or arcing from the conductor to trees on the right-of-way. This is not a problem with the higher voltage lines because of construction standards. Sagging limits are higher from the ground, conductors are spaced so that they cannot slap together, and maintenance inspections and requirements are more stringent.

There is the possibility that the transmission line could interfere with aerial fire suppression tactics, but problems can be reduced to acceptable levels. An acceptable level is defined as one where suppression activities can still be carried out without endangering life or property. Means to do this include identifying the transmission line on aeronautical charts, identifying the line on orders requesting aerial suppression, heightening the visibility of the transmission line with aerial markers readily visible to pilots, and/or substituting the use of helicopters for fixed-wing aircraft to drop retardant. In addition, firefighters may be given additional training to ensure safe operations in the vicinity of transmission lines.

CONSERVATION POTENTIAL

For the proposed transmission line project, conservation potential means planning and designing a transmission system to save energy. Energy is lost in transmitting from the power supply to the load area. Bonneville's policy is to decrease overall transmission system losses. See the discussion under PURPOSE OF AND NEED FOR ACTION and ALTERNATIVES INCLUDING THE PROPOSED ACTION.

Losses on the Federal Columbia River Power System are lowest for the Hot Springs Plan (table 2.4). The losses with the Plains or Taft Plans are slightly higher. The No Action alternative would result in significantly higher energy losses. On The Washington Water Power Company transmission system, the plans rank (lowest to highest) Alt. 3-Noxon Plan, Alt. 4-Taft Plan, Alt. 1-Thompson Falls-Pine Creek, Alt. 2-Eagle Creek Plan, and No Action (significantly higher energy loss).

SECTION DISCUSSIONS

This part of Chapter IV identifies noteworthy impacts--those impacts with greater, more serious, or more notable consequences than those discussed in part 1, the preceeding section on general impacts--and the specific segments where they might occur. Each plan is divided into two sections: an eastern section from Garrison to the intermediate substation (Hot Springs, Plains, or Taft) and a western section from that substation to Bell Substation near Spokane.

ALTERNATIVE A: HOT SPRINGS PLAN

The discussions below present all noteworthy impacts for the plan which begins at the Garrison Substation, near Garrison, Montana, connects with the Hot Springs Substation, near Hot Springs, Montana, and terminates at the Bell Substation, near Spokane, Washington. Segments not sustaining any noteworthy impacts under a particular resource topic will not appear in that part of the text. NOT ALL IMPACTS DISCUSSED WILL OCCUR FOR ANY SINGLE ROUTE. Ways to avoid, minimize, or reduce impacts are presented at the end of each resource discussion.

Under this plan, the Hot Springs Substation would be expanded within the existing site. A new, 10-acre, 500/230-kV substation may be needed near Eagle Creek in Idaho. The site would be developed if The Washington Water Power Company adopts their Eagle Creek Alternative (Plan 2). 5/ Impacts caused by substation construction/expansion and operation for this plan are summarized in table 4.11, Summary of Substation Requirements.

Many different routes could be constructed from the segments in this plan, listed below. The routes of lowest environmental impact for each plan are compared in Chapter II, under Comparison of Alternatives.

5/ The Washington Water Power Company has concluded that the Thompson Falls Plan and the Eagle Creek Plan should be removed from further consideration based on their review of environmental, technical, and cost factors. Letter, D.L. Olson, Senior Vice President-Resources, The Washington Water Power Company, to Marvin Klinger, Assistant Administrator for Engineering and Construction, Bonneville Power Administration (January 19, 1983).

The route of least environmental impact for Plan A includes the segments listed below and illustrated in figure 4.1:

Segments: 101, 102, 107, 108, 109, 110, 111, 113, 115, 116, 117, 5, 16, 18, 22, 34, 35, 43, 47, 50

Other segments also part of Plan A 6/: 114, 118, 119, 120, 121, 122, 123, 124, 125, 29, 33, 37, 40, 41, 45

Garrison-Hot Springs Section

Land Use

Urban/Residential: (Tables 4.2, 4.3; fig. 4.3) Five areas of concern exist in this section: in segment 119, near Gold Creek and at the crossing of Flint Creek; segments 122-125, the Clinton area in the Clark Fork Valley; segment 116 in the Rattlesnake area; segment 117, as it crosses Grant and Butler Creeks; and segment 5, in the Evaro and Dixon areas. Impacts--from short-term construction disturbance, and long-term presence of the line--may affect houses close to the right-of-way, towns or communities close by, and subdivided but undeveloped land.

Two farmsteads are located along Gold Creek next to the vacant 230-kV right-of-way (segment 119); the southern building would be extremely close to a new 500-kV line on this right-of-way, and would sustain increased visual intrusion and inconvenience during construction. Neither farmstead would be directly affected by the right-of-way or line. Four other farmsteads in this vicinity are located within one-half mile of the line, and would experience similar though less intense effects.

At the crossing of the Clark Fork Valley at Clinton (segment 124), four residences and the town of Clinton itself would fall within a quarter mile of the right-of-way; several more residences are within one-half mile of the right-of-way. Segment 124 crosses parcels of undeveloped subdivided land (.7 miles total), and could interfere with their development. No direct impacts would be sustained, but visual and temporary inconvenience effects on developed land would be intense, as the line would run close to a well-developed area.

The entire length of the Clark Fork Valley along segment 125 is developed. The towns of Turah, Piltzville, Bonner, West Riverside, and East Missoula are situated along the valley bottom within one-half to one-and-one-half miles of the line. Directly west of Clinton, two small developments have encroached on the existing right-of-way. Five miles of the route have been relocated upslope to avoid them, but the developments would still fall within one-quarter or one-half mile of the line. Disturbance during construction and long-term

6/ See footnote 3, p. IV-2.

Table 4.11 Summary of Substation Requirements

SUBSTATION	PLAN	TYPE	YARD REQUIREMENTS	ACCESS	MICROWAVE COMMUNICATIONS	LAND USE	SITE AND SITUATION	OIL SPILL CONTAINMENT	NOISE	OTHER	MITIGATION
HOT SPRINGS	A	500/230-kV substation	11-acre expansion; 20,000 cubic yards of grading.	existing roads	existing system	Rangeland	Existing substation at edge of wide valley; vegetation primarily range with some developed pastureland and trees lining water courses and on moist hillsides; located west of a state highway; several ranches are east of the highway about 1/4 to 1/2 mile.	Drainage control to be provided	Consistent with EPA guidelines (levels not to exceed 48 dbA at nearest adjoining residential property line).	Land owned by BPA	—
PLAINS	B	500-kV switching station	New 12-acre yard (38.6 total acres to be acquired); 27,000 cubic yards of grading.	200-300 feet new road	new terminal at sub.	Grazing/pasture	On flat land within broad intermountain valley; residences within one mile of the site; primarily range with some hay fields; forests on surrounding hillsides at higher elevation.	Drainage control to be provided	Consistent with EPA guidelines (levels not to exceed 48 dbA at nearest adjoining residential property line).	Powerline and petroleum pipeline cross site; would require coordination	Noise abatement
TAFT (Proposed Action)	C (BPA) 3 (WWP)	500/230-kV substation	New 10-acre yard; 20,000 cubic yards of grading	8.5 miles road improvement	1 new passive reflector (on 50' x 50' site); 1 new terminal at sub.	Forest	In a narrow mountain valley, moderate to steep slopes; part of the site clear-cut; near Randolph Creek, but beyond riparian zone.	Drainage control to be provided	Consistent with EPA guidelines (levels not to exceed 48 dbA at nearest adjoining residential property line).	Heavy snowfall area; winter snow removal needed for access	—
GARRISON	A,B,C	500/230-kV substation	Expansion within existing yard	existing roads	existing system	Rangeland	Facility located 3 miles west of Garrison; grassland vegetation surrounding area; no residences nearby.	Drainage control to be provided	Consistent with EPA guidelines (levels not to exceed 48 dbA at nearest adjoining residential property line).	—	—
BELL	A,B,C	500/230-kV substation	12.7-acre expansion; 75,000 cubic yards of grading	existing roads	existing system	Industrial	Near Kaiser Aluminum Plant; stands of pine on two sides of yard; topography varies at site, no nearby residences; site lies within a regional sole source aquifer.	Drainage control to be provided	Meets or exceeds Washington standards (levels not to exceed 53 dbA at nearest adjoining residential property line).	Land owned by BPA	—
THOMPSON FALLS	1 (WWP)	230-kV switching station	New 6-acre yard	existing roads	existing system	Agriculture/Forest	In Clark Fork Valley near Thompson Falls; valley is broad with steep, forested sideslopes.	Drainage control to be provided	Consistent with EPA guidelines.	—	—
EAGLE CREEK	A,B (BPA) 2 (WWP)	500/230-kV substation	New 10-acre yard; 10,000 cubic yards of grading	200 feet new road; Upgrade 1750 feet Forest Service Road	new active repeater sta. (100' x 100' site); new passive reflector (50' x 50' site); new terminal at sub.	Pastureland	In narrow Eagle Creek Valley surrounded by steep forested hills; several nearby houses; small farms and pasture on valley bottom.	Drainage control to be provided	Consistent with EPA guidelines.	Shallow water table; however, not on designated floodplain or wetland	Noise abatement
NOXON	4 (WWP)	230-kV switching station	Additions to existing yard	existing roads	existing system	Hydro-electric generating complex	Near Noxon Rapids Dam on Clark Fork River; steep, forested mountains to both sides.	Drainage control to be provided	Consistent with EPA guidelines.	—	—
WALLACE	1,2,3,4 (WWP)	230/115-kV substation	6-acre yard added to existing sub.	existing roads	new terminal at sub; possible new passive repeater	Urban/Residential	In a narrow, steep-walled valley.	Drainage control to be provided	Consistent with EPA guidelines.	—	—
PINE CREEK	1,2,3,4 (WWP)	230/115-kV substation	Terminal additions to existing yard	existing roads	Existing system	Urban/Commercial	In Silver Valley, an extensive mining area; next to residences, golf course.	Drainage control to be provided	Consistent with EPA guidelines.	—	—

visual intrusion on developed settings are the primary effects on these developed land uses. Effects would be intense because a 500-kV line would be quite out-of-scale in a valley with many areas given over to developed land uses.

In the Rattlesnake area (segments 115,116), the line would bisect a large, relatively dense residential subdivision which has developed to the edge of the existing right-of-way. More than 40 residences here would fall within one-quarter mile of the line. To the east, an additional house is situated on the edge of the right-of-way; three more are between one-quarter and one-half mile away. The line, with the existing 230-kV line, has been designed to reroute away from the existing 230-kV right-of-way to avoid direct conflict with the northern edge of the Lincolnwood residential subdivision where at least one residence and a small park have encroached on the existing vacant right-of-way. A small area of undeveloped subdivided land is also crossed in this area; its future development could be affected. Other direct impacts have been avoided by the line relocation mentioned above. Impacts would otherwise be indirect, long-term, visual intrusion; disturbance during construction; and noise from the line. These could be both intense and significant because the area is relatively densely settled and the right-of-way cuts right through it. These existing land uses are highly incompatible with 500-kV facilities.

Northwest of Missoula (segment 117), small residential developments are expanding where the existing 230-kV right-of-way crosses Lavalle, Grant, and Butler Creeks. Houses are built up to the edge of the present right-of-way, and several others are located within one-quarter mile of it. On Butler Creek, for instance, a storage shed and a residence lie right on the edge of the right-of-way. Although there would be no direct conflict with these structures, visual and inconvenience impacts would be intense.

On segment 5, in the Evaro area, one residence is located at the edge of the right-of-way, and other small communities are located very close to it. North of Evaro, where Highway 93 crosses the route, two residences and a trailer court are located at the right-of-way edge. At Valley Creek, south of Dixon, two residences and a small agricultural development are located at the right-of-way edge; at Dixon, two more residences are located very close to the right-of-way, which also passes the town itself very closely. As the line would be built on an existing vacant right-of-way, there would be no direct conflict with these structures and communities. However, visual and inconvenience impacts would be intense.

Mitigation: In some areas, slight adjustments of the line would mitigate visual impacts on residences near the right-of-way. However, in segments such as 119 and 117, paralleling the existing route on vacant right-of-way would cause fewer problems than trying to route it through adjacent areas of scattered developments. Mitigation discussed under Esthetics would reduce visual effects on developed land. Anywhere a residential area is closely approached by the line, mitigation for noise and TV/radio interference is likely to be necessary. Line placement in the Clinton and Rattlesnake areas would be especially constrained when future parallel lines are considered.

Forestry: (Tables 4.2, 4.3; figs. 4.3, 4.4) Between 37 and 52 miles of forest land would be affected. Areas of high or moderate forest productivity under intensive timber management are crossed in the Garnet Range by segments 110, 111, 113, 114, 115, and 122. Construction of the line and of access roads would remove from 25 acres (segment 111) to 109 acres (segment 110) of this land from production for the life of the line, a considerable local impact. This impact could increase in significance when combined with effects on temporary increases in water yield (affecting streams), on wildlife habitat and potential for wildlife disturbance, and on alteration of recreational experiences for dispersed recreation in the forest. The harvest of some timbered stands immediately outside the affected area could have to be delayed in order to limit water yield increases.

Mitigation: Right-of-way and access road clearing should be minimized in problem areas. An access system compatible with timber harvest needs will also be developed and cleared material will be used where possible.

Agriculture: (Tables 4.2, 4.3; fig. 4.3) From 11 to 23 miles of agricultural land would be crossed. About one to seven acres of farmland could be removed from production around tower bases. Most significant impacts are on irrigated farmland, which is encountered in small amounts (less than 0.6 miles) in segments 113, 117, 122, 124, 123, and 125, and in larger amounts in segment 5 (1.3 miles near the confluence of the Jocko and Flathead Rivers), segment 121 (1.1 miles in the Cramer Creek area), and segment 119 (7.0 miles in the Flint Creek area south of Drummond). Impacts, from construction, operation, and maintenance, would be direct and long-term. Small amounts of land could be removed from production at tower sites. In addition, should towers be located within the irrigation pattern, they could obstruct or prevent overhead irrigation, and could impede or prevent aerial spraying.

Prime Farmland, a formal Soil Conservation Service designation, would also be crossed. In each of segments 108, 117, 124, 125, and 120, less than a mile of Prime Farmland would be encountered. Greater amounts would be encountered in segment 5 (Flathead River and Little Bitterroot River Valleys) and segment 119 (Flint Creek Valley and south of Drummond). As much of this land is irrigated, consequences of tower placement would be similar to those listed above (see also Consultation, Review, and Permit Requirements).

Non-irrigated farmland and Farmland of Statewide Importance would also sustain some impacts where land is removed from production by towers and where the towers might interfere with farm management. Difficulties of farming around the tower bases, problems of weed infestation, safety questions, and reduction of crop production caused by compacting and/or erosion comprise impacts on the local level. Rangeland would be minimally affected by a transmission line.

Mitigation: Location of towers at the edges of fields would substantially reduce impacts on farmland, although this would not eliminate all difficulties or hazards with agricultural aerial spraying. Assistance to farmers in controlling weed infestation, education in ways of safely working around transmission lines, and subsoiling compacted land near tower bases or in the right-of-way should assist in restoring land productivity.

Recreation: (Tables 4.2, 4.3; fig. 4.5) Significant impacts would occur on four resources: roadless areas, National Trails, intensive use sites or areas, and dispersed use recreational areas. In segment 114, 4.1 miles of the route would cross a roadless portion of the Rattlesnake National Recreation Area, and 6.1 miles would cross an intensive recreation use area. The Lewis and Clark National Trail is crossed in segments 113 and 125. Other intensive use sites are encountered in segment 101 (Carten Creek Rest Area), 119 (Bearmouth Rest Area and Bearmouth Chalet), and 121 (Clinton Recreation Area). Dispersed use areas occur along much of the Garnet Range (segments 108, 109, 110, 111, 122), and along the Clark Fork River, especially at crossings (segments 121, 124, 125).

Impacts would be direct and considerable at developed intensive recreational sites and trail crossings and in the immediate vicinity of the line in dispersed use areas. They would be indirect and more moderate in dispersed and other use areas and in background views from within the Rattlesnake Wilderness Area. As a discordant factor in natural surroundings, the line may reduce the quality of the recreation experience; it may also provide increased access to that experience via access roads constructed for maintenance, particularly in winter months. Related, cumulative impacts would primarily be visual (see Esthetics). Impacts would be local and regional in context, as when primary users are from local areas or when hikers in the Rattlesnake or hunters in the Garnets travel from other areas in western Montana. Nationally important impacts would occur should a line cross the Rattlesnake, designated as a National Recreational Area. Congress established this area to promote and preserve its high value for municipal watershed, recreation, wildlife habitat, and ecological and educational purposes. 7/

Mitigation: Recreational impacts could be reduced by reducing visual impacts. Using non-reflective conductors and tower materials near heavy-use areas and minimizing right-of-way and access road clearing would reduce recreation impacts. Avoiding crossing over or close to intensive use areas would constitute the best mitigation.

Corridor Development/Long-Range Plans: (Fig. 2.5) Building an additional line or lines along segments in this section would cause increased impacts, which could be significant in areas having one or more resources highly susceptible to impact (i.e., environmentally sensitive areas). The following sensitive areas are encountered: Gold Creek (segment 101; developed land, visual, cultural impacts); Drummond (segment 119; agricultural, developed land and associated socioeconomic effects); Clinton-Wallace Creek (segments 123, 124, 122, 127; communities, agricultural land, and associated socioeconomic, wildlife, and visual concerns); the upper Rattlesnake Creek area (segments 113, 114; recreation, natural system, and visual problems); and along the Clark Fork from Turah through Rattlesnake Creek to Grant and Butler Creeks north of Missoula (segments 125, 116, 117; socioeconomic, developed, residential, and agricultural land use, as well as visual effects).

7/ See footnote 3, p. IV-2.

More significantly, the physical or land use problems generally associated with the last two areas described would constrain the location of future lines. It would be difficult if not impossible to place lines in addition to the present proposal along the entire Clark Fork Valley between Nimrod and the Rattlesnake Creek area because developed land uses such as farms, residences, communities, and a railroad and major highway have filled the valley around the existing transmission line corridor. In particular, building this proposal across the densely settled lower Rattlesnake area would use the remaining vacant right-of-way, making future development virtually impossible without serious land use conflicts or costly design modifications. Along stretches of segments 117 and 5 to Hot Springs Substation, future development could be constrained for similar reasons. Small developed areas occur near the existing right-of-way at Grant and Butler Creeks (segment 117) and near Evaro, Valley Creek, and Dixon (segment 5). Development in addition to this project would involve substantial impact; yet it would not be possible to bypass these areas because similar development has occurred along these valleys on either side of the line.

The area from Camas Prairie across the upper reaches of Rattlesnake Creek (113, 114) would constrain development of more than the present line owing to geotechnical problems (involving steep slopes, erosive soils and high elevations) and crossing the Rattlesnake National Recreation Area.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) Noteworthy impacts on wildlife would occur in areas of big game critical winter range. Small amounts of such range (less than one mile each) are encountered in segments 108, 114, and 119; segment 102, in the Garnet Range north of Goldcreek, crosses 5.0 miles; and segment 120, northwest of Bearmouth, crosses 5.7 miles of big game critical winter range. Habitat alteration due to clearing would be direct and long-term; disturbance from construction would be direct and short-term, but increased access for hunters would be an indirect long-term impact.

These effects would be locally important, as big game are socially and economically important wildlife species. Cumulative impacts could occur where vegetation is particularly slow to recover, and where (as in the Rattlesnake area) wildlife observation could be esthetically disrupted by the line.

Some impact on the landscape would also occur wherever the line crosses rivers and riparian habitat. Bald eagles do appear at river crossings in segments 101, 119, 124, 125 (Clark Fork River), segment 5 (Flathead River), and segment 113 (Blackfoot River). However, their number is low at these crossings; any conflicts are not considered a noteworthy problem. The BPA Biological Assessment reports that the proposed action would not affect the bald eagle; the U.S. Fish and Wildlife Service has concurred with that finding. (See discussion about Endangered and Threatened Species under Consultation, Review, and Permit Requirements.)

Mitigation: Clearing of the right-of-way and for access roads, particularly near river crossings, will be minimized; seeding will be used to speed vegetative recovery; the timing of construction activities, particularly those scheduled between December and March, will be coordinated with appropriate wildlife officials; access roads will be closed or controlled where appropriate.

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) Three areas of greater concern exist within the alternatives of this section: segment 120, in the Mount Baldy area; segment 125, above Clinton; and segments 111, 113, 114, 115, 116, and 117, running west through the Garnet Range, across the Rattlesnake area, to Evaro. Impacts on vegetation resources in these areas are similar to those described under Introduction of Topics: that is, loss of vegetation production, change in composition and density of vegetation due to vegetation removal, disturbance and subsequent erosion and/or compaction. However, in these areas of particular sensitivity, impacts may be intensified, or longer lasting, particularly where extensive clearing occurs or where high access road needs prevail.

Segments 120 and 125 both encounter areas of steep slope where a high amount of new access would be required. Several segments encounter areas of problem soils and high access requirements, including segment 111 (less than one mile) and segment 113 (two miles).

Segments 114, 115, and 116 are of particular concern as they cross the Rattlesnake area. Segment 114 would cross about 4 miles of roadless area, where vegetation is relatively undisturbed. Land at very high elevation (fig. 4.8) in the Blue Point vicinity sustains fragile alpine vegetation on steep slopes. All three segments would cross problem soils and would have high access requirements.

Mitigation: Selective clearing, seeding of cleared areas, and limitation of construction in wet seasons would be recommended for areas with problem soils.

Water Resources: (Tables 4.2, 4.3; fig. 4.7) Three areas of greater concern exist in this section. Access road and other construction disturbance could increase stream sedimentation (primarily short-term) through accelerated runoff in areas of problem soils and high erosion potential (see Soils/Geology) at Rattlesnake Creek and Johnson Gulch in segments 114, 115, and 116. The Rattlesnake municipal watershed, where high water quality is necessary for open surface water collection and recreation use, would be crossed by all three segments. Segments 115 and 116 would not affect water quality, as they cross below the dam used to divert domestic water to the City of Missoula. Segment 114 also crosses unroaded land where previously undisturbed areas would be affected. Steep terrain and slow vegetative recovery could extend the period of erosion and sedimentation in this segment.

In segment 124, one tower would be located in the Wallace Creek floodplain and one might need to be located in the Clark Fork floodplain at their conjunction (see fig. 4.14). Work at tower sites and for access road construction may compact and disturb the soil cover in this small area, but would not affect the floodplain.

Mitigation: Revegetation to desirable grasses, use of water bars, and control of access are standard mitigation measures in sensitive areas. Limitation of clearing for new access would also be desirable in problem areas.

Soils/Geology: (Tables 4.2, 4.3; fig. 4.8) Four noteworthy areas of concern exist in this section: segment 107, in the Garnet Range north of Drummond; along segments 110-117, in the Garnet Range from Mount Baldy through the Rattlesnake area and into the Lolo National Forest; segment 125, along the Clark Fork River east of Missoula; and in segment 5, in the Little Bitterroot Valley and near Dixon.

Segment 107 would cross more than 10 miles with moderate erosion potential from a point east of Bert Creek to Rattler Gulch; about one-half mile of steep slopes (over 30 percent grade); and 1 mile of rock outcrops across Edwards Gulch and Lyon Gulch. Access requirements would be high, as road and tower construction would be difficult in these areas. On steep slopes combined with moderate erosion potential, more soil may be disturbed, causing increased sedimentation in streams and slowing vegetation recovery, particularly because of decreased soil fertility on disturbed sites. These effects are short-term and primarily caused by construction disturbance.

Problems are scattered throughout the routing on the north side of the Garnet Range, through the Rattlesnake area, and into the Lolo National Forest (segments 110, 111, 113, 114, 115, 116, and 117). Problem soils, susceptible to erosion and very susceptible to land slumping, occur in numerous places.

Segments 114-117 would also encounter moderate erosion potential; segments 113, 114, and 115 would each cross 4-6 miles of steep slopes and encounter high elevations in places, areas where erosion is more severe and construction more difficult. Segments 114 and 115 require a high amount of access road construction. Where these conditions overlap, construction requires more cut-and-fill work, intensifying erosion, hampering revegetation, and increasing sedimentation of nearby water resources, a particular concern in the Rattlesnake area.

Although these impacts would primarily be short-term, occurring during and for some time after construction, long-term operation and maintenance would require continued use of access roads, thus sustaining the soils impacts over a longer period of time but to a much lesser degree.

Segment 125 would cross problem soils and areas of moderate erosion potential, as well as steep and very steep (over 55 percent) slopes in places. Although access road requirements are moderate, steepness of slope and erosion potential would produce effects like those discussed above.

Where the line would encounter fourteen miles of problem soils near Dixon and in the Little Bitterroot Valley (segment 5), in areas of moderate erosion potential, erosion would increase. Construction would be avoided as much as possible when soils are wet.

Mitigation: Most impacts could be reduced by using low gradient road cuts, by prompt reseeding of cut-and-fill slopes, use of drainage structures to reduce erosion, and by minimizing clearing for right-of-way and access road construction. Identifying opportunities to span steep slopes would also reduce impacts. Avoiding construction on problem soils when they are wet would reduce rutting and compaction from heavy equipment. Fertilizing would help to compensate for soil nutrient loss and consequent slowness in revegetation. Where there are terrain barriers, avoidance is desirable; where this is not possible, blasting and ripping of bedrock would reduce impacts.

Esthetics

(Table 4.2, 4.3; figs. 4.9-4.13) Significant esthetic impacts would occur in six areas of the Garrison-Hot Springs section: segments 101 and 103 in the Gold Creek area; where segments 113-117 cross the Blackfoot River, proceed through the Rattlesnake area, and move west toward Butler and Grant Creeks; segment 119 in the Flint Creek Valley and east of Nimrod; segments 120 and 121 as the line follows I-90 in the Clark Fork Valley; segments 122-125 in the Clinton area and along the Clark Fork Valley; and segment 5, as it crosses Highways 93 and 200 near Evaro and Dixon, Montana.

Where segment 101 crosses I-90 and where much of segment 103 passes close to I-90, the line would be visible to travelers. Residents of Gold Creek and the surrounding area, as well as users of Frontage Road, would have extensive views of the line. Travelers stopping at rest areas on I-90 will also have views of the line.

These effects would be direct, long-term, and intense due to the large numbers of viewers with high visual sensitivity in the area and to the domination of the line in the landscape.

In segment 119, the line would cross a designated scenic highway (Highway 10A) in the Flint Creek Valley. The line, cutting across the valley floor, would be visible from many vantage points within the valley, an area of high viewer sensitivity. The line would parallel an existing line; however, they would be unmatched as to size, configuration, and spacing, creating a chaotic appearance.

Where segment 119 approaches Nimrod from the east, it would run close to I-90 for a considerable distance. Skylined towers would be visible from many vantage points. The cumulative effects of the many lines in this stretch would create a chaotic appearance.

Segments 120-125 would follow the Clark Fork Valley, with extensive serious impacts in the Clinton and Nimrod areas. Travelers would have intermittent views of the line as segments 120 and 121 run near I-90. Although vegetative patterns and background tend generally to "absorb" the line visually, exceptions occur, most notably in Nimrod where the valley narrows and the line is closer to I-90. The out-of-scale towers would be quite noticeable to large numbers of people.

The addition of another line in the Clinton area (segments 122, 123, 124) would add to the existing disarray. Large numbers of people, including both residents of the area and travelers on I-90, would have views of the line, which cuts across the grain of the Clark Fork Valley, crosses I-90, and runs close to the Clinton interchange. Towers would be out-of-scale with nearby features; views would be in the foreground and would be of long duration. They would also be in direct line-of-sight along segment 123, appearing to stack up as I-90 travelers get closer to Clinton. The new line would not match the existing line, disrupting the integrity of the Clinton area. The towers and line would dominate the landscape when viewed from many vantage points.

Northwest of Clinton, a 10-mile portion of segment 125 would parallel I-90 and run close to several residences. Many people would see the line, which would require extensive clearing and access road construction. Highly visible scars would be left, conflicting with the natural setting. Views would be in the foreground to middleground, and would be of long duration.

Also in segment 125, the line would cross a high density rural residential area in east Missoula, crossing both I-90 and an access road to a popular ski area (Marshall Ski Bowl). As the line cuts across the valley and into the Rattlesnake area, it would be highly visible to large numbers of people and could be seen at all distances, from foreground to background. Extended views of this line would occur at several vantage points, most notably from I-90 where extended views of the line to westbound travelers would be possible as the line goes over the Rattlesnake Divide. In addition to long-term direct disruption of views, construction would cause short-term disruption of the area.

In segment 113, the line would cross the Blackfoot River, a highly scenic corridor. It would be visible to travelers along the highway and to river users. For westbound travelers, skylined towers would also be visible, a negative impact, but of short duration.

Segment 114, further west, would cross the Rattlesnake Recreation Area, officially designated by Congress for preservation of its recreation, wildlife, ecological, and other values. The public places a high value on its scenic qualities. A transmission line visible in this area would be foreign to the setting and inconsistent with high viewer expectations. It would also cause scarring of the natural landscape, increasing the incompatibility. (Following additional consultation with the Forest Service and the State of Montana, this segment has been dropped from the preferred routing for this plan. Also see Volume II, part IV. K.)

The introduction of another line in the narrow Rattlesnake Valley (segments 115, 116) would add to the visual disruption by cutting across the prevailing land patterns. The additional line would not match the existing lines as to size, configuration, or spacing, giving the right-of-way a chaotic appearance. The lines would also be out-of-scale with nearby structures, be visible to large numbers of people, and would be an ever-present and dominating element in the valley. The area contains residential subdivisions, and is the gateway to the National Recreation Area. As such, a high value is placed on retention of the area's existing character.

Where the line would cross Grant and Butler Creeks in segment 117, it would also dominate the view in areas of residential development. Not only would the line be visible to many residents, but it would cut across the main access to these areas. The line in this area would also affect the north vista of Missoula. Although the landscape here is generally compatible with a transmission line, the impact would still be significant because of the large number of people potentially exposed to views of the line.

Finally, where the line would cross Highways 93 and 200 near Evaro and Dixon in segment 5, foreground views would predominate for many travelers, lessened somewhat by existing disruptions and by the short duration of these views.

Mitigation: For most of these areas of concern, the use of non-reflecting conductors and treated towers would minimize or lessen the higher visibility of the transmission lines by reducing contrast between the line and its surroundings. In segment 125, selective clearing and careful access road construction would aid in reducing contrast as well. In segments 115 and 116, treated towers and non-specular conductors or improved appearance structures would be used.

In segment 114, which passes through the Rattlesnake Recreation Area, the use of long spans with no clearing or access roads would reduce scarring and visibility. However, it would not change the line's incompatibility with a National Recreation Area. For segment 5, the use of non-specular conductors would be a mitigation measure.

Social and Economic Considerations

(Tables 4.2, 4.3; figs. 4.2, 4.3, 4.4, 4.5) Primary areas of concern in this section are the Missoula-Rattlesnake area, a population center adjacent to the Rattlesnake National Recreation Area; the Flathead Indian Reservation; the Clinton area; and the area traversed by segment 119, near Drummond, which contains much desirable farmland.

The Clinton and Missoula areas (segment 125; segments 115, 116) contain much private land and are higher in landowner density than other segments in this section. Because BPA would pay no local taxes on the project, local residents would prefer that a public project be sited on public land. Larger numbers of people would be exposed to and affected by short-term construction impacts and by long-term operation and maintenance impacts in these areas. Inconvenience by land use type would also occur in segments 123-125, where agricultural and some undeveloped subdivided land in the residentially developing Clinton area would be crossed (see Urban/Residential). Segment 117, west of Missoula, would also encounter areas with high residential potential; a line there could change future development patterns. Construction of new access roads across private land may give increased access to public lands by the public (possibly a benefit), but may inconvenience individual landowners in these areas.

Construction and presence of the line in the Missoula-Rattlesnake area would also increase alienation of the public. Local opposition to crossing a densely settled subdivision (segment 116) or the National Recreation Area (segment 114), a resource of local, regional, and national importance, is high.

The Flathead Reservation, crossed by segment 5, presents special considerations as well because there is disagreement over the tenure and use of the present easement across the Reservation. Crossing the Reservation could, as a consequence, create conflicts among Reservation groups.

Segment 119, which would cross a block of Prime Farmland, would involve issues of private land ownership, and would present both short- and long-term inconveniences to irrigated farmland in particular (see Agriculture). New corridor and new access road impacts would be low, but high landowner opposition and concern over conflict with ranching operations would mean increased alienation in this area.

Mitigation: Coordination with local government agencies would minimize service- and community-related impacts from the construction workforce. Close consultation with landowers on tower and access road siting, maintenance of weed control practices, education of contractors on minimizing disruptive practices for construction and maintenance of the line (including advance notice of necessary work), continued development of fair negotiation and compensation practices, and prompt response to landowner problems would reduce socioeconomic impacts in these areas.

Cultural Resources

(Tables 4.2, 4.3; fig. 4.5) Five areas of historic concern exist in this section: an historic Indian encampment area and sites (segment 5); Indian agencies near Dixon (segment 5); remains of the old Mullan Road in the Clark Fork Valley and in the hills above the Clark Fork west of Garrison (segments 101, 119, 122, 123, 124, 125); an area of Chinese burials and an adjacent cemetery south of Gold Creek; and a pioneer mining town also south of Gold Creek (segment 119). Remains of a mining camp also exist in segment 110.

Impacts on archeological resources in this section would be caused primarily by the following: construction and maintenance, where subsurface sites such as prehistoric campsites, quarries, and activity areas exist; and presence of the line where the visual intrusion may detract from a visitor's experience of a surface site such as rock art or a religious area of significance.

The Indian encampment, which dates to the earliest recorded history in the area (c. 1810) has regional and possibly Tribal significance. Construction of the line and of access roads could disturb subsurface cultural deposits, a direct, long-term impact. The Indian agency sites for the Confederated Tribes of the Flathead Reservation, dating back to the 1850's and 1860's, could sustain similar disturbance. In the unlikely event that any surface structures remain, the presence of the line could visually intrude on the sites. These sites also have regional significance.

The Mullan Road, built between 1859 and 1862 to serve military traffic between southeastern Washington and Montana, was used primarily by miners and immigrants in the 1860's. It possesses national and regional significance. Remains of the road, which are scarce, could be destroyed or altered, rendering them ineligible for nomination to the National Register of Historic Places. Increased public access to the remains could also hasten their disappearance.

Graves of Chinese miners from the Pioneer/Gold Creek area in the late nineteenth century are known to exist under the existing transmission line west of Pioneer. Rock-covered graves, perhaps of Chinese or of local white homesteaders, exist nearby. The graves are of local significance, and they would be adversely affected if they are disturbed.

The town of Pioneer, founded during the 1860's gold rush, shares with Bannack the distinction of being the oldest town in Montana. The numerous remaining structures are likely to be eligible for inclusion in the National Register of Historic Places as an historic district; the town is also locally and regionally significant. The area would be somewhat sensitive to visual intrusion by the line; however, an existing transmission line already compromises the visual quality. Increased public access to and awareness of the Pioneer area are likely to encourage vandalism of historic structures.

Segment 108 would cross the Madison formation, west of Rattler Gulch, where prehistoric quarries and manufacturing areas are likely to exist. Prehistoric campsites on alluvial terraces of the Clark Fork River and the Carten Creek alluvial fan (segment 101), along the south side of the Clark Fork Valley (segment 119), and along terraces or traverses of Wallace Creek and the Clark Fork River (segments 122, 124 and 125) could also be affected. Segment 119, on the west side of Flint Creek Valley, would also cross an area of possible quarries and workshops and likely prehistoric campsites. Where the line would cross the Rattlesnake area (segments 114, 116), evidence exists of prehistoric campsites, activity areas, and burials. Segment 5, at the Flathead River-Jocko River confluence and near the Little Bitterroot River, could also encounter prehistoric campsites and activity areas.

These sites would be disrupted by construction and use of heavy equipment. Bulldozing and excavation for tower sites could totally destroy the sites. The physical effects of disturbance or destruction would be direct and immediate, but the loss of information would constitute a long-term irretrievable/irreversible impact.

Areas subject to visual impacts by the line are found in segment 5. Prehistoric rock structures exist on the northwest side of the Flathead-Jocko River confluence and on ridges between the Flathead and Little Bitterroot Rivers. Impacts could be directly created by construction activities, including access road construction and tower placement, and indirectly created by visual presence of the line, towers, and roads. The line could interfere, as a consequence, with the use of the site as a sacred/ceremonial site (see Consultation, Review, and Permit Requirements on American Indian Religious Freedom Act). Alteration would be long-term, and greatest near the sites.

Mitigation: Survey and tests of subsurface remains would mitigate impacts on cultural deposits at historic sites in segment 5; impacts on any remaining structures would have to be avoided should they be determined eligible for nomination to the National Register of Historic Places (see Consultation, Review, and Permit Requirements). Survey for the Mullan Road, followed by mapping and photographing of any remaining unaltered portions, would reduce overall impact; avoidance would be necessary should any portions be determined eligible for National Register listing. Any disturbance or removal of burials would, as required, comply with Montana State laws on the subject.

Hot Springs-Bell Section

Urban/Residential: (Tables 4.2, 4.3; fig. 4.3) Three areas of concern exist in this section: at Weeksville and the entire length of segment 18 approaching Thompson Falls; from north of Hayden Lake to Rathdrum in segment 47; and in segment 50, approaching Spokane. Impacts--from short-term construction disturbance and long-term presence of the line--may affect residents close to the right-of-way and towns or communities close by. Right-of-way acquisition on undeveloped but subdivided land could conflict with its development.

Inhabitants of small communities, individual farms and residences, and undeveloped subdivided land could be affected at Weeksville and along the entire length of segment 18. Impacts would be from construction disturbance, noise, possible electrical interference with TV and radio reception, and visual intrusion. The scale of the transmission facilities would be out of proportion to this developed setting.

Individual residences and communities north of Hayden Lake and west into the Rathdrum area could experience temporary disturbance and long-term visual intrusion. No direct conflicts would occur where the line would be built on existing vacant right-of-way. Conflicts with future recreational development could occur, however, north of Hayden Lake, as transmission line facilities would be out of proportion in the residential/recreational developed settings of this area.

A new line along segment 50 would be built within vacant right-of-way and thus would involve no direct urban-residential impact. However, much of the Spokane River Valley in this area has been developed; the line would represent short-term inconvenience impacts and increased visual intrusion beyond that of the present 230-kV lines. About 14 individual houses or small clusters of houses, as well as the suburban/rural developments of Hauser, East Greenacres, Moab, East Farms, Otis Orchards, Trentwood, Mead, and a small part of northeast Spokane, would experience these effects.

Mitigation: Standard BPA mitigation for noise and TV/radio interference from the line may be necessary in these areas. Minimizing noise and other disturbance from construction would also be desirable.

Forestry: (Tables 4.2, 4.3; figs. 4.3, 4.4) Between 90 and 99 miles of forest land would be crossed. Areas of high or moderate forest productivity under intensive timber management are crossed in all segments but segment 18 (approaching Thompson Falls) and segment 50, near Bell Substation. Between 40 acres (segment 34) and 285 acres (segment 22) would be affected. Construction of the line and of access roads would remove this land from production for the life of the line, a local impact. This impact could increase in significance where combined with effects from temporary increases in water yield (affecting stream channels), from wildlife habitat alteration and wildlife disturbance, and from alteration of dispersed recreational experiences in the forest. The management of some timbered stands immediately outside the affected area in segment 22, for instance, would have to be delayed in order to limit water yield increases.

Mitigation: Right-of-way and access road clearing will be minimized in problem areas. Development of an access system compatible with timber harvest need and use of cleared material where possible should also be done.

Agriculture: (Tables 4.2, 4.3; fig. 4.3) Between 44 and 52 miles of agricultural land would be crossed. From 2 to 16 acres of farmland could be removed from production around tower bases. Notable impacts on agriculture could occur at both ends of this section. Segments 18, 22, and 29 in the Thompson Falls area and segments 47 and 50 at the western end of the section contain both irrigated and Prime Farmland.

Farthest east is segment 16, which would cross some Prime Farmland west of the Hot Springs Substation. Segment 18 would cross both irrigated and Prime Farmland along the central portion of the Clark Fork Valley. However, nearly all construction on segments 16 and 18 would involve tearing down an existing line and rebuilding in its place. This may cause a short-term disturbance but no additional farmland would be removed. Segment 22, west of Thompson Falls, also contains lesser amounts of Prime and irrigated farmland. Segment 29 crosses three separate fields under irrigation, and over six miles of Prime Farmland near Belknap. Impacts on irrigated farmland, from construction, operation and maintenance, would be direct and long-term. At most, 2-16 acres of farmland could be removed from production at towers. In addition, should towers be located within the irrigation pattern along segment 29, they would prevent overhead irrigation, and would impede or prevent any aerial spraying.

In the western portion of the section, segments 47 and 50 both cross substantial amounts of Prime and irrigated farmland. Segment 50 is of particular concern, as it crosses about 15 miles of Prime Farmland, most of which is irrigated. Since the segments for the most part use existing right-of-way, irrigation practices would suffer no direct interference.

A total of 160 acres of non-irrigated farmland is also crossed along the right-of-way in these segments, but impacts are less serious. Small amounts of land (at most, a total of three acres) may be removed from production by towers which may, in turn, interfere with farm management. Difficulties of farming around tower bases, problems of weed infestation, safety questions, and reduction of crop production caused by compacting and/or erosion comprise impacts on the local level. Over eight miles of Farmland of Statewide Importance (see Consultation, Review, and Permit Requirements) would also be crossed in segment 50. Effects on rangeland from short-term disturbance and reduced productivity would be minimal.

Mitigation: Location of towers at the edges of fields, particularly where Prime or irrigated farmland is involved, would substantially reduce impacts on farmland, although aerial spraying for agricultural purposes may still be difficult or hazardous. Assistance to farmers in controlling weed infestation, education in safely working around transmission lines, and subsoiling land compacted by construction activities should assist in minimizing effects on land productivity.

Recreation: (Tables 4.2, 4.3; fig. 4.5) Noteworthy local impacts would occur on both intensive and dispersed recreational use areas. In segment 16, the line would run near the Rainbow Lake Campground, an intensive use site. Dispersed use areas occur at intervals along the routes, but mainly along segment 18 (Clark Fork River) and segments 29, 34, 37 and 43.

The transmission line and the right-of-way are discordant intrusions in natural surroundings, a considerable impact at or near intensive use sites and a moderate impact in dispersed use areas (unless the line approaches them directly). At the same time, the right-of-way may provide increased access to the dispersed use areas for recreation users. Related, cumulative impacts are primarily visual (see Esthetics).

Mitigation: Recreation impacts could be reduced by reducing visual impacts, by minimizing right-of-way clearing, and by using non-reflective conductors and treated towers at or near sites. Avoiding crossing over or near intensive use areas would constitute the best mitigation.

Corridor Development/Long-Range Plans: (Fig. 2.5) Building a future line, in addition to this proposal, could increase resource impacts along all segments, but particularly in five environmentally sensitive areas. No single route option would encounter all of these areas.

These areas are the Rainbow Lake area (segment 16; increased visual, recreational problems); the Clark Fork Canyon (segment 18; increased effects on developed and agricultural land uses and associated socioeconomic concerns, bald eagle and fishery resources, visual resources); Beaver Creek (added problems for agricultural and residential land uses, visual concerns); Hayden Lake-Rathdrum Prairie (intensified impacts on fisheries, recreational resources, visual quality, and developed lands); and Pleasant Prairie (additional effects on visual quality, agriculture, and communities). More significantly, building the proposal would effectively fill the existing right-of-way to capacity through the Rainbow Lake and Clark Fork Canyon areas, even considering the multiple-circuit modifications proposed to avoid the need for additional right-of-way. Developing the corridor beyond this proposal in these areas would entail overcoming considerable physical constraints and creating serious conflicts with land use and wildlife habitat, particularly in the Clark Fork Canyon.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) Three areas of greater concern exist in this section: where Eddy Island is crossed in segment 18; in segment 50, south of Moab, Washington, where an upland sandpiper colony could be affected; and in segment 47, where the route runs in the Hayden Lake vicinity.

In segment 18, construction disturbance could displace wintering bald eagles from Eddy Island, a direct, short-term impact. Disturbance of a variety of wildlife species (e.g., whitetail deer, geese, and elk) which use the island year-round for nesting or wintering could also be a significant impact.

In segment 50, south of Moab, construction activities along about one mile of route could adversely affect the only known active nesting colony of upland sandpipers in the Pacific Northwest. This could be a regional and national impact, as the nationwide population has been decreasing. Construction activity disturbance, resulting in temporary nest abandonment, could be a direct, but short-term impact. However, construction of access roads and tower sites would result in loss of nesting habitat and could destroy nests.

The westslope cutthroat trout spawning beds in the North and East Forks of Hayden Creek suffer from siltation problems caused by erosion from the existing road system, grazing use, and logging activity. Construction of access roads and tower sites could increase local erosion and thus increase siltation in these areas, a potentially significant direct, short-term impact. If fry production were decreased as a consequence, the cutthroat trout population in Hayden Lake could also be affected. 8/ Somewhat increased impacts could also occur wherever the line crosses rivers. Bald eagles do appear at three crossings of the Clark Fork River (segments 18, 22, 29). However, their relatively low population, the minimal disturbance of their habitat, and the low collision potential make this not a noteworthy problem. The U.S. Fish and Wildlife Service has concurred with BPA's Biological Assessment of this potential problem.

Mitigation: To mitigate disturbance of the upland sandpiper colony, the timing of survey and construction activities near nesting sites--particularly between mid-April and mid-August--would be coordinated with local agencies (Washington State Department of Game, Nature Conservancy, Spokane Audubon Society). To minimize loss of habitat and nests, as few as practical towers would be placed in the sandpiper nesting area, with no permanent access road construction. As Eddy Island is used by a variety of wildlife (bald eagle, osprey, waterfowl, and big game), BPA would coordinate construction timing with the USFWS, particularly relating to times that bald eagles are present in the area.

8/ The route location here (segment 47) has been adjusted north in the Hayden Creek area, in consultation with the U.S. Forest Service, to avoid these impacts. Also see Volume II, Part IV. U.

The relocation of segment 47 has avoided impacts on many resources. The following measures would still be used along the relocated portion of route: use of existing access roads and construction of a minimal amount of new roads would minimize erosion; erosion control measures (such as water bars) would be installed on roads; amount of right-of-way clearing would be minimized and, wherever possible, streams would not be crossed with access roads; prompt mulching and reseeding of the areas would also be undertaken.

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) Three noteworthy areas of concern exist in this section: segment 35, north of Prichard; segment 37, just north of Character Peak; and segment 47, near Hayden Creek. 9/ Vegetation would be removed or disturbed for right-of-way and roads, with consequent erosion and sedimentation and potential cumulative effects on wildlife, water resources, and esthetics. These effects in these areas are noteworthy because they are more intense due to the predisposing factors of steep slopes, high access requirements, and the relatively undisturbed character of the vegetation, which means that any effects are likely to last longer, be more severe, and/or lead more readily to secondary effects.

Mitigation: Mitigation measures are discussed under the Garrison-Hot Springs section. In particular, prompt reseeding of disturbed areas and selective clearing, where possible, would minimize the amount or duration of disturbance of vegetation.

Water Resources: (Tables 4.2, 4.3; fig. 4.7) The Clark Fork River floodplain would be crossed east of Thompson Falls, in segment 18; and the Prospect Creek floodplain would be crossed, south of Thompson Falls, in segment 22 (see fig. 4.14). Tower structures would not constrict flood flow because they would be built on islands. Although disturbed areas may be susceptible to erosion, particularly during the first year after construction, neither area is of noteworthy concern. Possible sedimentation problems in the Hayden Creek drainage (segment 47) could result from the cumulative effect of road system use, grazing use, logging activity, and the new development (more roads, clearing, and vehicular use) associated with the transmission line. (See also potential effects on fisheries, under Wildlife.) 10/

Mitigation: Control of access and revegetation of disturbed areas would lessen disturbance and speed recovery of surrounding vegetation.

Soils/Geology: (Tables 4.2, 4.3; fig. 4.8) Two areas of concern occur in this section. In segment 18, problem soils exist near the eastern end of the segment, and steep slopes and terrain barriers are encountered near Eddy Mountain. All other segments, except the westernmost parts of segments 47 and 50, would include some areas of steep slope and mass movement potential. Construction could result in erosion, sedimentation, and loss of soil productivity and related effects.

9/ See footnote #8.

10/ See footnote #8.

Mitigation: Limitation of construction on problem soils (segment 18) during wet weather would reduce rutting and compaction; low gradient road cuts, early seeding of cut-and-fill sites, and use of drainage structures would reduce erosion and sediment production from roads (segments 18, 16). For tower locations on segment 18, detailed site investigation may be needed to determine site stability.

Esthetics

(Tables 4.2, 4.3; figs. 4.9-4.13) Several areas of particular concern exist along this section: near Rainbow Lake (segment 16); in the Clark Fork Valley east of Thompson Falls (segment 18); at Prospect Creek near Thompson Falls (segment 22); at Upper Prospect Creek, near Thompson Pass (segment 22); at Eagle Creek (segment 35)and in segment 37; near Hayden Lake (segment 47); and as the line would near Bell Substation (segment 50).

Several lines cross and parallel Highway 28 west of Hot Springs. Near Rainbow Lake, these lines form a single wide corridor which is itself well screened from the highway except at crossings and near the east end of Rainbow Lake. Here, the adverse visual impact has already been established and would not significantly change with rebuilding to a double-circuit line. A parallel line, however, would stand out, adding to the chaotic appearance of the corridor. Users of Rainbow Lake may be adversely affected by increased visibility of the taller towers.

Similarly, near Thompson Falls in the narrow Clark Fork Valley, the existing utility structures have already established adverse visual conditions. Rebuilding would not significantly alter this situation, although visibility may be increased because the towers are taller. A parallel line, with its wider corridor, would visually dominate the valley.

At Prospect Creek, near Thompson Falls, the visual impacts would not increase significantly where the line parallels the existing Dworshak-Hot Springs line because they would have similar configuration and spacing. Where they diverge, however, the appearance would be more chaotic and the two separate corridors would be more visible. Impacts would decrease as the line moves out of the valley viewshed. Within the valley, both visual and recreational values would be affected. At Upper Prospect Creek, the undisturbed and highly scenic character of the area would be adversely affected by extensive scarring from clearing and access road construction. Because it would run near the highway, the line would offer extended views of the right-of-way and towers. Recreational activities would suffer, as the line would degrade the existing high visual quality of the landscape.

The residents of Eagle Creek Valley would be affected negatively by the construction of a substation (also see Washington Water Power Plan 2) and of transmission lines in this isolated, scenic valley. Undisturbed landscape would be altered, and the lines would appear out-of-scale with the small size of the valley.

The line and towers would not be consistent with viewer expectation where the route crosses the Coeur d'Alene River (segments 35, 37). The river is under study and could be designated by the State of Idaho as a Scenic River; thus, viewer expectations would be high. The crossing would be visible to river users, highway users, and to local residents. Towers could be skylined, and possible airway markings on conductors would make the line that much more visible.

The line would enter a visually sensitive area in segment 47, where it would parallel Hayden Creek and run close to the main forest entrance road into the scenic Hell's Canyon. 11/ Although upslope and screened from most views, it would be perceived as a visual intrusion. In addition, where the line enters the Purcell Trench and crosses Highway 2, one tower would be prominently skylined and 1.2 miles of the line would be visible to travelers and nearby residents. Screening would not be possible.

Finally, potential visual impacts may increase as the line nears Bell Substation because many more people live in the area. However, the existing lines have already affected the visual quality of the area, so overall impacts will be low. Exceptions will occur wherever individuals have unobstructed foreground views of the line.

Mitigation: Non-specular conductors and treated towers are necessary mitigation measures for each of these problem areas. In addition, in rebuilding segment 18 east of Thompson Falls the towers must be spaced to coordinate with the existing 500-kV line; selective clearing at Eagle Creek and selective clearing and access road construction in segment 22, near Upper Prospect Creek, are necessary to minimize effects. To reduce visibility and scarring at the crossings of the Coeur d'Alene River, clearing and access road construction would be limited between crossing towers. Near Hayden Lake, treated towers, non-specular conductors, and possible routing adjustments would lessen impacts.

Social and Economic Considerations

(Tables 4.2, 4.3; figs. 4.2, 4.3, 4.4) The primary areas of concern for socio-economics are found along segment 18, in the Clark Fork Valley as the line approaches Thompson Falls, and along segment 50, as the line approaches Spokane. Other segments of specific concern include segment 29, with potential impacts on agriculture; segment 16, which crosses a portion of the Flathead Indian Reservation; and segments 35 and 37, which cross the Coeur d'Alene River.

In segment 16, the crossing of about six miles of Reservation land, not private land, is the most important factor. Special considerations include disagreement over the tenure and use of the present easement across the Reservation. (See Volume II, Part II. D. 3, for further discussion.) Crossing the Reservation could, as a consequence, also create conflicts among Reservation groups.

11/ See footnote 8.

Segments 18 and 50, although located at opposite ends of the Hot Springs-Bell section, share characteristics sensitive to impact. Landowner density near the right-of-way is also high in places as the line nears Spokane. Alienation toward development is a potential consequence. New right-of-way would not be required. An additional consideration in segment 50 is the crossing of Prime Farmland (see Agriculture). Construction would cause short-term disturbance; operation and maintenance of the line would constitute long-term impacts, with visual consequences as well.

Elsewhere in this section, agriculture could be affected, primarily by construction on segment 29 (see Agriculture). The crossings of the Coeur d'Alene River in segments 35 or 37 could increase alienation, as viewer expectations would be high (see Esthetics).

Mitigation: Impacts on agriculture in segments 18, 29, and 50 can be mitigated largely through careful tower siting practices and landowner consultation. Close consultation with landowners on tower and access road siting, specifying that contractors minimize disruptive practices for construction and maintenance of the line (including advance notice of necessary work), continued development of fair negotiation and compensation practices, and prompt response to landowner problems will reduce socioeconomic impacts in these areas.

Cultural Resources

(Tables 4.2, 4.3; fig. 4.5) Two areas of concern for historic resources occur in this section: fur trading post sites at the mouth of Thompson River and east of Thompson Falls (segment 18); and the Glidden Pass Trail (segment 22).

Impacts on the fur trading post sites could involve direct disturbance of subsurface deposits, resulting in possible destruction of the sites. Such impacts could be of regional significance because few of these sites (which date to the early nineteenth century) remain.

The Glidden Pass Trail is a late nineteenth-century mining trail, most of which is located in a pristine roadless area. A transmission line could cause direct disturbance or loss of portions of it, as well as long-term visual intrusion. This would be an unacceptable intrusion of considerable intensity and would constitute a locally significant impact.

Two areas of concern for prehistoric resources occur in this section. In the Thompson Falls area, a prehistoric rock art site, campsite, and trail along the north side of the Clark Fork Valley (segment 18) would be susceptible to increased visual intrusion from adding a line on the existing right-of-way. Slightly to the west, at the crossing of the Clark Fork near Thompson Falls, prehistoric camps could be disturbed or destroyed by right-of-way clearing, access road construction, or tower excavation. The second noteworthy area also involves small prehistoric camps near Hayden Lake (segment 47). Here less than a mile of route could have impacts similar to those described above. 12/

12/ See footnote #8.

Mitigation: Both historic sites may be eligible for inclusion on the National Register of Historic Places. Should this be determined, all direct impacts would be avoided. Visual intrusion could be minimized by non-specular conductor and painted towers (along segment 18) and, along segment 22, by selective clearing as well.

The campsites could be located by survey and avoided. Measures proposed to reduce visibility along segment 18 would minimize effects on the rock art site and trail.

ALTERNATIVE B: PLAINS PLAN

The discussions below present all noteworthy impacts for the plan which begins at the Garrison Substation, near Garrison, Montana, connects with the Plains Substation, near Plains, Montana, and terminates at the Bell Substation, near Spokane, Washington. Route segments not sustaining any noteworthy impacts under a particular resource topic will not appear in that part of the text. NOT ALL IMPACTS DISCUSSED WILL OCCUR FOR ANY SINGLE ROUTE. Ways to avoid, minimize, or reduce impacts are presented at the end of each resource discussion.

Under this plan, two new substations may be developed. A new 12-acre switching yard would be constructed near Plains, Montana. A new 10-acre 500/230-kV substation may be needed near Eagle Creek in Idaho. The site would be developed if The Washington Water Power Company adopts their Eagle Creek alternative (Plan 2). Impacts caused by substation construction/expansion and operation for this plan are summarized in table 4.11, Summary of Substation Requirements.

Many different routes could be constructed from the segments in this plan, listed below and geographically illustrated in figure 4.1. The routes of lowest environmental impact for each plan are compared in Chapter II, under Comparison of Alternatives.

The route of least environmental impact for Plan B includes the following segments:

Route B-1 (Plains South): 118, 129, 130, 132, 134, 135, 137, 138, 139, 142, 143, 144, 147, 148, 14, 18, 22, 34, 35, 43, 47, 50

The route of next-lowest impact includes the following segments:

Route B-2 (Plains North): 101, 102, 107, 108, 120, 121, 127, 128, 138, 139, 142, 143, 144, 147, 148, 14, 18, 22, 34, 35, 43, 47, 50

Other segments also part of Plan B 13/: 109, 110, 111, 113, 114, 115, 116, 117, 119, 122, 123, 124, 125, 126, 4, 1, 6, 29, 33, 37, 40, 41, 45

Garrison-Plains Section

Areas of particular concern for this section include: all those discussed for Garrison-Hot Springs (p. 30) except for segment 5; and all those discussed for Garrison-Taft (p. 56) except for the area between Alberton and Taft Substation (segments 145, 10, 15, 92, and 26). The discussion below focuses on noteworthy impacts on segment 14 and the Plains substation (the only part of the Plains plan not covered in either of the above) and references those section discussions where additional impacts are treated.

Land Use

Urban/Residential: (Tables 4.2, 4.3; fig. 4.3) Although the line may be visible from the town of Plains, impact would be slight and indirect due to distance (about two miles). No effects on urban-residential land use would occur. Other noteworthy impacts in this section would occur in segments 119, 122-125, 115, 116, and 117 (see Garrison-Hot Springs section); and in segments 127, 139, and 144 (see Garrison-Taft section).

Mitigation: See Garrison-Hot Springs section.

Forestry: (Tables 4.2, 4.3; figs. 4.3, 4.4) Areas of intensive timber management are crossed along segment 14. Other areas of noteworthy impact include segments 110, 111, 113, 114, 115, and 122 (see Garrison-Hot Springs section); and segments 126, 127, 128, 142, 143, and 148 (see Garrison-Taft section). Overall, between 77 and 110 miles of forest land would be crossed in this section.

Mitigation: See Garrison-Hot Springs section.

Agriculture: (Tables 4.2, 4.3; fig. 4.3) In segment 14, about a mile of non-irrigated farmland would be crossed. About 12 acres of agricultural land would be removed to develop Plains Substation (table 4.11). Other areas of noteworthy impact include segments 113, 117, 122, 124, 123, 125, 108, 120, and 119 (see Garrison-Hot Springs section); and segments 127, 132, 134, and 144 (see Garrison-Taft section). From 2 to 14 miles of agricultural land would be crossed. About 0.1 to 4 acres of farmland could be removed from production under tower bases.

Mitigation: See Garrison-Hot Springs section.

Recreation: (Tables 4.2, 4.3; fig 4.5) In segment 14, in the Flathead River area, 2.5 miles of roadless forest would be crossed. The value of this area

13/ See footnote 3, p. IV-2.

for recreational activities in remote settings would be compromised by building a right-of-way and road system through it. Other noteworthy areas of concern occur along segments 114, 113, 125, 101, 121, 108, 109, 110, 111, 122, and 124 (see Garrison-Hot Springs section); and along segments 139, 142, 135, 137, 127, and 128 (see Garrison-Taft section).

Mitigation: See Garrison-Hot Springs section.

Corridor Development/Long-Range Plans: (Fig. 2.5) Impacts would increase for natural systems and visual and cultural resources in the Siegel Mountain-Flathead River crossing area, should segment 14 be paralleled in the future. Potential geotechnical problems in the Siegel Mountain area are severe enough to constrain development of more than one route through this area. Other impacts on sensitive and constraint areas include segments 101, 119, 123, 124, 122, 127, 113, 114, 132, 125, 116, and 117 (see Garrison-Hot Springs section) and segments 132, 135, 139, 4, 1, and 6 (see Garrision-Taft section). No single route option would encounter all these areas.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) Segment 14 crosses riparian habitat for waterfowl and bald eagles along the Flathead River. Impacts would be similar to those discussed for a similar crossing along segment 5 under Garrison-Hot Springs, except that the segment 14 crossing is farther west. Other areas of concern are: segments 108, 114, 119, 102, 120, 101, 113, 124, and 125 (see Garrison-Hot Springs section); and segments 130, 134, 143, 144, 135, 148, and 6 (see Garrison-Taft section).

Mitigation: See Garrison-Hot Springs section.

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) Segment 14 in the Siegel Mountain area is an area of concern because access road requirements are high and because steep slopes, high elevation, and the undisturbed nature of the area render the vegetation more susceptible to impact along about two miles. Other areas of concern include: segments 120, 111, 113, 114, 115, 116, and 117 (see Garrison-Hot Springs section).

Mitigation: See Garrison-Hot Springs section.

Water Resources: (Tables 4.2, 4.3; fig. 4.7) No noteworthy impacts would be expected to occur in segment 14. Other areas of concern include: segments 114, 115, and 116 (see Garrison-Hot Springs section); and segment 130 (see Garrison-Taft section).

Mitigation: See Garrison-Hot Springs section.

Soils/Geology: (Tables 4.2, 4.3; fig. 4.8) Segment 14 crosses terrain with moderate erosion potential, steep slopes, high elevations, and terrain barriers in the form of shallow soils, rock outcrops, and talus near Siegel Creek and from the Flathead River crossing to Henry Creek. Consequences of construction in this area include increased erosion, with indirect impacts on water resources and vegetation, and increased difficulty of construction where steep slopes, rock, and high elevations are encountered. Other areas of special concern include: segments 110-117, 125, and 107 (see Garrison-Hot Springs section); and segments 130, 134, 135, 126, 128, 139, 142, and 148 (see Garrison-Taft section).

Mitigation: See Garrison-Hot Springs section.

Esthetics

(Tables 4.2, 4.3; figs. 4.9-4.13) In segment 14, at Siegel Pass, a high potential for access road scars exists at the crossing of the Flathead River near its confluence with the Clark Fork River. Towers would be skylined, becoming a major landscape feature and affecting many people, including both travelers and residents of Paradise. The line would also cut across the valley, conflicting with the land pattern in views at all distances. As two major highways intersect near the town, the area would be highly sensitive to transmission line presence.

The line may also be visible from Plains, as it passes about two miles away. Although no vegetation screening is available on this rangeland terrain, landform screening would assist in diminishing impact. The line would generally follow landforms but would have to cross the ridgeline, increasing visibility and skylining towers. The area is also noteworthy because of the local impact on the town of Plains and the establishment of a substation in the area.

Mitigation: The use of non-specular conductors, treated towers, and selective clearing in segment 1 would reduce impacts by reducing visibility in middle-ground and background views; non-specular conductors would reduce visibility near Plains; such conductors, treated towers, and clearing and access road constraints would do the same at the confluence of the Flathead and Clark Fork Rivers near Paradise.

Social and Economic Considerations

(Tables 4.2, 4.3; figs. 4.2-4.5) No noteworthy effects would occur along segment 14. Areas of concern along this section include: segments 101, 103, 113-117, 119, 120, 121, and 122-125 (see Garrison-Hot Springs section); and segments 132, 135, 127, and 142 (see Garrison-Taft section).

Mitigation: See Garrison-Hot Springs section.

Cultural Resources

(Tables 4.2, 4.3; fig. 4.5) Segment 14 encounters prehistoric rock art on the north side of the Flathead River, just upriver of its confluence with the Clark Fork River. Impacts could be directly created by construction activities, including access road construction and tower placement, and indirectly by visual presence of the line, towers and roads. The line would interfere, as a consequence, with the use of the site as a sacred/ceremonial site (see Consultation, Review, and Permit Requirements on American Indian Religious Freedom Act). Alteration would be long-term and greatest near the site.

Also in segment 14, prehistoric campsites would be crossed at the confluence of the Flathead and Clark Fork Rivers, and campsites and trails on the north side of the Clark Fork Valley upriver of that confluence.

Other areas of concern for this section include: segments 101, 119, 122, 124, 125, and 110 (see Garrison-Hot Springs section); and segments 127, 132, 134, 144, 148, (see Garrison-Taft section).

Mitigation: See Garrison-Hot Springs section.

Plains-Bell Section

Urban/Residential: (Tables 4.2, 4.3; fig. 4.3) Areas of concern and mitigation techniques would be identical to those for Hot Springs-Bell.

Forestry, Agriculture, Recreation, Corridor Development/Long-Range Plans: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.5, 2.5) Noteworthy impacts and mitigation for all resources listed above are nearly identical to those described for Garrison-Hot Springs. Only impacts on segment 16 would not occur, as it is not part of this plan.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) Noteworthy areas of concern and recommended mitigation for this section are identical to those for Hot Springs-Bell.

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) The single noteworthy area in this section is covered in the discussion of segment 35, in the Hot Springs-Bell section.

Water Resources: (Tables 4.2, 4.3; fig. 4.7) Areas of noteworthy concern and mitigation are identical to those for Hot Springs-Bell.

Soils/Geology: (Tables 4.2, 4.3; fig. 4.8) Noteworthy areas of concern are identical to those for Hot Springs-Bell. Mitigation would also be similar, except that detailed site investigation may also be needed for substation location near Plains to determine soil suitability.

Esthetics

(Tables 4.2, 4.3; figs. 4.9-4.13) Areas of noteworthy concern and their potential mitigation are nearly identical to those discussed for Hot Springs-Bell. Impacts on segment 16, near Rainbow Lake, would not occur, as it is not part of this plan.

Social and Economic Considerations

(Tables 4.2, 4.3; figs. 4.2-4.4) Areas of concern and recommended mitigation for this section include all those for Hot Springs-Bell except those noted for segment 16.

Cultural Resources

(Tables 4.2, 4.3; fig. 4.5) Noteworthy areas of concern for this section are the same as those discussed for the Hot Springs-Bell Section.

ALTERNATIVE C: TAFT PLAN (PREFERRED ALTERNATIVE)

The discussions below present all noteworthy impacts for the plan which begins at the Garrison Substation, near Garrison, Montana, connects with the Taft Substation, near Taft, Montana, and terminates at the Bell Substation, near Spokane, Washington. Route segments not sustaining any noteworthy impacts under a particular resource topic will not appear in that part of the text. NOT ALL IMPACTS DISCUSSED WILL OCCUR FOR ANY SINGLE ROUTE. Ways to avoid, minimize, or reduce impacts are presented at the end of each resource discussion.

For this plan, a new 10-acre 500/230-kV substation would be built near Taft, Montana. Impacts caused by substation construction/expansion and operation for this plan are summarized in table 4.11, Summary of Substation Requirements.

Many different routes could be constructed from the segments in this plan, listed below and geographically illustrated in figure 4.1. The routes of lowest environmental impact for each plan are compared in Chapter II, under Comparison of Alternatives.

The route of lowest environmental impact for Plan C includes the following segments:

Route C-1 (Taft South): 118, 129, 130, 132, 134, 135, 137, 138, 139, 142, 143, 145, 10, 15, 92, 26, 28, 32, 37, 41 43, 47, 50

The route of next-lowest impact includes the following segments:

Route C-2 (Taft North): 101, 102, 107, 108, 120, 121, 127, 128, 138, 139, 142, 143, 145, 10, 15, 92, 26, 28, 32, 37, 41, 43, 47, 50

Other segments also part of Plan C: 109, 110, 111, 113, 114, 115, 116, 117, 1, 4, 6, 119, 122, 123 124, 126, 146, 147, 148, 13, 7, 25, 31, 40, 45

Garrison-Taft Section

Land Use

Urban Residential: (Tables 4.2, 4.3; fig. 4.3) Areas of greater concern for Garrison-Hot Springs and Garrison-Plains are also encountered in this section; segment 5, however, with its effects on the communities of Evaro and Dixon, is not included in this plan. Additional areas of noteworthy concern include the crossing of Schwartz Creek in segment 127, the segments which cross the mouth of Ninemile Valley and which proceed up the Valley, and the Miller Creek area.

Where Schwartz Creek enters the Clark Fork River, southeast of Clinton, a farm is located adjacent to the right-of-way; four other farms are located within one-quarter mile of the right-of-way. Crossing this area would cause fairly intense visual and inconvenience effects.

Where segment 132 crosses the Flint Creek Valley above Maxville, there are 19 residences within 1/2 mile of the line. Although no direct developed land use impacts will occur, there could be significant inconvenience effects and visual intrusion on some residences.

In the Miller Creek area (segments 138, 139), the route passes within one-half mile of a small residential development (segment 138) and of approximately six additional individual dwellings (segment 139). It also crosses a large (220-unit) undeveloped residential subdivision recently approved for development (segment 139).

It is unlikely that the line would be located within view of the residential development near segment 138, as the location takes advantage of screening and topography. However, residents of this area will be able to view the line as they travel to and from Highway 93. Residents of the scattered dwellings on the valley slope across from segment 139 would have direct views of the line. Segment 139 would also conflict directly with the development of portions of the proposed subdivision as currently planned, and would intrude visually on dwellings which may be developed. However, the line's location along the steeper face of the south slope of Miller Creek Valley avoids most parts of this development. BPA's experience with similar situations indicates that the presence of the line would not interfere with any possible future expansion of south Missoula into the Miller Creek area.

Much of the Clark Fork Valley in the Missoula area (segments 117, 1, 4, 144, 145, and 148 in this section) is developed or is undergoing rapid residential development. Although the more settled areas are confined to the unforested valley floor closer to the river itself and to I-90, numerous subdivisions are extending into the wooded foothills up tributary streams to the north of the Clark Fork River. Noteworthy problem areas occur in such situations where the route would either cross close to these subdivisions, with possible conflicts with adjacent subdivided undeveloped land, or would be visible from the more densely settled communities along the river itself. Impacts would not be direct (except for conflict with undeveloped subdivided land) and would involve short-term disturbance and long-term visual intrusion.

Segment 1 would cross within one-quarter mile of a small development of about seven residences at O'Keefe Creek and Highway 93. It would encounter a similar situation at Mill Creek in the hills above Frenchtown where three residences are within one-quarter mile of the line. In the Houle-Roman Creek area at the mouth of the Ninemile Valley, the route would cross close to a large rapidly developing residential subdivision where about 35 residences are already in place and numerous other lots are set for development.

A similar area would be encountered by segment 4, along Sixmile Creek. Here, approximately 40 residences in a forested setting would be within one-half mile of the line. In this area as well, there are numerous lots set aside for future development. That development could be affected or prevented should the right-of-way cross the lots. The segment would also pass within one-half mile of about 10 additional houses and be visible from the community of Ninemile.

Segments 144 and 145 cross the Clark Fork River near the mouth of the Ninemile Valley; segment 148 runs the length of the valley. Segment 145 crosses an area which may develop into urban/residential/commercial land use. Actual impacts will be indirect and visual: for instance, the line could be visible from Lothrop. Impacts from segments 144 and 148 are more intense because the route crosses close to the mouth of the Ninemile Valley, continues up the west side of the valley, passes close to the nearby communities of Soudan and Ninemile, and would potentially conflict with development of land on the south side of the Clark Fork crossing.

Mitigation: Visual impacts would best be mitigated by those techniques listed under Esthetics. Should any transmission line interference occur with TV or radio reception, BPA would follow standard mitigation procedures to correct the reception.

Forestry: (Tables 4.2, 4.3; figs. 4.3, 4.4) Between 108 and 142 miles of forestland would be crossed in this section. About 10 acres of forest would be removed to develop the new Taft Substation. Noteworthy areas of intensively managed, high or moderate forest productivity include all those identified for Garrison-Hot Springs. In addition, this plan encounters such areas in segments 6, 10, 13, 15 and 92 (in the Ninemile Valley and west); segments 126, 127 and 128 (between Clinton and the Miller Creek area), segments 134 and 135 (in the John Long Mountains); and segments 142, 143, and 148 (in the Lolo National Forest south and west of Missoula). Treatment of timbered areas may also be delayed due to possible watershed management conflict related to increased water yield in Upper Schwartz Creek and Martin/Sherman Gulches.

Mitigation: See Garrison-Hot Springs section.

Agriculture: (Tables 4.2, 4.3; fig. 4.3) Between 1 and 13 miles of agricultural land may be crossed; about 1 to 4 acres of farmland around tower bases may be removed from production. Impacts on agriculture are generally similar in nature to those for Garrison-Hot Springs. All Garrison-Hot Springs segments are part of this section except for segment 5. Small additional amounts (about 15 acres total) of irrigated farmland could be crossed in each of segments 127, 132 and 134; small additional amounts of Prime Farmland could also be crossed, including less than one-half mile of irrigated farmland on segments 144 and 145, and about one mile of irrigated farmland in the eastern portion of segment 127 in the Clark Fork Valley. Small amounts of non-irrigated farmland could be crossed in segment 139 (about six acres within the right-of-way), and in segments 144 and 145 (about 36 acres total within the right-of-way) along the Clark Fork Valley. About one and one-half miles of Farmland of Statewide Importance are encountered in the Miller Creek Valley (segment 139).

Mitigation: See Garrison-Hot Springs section.

Recreation: (Tables 4.2, 4.3; fig. 4.5) Areas affected by the line include all those identified in the Garrison-Hot Springs section. Other impacts include: a third crossing of the Lewis and Clark Trail in segment 139; crossing of the Stark Mountain Trail in segment 10; encountering a dispersed hunting and fishing area along the Clark Fork River in segment 145; crossing the Blue Mountain Recreation area in segment 142; crossing the Valley of the Moon Ranch at Rock Creek (segment 135); and encountering various dispersed recreational use areas along Upper Miller and Schwartz Creeks in segments 135, 137, 127, and 128, and near the Taft substation (segments 15, 26) where dispersed winter recreation activities occur (snowmobiling and skiing).

Mitigation: Visual mitigation specified under Garrison-Hot Springs would be used to minimize visual intrusion. However, these measures may be offset if marking of towers and conductors across Rock Creek or the Clark Fork River is necessary.

Corridor Development/Long-Range Plans: (Fig. 2.5) The same impact-sensitive and constraint areas described for Garrison-Hot Springs occur here as well, except for those along segment 5 and for the following additions. A line parallel to the proposal would: heighten visual, socioeconomic, recreational and developed land impacts at Maxville (segment 132); add to potential visibility, recreation and wildlife problems at the Rock Creek crossing (segment 135); intensify visual, developed land use, socioeconomic, and recreational impacts in the Miller Creek-Bitterroot River-Blue Mountain area (segments 139, 142); cause additional effects on urban-residential, visual, socioeconomic, wildlife, soils and cultural resources in the area of the mouth of Ninemile Creek; and intensify visual, recreation, socioeconomic and developed land effects in the St. Regis area (segment 15). Should the proposal follow segment 4 across the Ninemile Valley, the extensive distribution of developed land uses, particularly residential, would effectively constrain future development. Additional lines could not be constructed without conflicts or costly design modifications, which themselves could result in tradeoffs for visibility. Similar effects, as well as effects on wildlife and historic resources, would occur should segments 1 or 6 be paralleled in the future. (No single route option would encounter all of these areas.) The preferred routing option between Garrison and Taft avoids severely constrained areas and several other environmentally sensitive areas.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) Big game critical winter range areas for this section include all those of the Garrison-Hot Springs section. In addition, segments 130, 143, 144 and 145 would cross less than a mile each of such range. Segments 134 (1.6 miles), 135 (a little over a mile near Rock Creek), 148 (about 5.5 miles), and 6 (about 8.4 miles) in the Ninemile area would also cross critical winter range.

Presence of the line could create a potential for waterfowl collisions with the line, an impact of local significance, in segments 144, 145, 15, and 92 at crossings of the Clark Fork River. Bald eagles also appear in segment 135 (at Rock Creek); segments 144, 145 and 15; and at other river crossings (segments 101, 119, 124, 125, 127 - Clark Fork River; segment 113 - Blackfoot River; segment 139 - Bitterroot River). However, these crossings are not considered problem areas because few eagles use them, because habitat would be minimally disturbed, and because collision potential is low. The BPA Biological Assessment reports that the proposed action would not affect the bald eagle; the United States Fish and Wildlife Service has concurred with those findings.

Mitigation: Minimizing clearing and disturbances of riparian habitat, especially at the Clark Fork, Blackfoot, and Bitterroot River crossings; seeding to speed vegetative recovery; and timing construction activities in coordination with the USFWS when bald eagles are present would all diminish intensity, duration, and likelihood of impacts. Marking or removing overhead groundwires might also assist in reducing the chance for collisions.

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) Areas of greater concern for this section include all those discussed under the Garrison-Hot Springs section. An additional area of concern exists along segment 10, where high amounts of new access road construction would be required along about four miles in a previously undisturbed area. Segment 10 also crosses 16 miles of steep terrain where impacts on vegetation would be more intense and long-lasting. Access road construction and right-of-way clearing cause erosion, a cumulative factor in these areas.

Mitigation: Measures discussed under Vegetation in Introduction of Topics would be recommended to reduce erosion potential, including prompt reseeding of disturbed areas and selective clearing wherever these areas occur.

Water Resources: (Tables 4.2, 4.3; fig. 4.7) Impacts on water resources include all those discussed under the Garrison-Hot Springs section. In addition, problem soils and, in places, high erosion susceptibility occur in segment 130, near Jones and Douglas Mountains. Access road construction and other construction and heavy equipment disturbance will cause erosion and accelerated runoff along the 14.5 miles of route with high access road requirements. Gird and Gold Creeks could be affected by short-term sedimentation.

A floodplain would also be crossed in segments 15 or 92 where the line crosses the Clark Fork River north of St. Regis (see fig. 4.14). In segment 15, one tower would be placed in the floodplain, because the floodplain is too wide to span. There would be no adverse effects on the floodplain.

Mitigation: See Garrison-Hot Springs section.

Soils/Geology: (Tables 4.2, 4.3; fig. 4.8) Particular areas of concern for this section include all those discussed in the Garrison-Hot Springs section, except for segment 5, which is not crossed by the Garrison-Taft section. In addition, six other areas of concern are crossed by the route alternatives for this section: segment 130, in the Gold Creek area; segments 134 and 135, running west and north to a point southeast of Miller Peak; segments 126 and 128, in the Miller Creek area; segments 139 and 142 crossing the Bitterroot River to a point near Blue Mountain; segments 1[illegible], 10, 15, and 92 proceeding north through the Ninemile Valley and west toward Taft; and segment 6 along the Ninemile Valley. These areas are noteworthy because numerous soil or geologic difficulties overlap there. Primarily high amounts of access would be required for nearly every segment listed.

Segment 130 would encounter small areas of problem soils near Gold and North Gold Creeks. In addition, the route would cross terrain barriers, areas of mass movement and high erosion potentials, and 5.5 miles of high elevation (over 6000 feet) terrain in the Gold Creek Valley area.

Segment 134 would encounter areas of moderate erosion potential near Smart Creek and the Silver King Ridge area, steep slopes at Smart Creek, and 3 miles of land at high elevation (over 6000 feet). Moderate erosion potential and moderate mass movement potential areas would also be crossed by segment 135, near Kitchen Gulch. Steep slopes would be encountered from Burnt Mountain to the Rock Creek crossing, and very steep slopes and terrain barriers at Rock Creek. Elevations over 6000 feet would also be encountered.

Segments 126 and 128 would encounter terrain with moderate erosion potential west of the Miller Creek crossing, very steep slopes scattered along Greenough Creek, and steep slopes from Greenough Creek to Miller Creek (segment 126), and in the Miller Creek area (segment 128). Elevations over 6000 feet would be encountered on both segments.

Segments 139 and 142 would encounter: problem soils (near Miller Creek); steep slopes and land with moderate erosion potential and mass movement potential (at the Bitterroot River crossing); land with mass movement potential (between the Bitterroot River and Blue Mountain); steep slopes (near Blue Mountain); and scattered areas of over 6000 feet elevation (segment 142).

Segments 15 and 92 would cross significant extents of problem soils on moderate slopes north of Haugan. Additionally, the east side of the Clark Fork crossing on segment 92 is steep, rocky, and sensitive to impact. Segment 10 would encounter moderate mass movement potential terrain near Superior and a small area over 6000 feet. Segment 148 would cross problem soils up the Ninemile Valley and would encounter terrain with moderate erosion potential and steep slopes near Stark Mountain and the Upper Ninemile Creek. Segment 6 crosses scattered problem soils in the Ninemile Valley, land with moderate erosion potential over its entire length, and steep slopes in the Sixmile Creek area.

Where these overlapping problems exist, the following impacts would occur: at elevations over 6000 feet, construction would become more difficult, and soils may be more sensitive to erosion. Similar problems would exist at slopes which are steep (31-55 percent) or very steep (over 55 percent). High access requirements would further complicate and increase these impacts. Steep slopes combined with moderate erosion potential, when encountered in the construction process, would sustain more soil disturbance, causing increased sedimentation in streams and slowing revegetation, particularly because of decreased soil fertility. Problem soils, susceptible to erosion and possessing high landslide capability, would also sustain higher impacts from construction. Although these impacts would primarily be short-term, and due to construction, maintenance would require periodic use of access roads, and may sustain the soils impacts over a longer period of time but to a lesser degree.

Mitigation: For general mitigation for these problem areas, see Garrison-Hot Springs. In addition, problem soils within segment 139 (Lolo crossing) can mostly be avoided by staying off and not undercutting the steep side slope. Localized problem soils in segment 148 should be avoided where possible. Spanning Rock Creek (segment 135) may eliminate many problems associated with steep slope and terrain barriers in this area.

Esthetics

(Tables 4.2, 4.3; figs. 4.9-4.13) Areas of esthetic concern would include all those discussed for Garrison-Hot Springs (except those on segment 5). The following areas are of additional concern: where segment 132 crosses Highway 10A near Maxville; where segment 135 crosses Rock Creek; where segment 127 crosses Highway I-90 south of Clinton; where Miller Creek and the Bitterroot River are crossed by segment 139; where segment 142 passes near Blue Mountain; where segment 145 nears the Ninemile Valley; where segments 1 and 6 pass north of Missoula and up the Ninemile Valley; and where segments 15 and 92 cross the Clark Fork River near St. Regis.

Highway 10A is a popular designated scenic route (Pintlar Scenic Route). A moderate number of travelers use this highway; most have a high awareness of visual amenities, partly as a result of the scenic designation. The crossing would be highly visible, with one tower close to the road, although views could generally be of short duration and limited to a short segment of the line. In addition to highway travelers, 5 - 10 residences in Maxville would have direct views of one or two towers.

Rock Creek, a very popular, nationally important recreation fishing stream, receives many visitors with a high visual awareness of their surroundings. Rock Creek has been designated a Blue Ribbon trout stream by the Montana Department of Fish, Wildlife and Parks. It is the only such stream in Western Montana. Although the line would not disrupt the integrity of the main valley, it would be highly visible along the first two miles of Rock Creek.

Views of the crossing would also be seen by travelers on I-90 and by users of two rest stops and related attractions near the mouth of Rock Creek. Views would be extensive, and the line would conflict with the natural land patterns, increasing the visual disruption. Scarring from access roads and clearing is possible and would significantly increase the visual impact. Should any airway markings be used, they would increase the visibility of the line and would negate any visual mitigation.

Where segment 127 would cross Highway I-90 southeast of Clinton, it would cut across the valley floor and disrupt prevailing landscape patterns. The towers would be visible in foreground views to a large number of travelers on I-90. Some rural residents close to the line would also be affected visually by the line, which would be a dominant element in the landscape.

The first miles of segment 139 would be visible from the Lolo area and from southeast Missoula, as well as visible to a few local residents on the north side of Miller Creek. Three to four towers would be skylined. Visibility would be high near the main access to Miller Creek residential areas farther up the stream, producing both foreground and middleground views.

The crossing of the Bitterroot River in segment 139 would be highly visible to travelers on Highway 93 as well as to nearby residents. It would be in direct view of travelers in both directions for an extended distance. The west crossing tower would be skylined on a ridge.

The first three miles of segment 142 would be visible from vantage points in south and southeast Missoula. The line itself could readily be absorbed into the background because of the distance involved, except under certain lighting conditions. Scars from right-of-way clearing and access road construction, however, would be present in many views, and especially to residents in southeast Missoula with residences built to take advantage of views of the Blue Mountain area. The remainder of this segment would be visible from the Blue Mountain Lookout, a popular recreation scenic viewpoint. Although not in the primary viewshed (most views are oriented toward Missoula), it would be close to the Lookout and would be a negative visual element.

In segment 145, the line would cut across the grain of the land, would be out of scale with its surroundings, and would be ever-present in the view. Greatest impact would be upon travelers on I-90 and local residents. Extended views of the line would be possible for up to five miles for westbound travelers. Several towers would be skylined on the north side. Impacts would be intense for this segment because of the extent of visual disruption and visibility. Although the line would pass near an Indian rock art site, no direct visual impacts would occur.

As the line in segment 1 parallels I-90, it would be highly visible to travelers. Local residents would also experience immediate visual impacts from the nearby line. Although screening is available for many of the residents of this area, the line would still be visible from access to the homes. Along the Ninemile Valley, the line takes advantage of the natural land patterns and screening provided by the forest; only the upper portions of the line would be visible, except for views from a point directly on the right-of-way. Segment 4, crossing the lower Ninemile Valley, would be a significant visual intrusion to residents and visitors to the valley. The towers would disrupt the natural land patterns and be a dominant feature in the landscape, visible from many vantage points.

Either crossing of the Clark Fork River near St. Regis (segments 15 and 92) would require larger structures and may require airway marking, making them highly visible. The transmission line would disrupt the visual integrity of this highly scenic portion of the Clark Fork Valley. Travelers on Highway 461 and nearby residents (along segment 15) would have extensive views of the line, which would represent an incompatible element in the landscape.

Mitigation: Use of treated towers and non-specular conductors is necessary for each of these problem areas. In addition, location of towers as far as possible from the road is necessary at the crossing of Highway 10A near Maxville (improved appearance towers are also being considered here); limited road construction or right-of-way clearing, and use of special tower location to take advantage of landform screening is necessary at the Rock Creek crossing; limited access road construction on unstable slopes is recommended for the first miles of segment 139; selective clearing and access road construction is necessary in the Blue Mountain area; and careful tower placement to avoid skylining and direct foreground views is recommended for segment 127 near Clinton. At either crossing of the Clark Fork River near St. Regis (segments 15, 92), mitigation potential would be very limited if airway markings were necessary.

Social and Economic Considerations

(Tables 4.2, 4.3; figs. 4.2-4.5) Areas of concern for socioeconomics are the Missoula-Rattlesnake area, the Clinton area, and segment 119 near Drummond (see Garrison-Hot Springs section); the Ninemile Valley (segments 1, 6, 148); and the Bitterroot Valley (segments 138, 139).

In the Ninemile Valley, effects along segments 1 and 6 are noteworthy in two respects: new corridor establishment on segments 1 and 6; and alienation in the Frenchtown and Ninemile Valley area, where residents place a high local and regional value on environmental preservation. Regional groups of concerned citizens are strongly opposed to such placement. Segment 148, which would proceed up the valley, would have high alienation consequences, as local and regional citizen groups have expressed strong opposition to changing the relatively natural environment there. Prime Farmland, another consideration, is crossed in segment 127 (see Agriculture).

The Bitterroot Valley crossing (segments 138, 139) would also cause high alienation among local residents, as there are numerous residences in the area and as a relatively large amount of private land would be crossed there.

Mitigation: Building both BPA's 500-kV and WWP's 230-kV lines on a set of double-circuit towers would be considered to reduce clearing and associated impacts. See Garrison-Hot Springs section.

Cultural Resources

(Tables 4.2, 4.3; fig. 4.5) Areas of greater concern for historic resources include all those discussed for Garrison-Hot Springs, with the exception of those on segment 5, which is not included in this plan. The Mullan Road route (see Garrison-Hot Springs discussion) could also be affected in segments 127, 144, and 145 in this section.

Several noteworthy historic resources susceptible to impact are concentrated in the Ninemile Valley area. A mining camp and possible remains of Montreal, a mining townsite, are located in segment 13, on Eustache Creek. Both date from the 1870's gold rush, and are locally and regionally signficant. The Pardee-Keystone Historic District, so designated by the Montana State Historic Preservation Office, is located in the Pardee and Keystone Creeks vicinity on segments 13, 15, and 92. It contains numerous structures. The mining townsite of Martina would also be crossed at the northern end of segment 148, on Ninemile Creek. Remains may still exist; the site may be eligible for inclusion on the National Register of Historic Places (see Consultation, Review, and Permit Requirements).

Each of these resources could be affected by the construction and presence of the line. Construction may create direct impacts, particularly should any buildings be directly encountered, a long-term impact. Indirect visual impacts would also be long-term. Increased access to the sites could increase likelihood of vandalism of any remaining structures.

Areas of particular concern for archeological resources include all those discussed for the Garrison-Hot Springs section, except for segment 5. In segment 6, at the tributaries of Ninemile Creek, prehistoric campsites and tool manufacturing areas exist. These sites could be disrupted by construction and use of heavy equipment; bulldozing and excavation for tower sites could totally destroy a site. The physical effects of disturbance or destruction would be irretrievable and irreversible.

Additional areas of concern are encountered on segment 127, where prehistoric campsites exist on the terraces of the Clark Fork River and the Starvation Creek alluvial fan; segment 132, where prehistoric transient campsites and activity areas occur at the crossing of Flint Creek; segment 134, where prehistoric campsites, workshops, and activity areas exist in the vicinity of the crossing of the South Fork of Willow Creek; and segment 148, in the Ninemile Valley, where numerous campsites and workshops are likely to exist on benches up the tributaries to Ninemile Creek. Impacts would be similar to those discussed for campsites in the Garrison-Hot Springs section.

A prehistoric rock art site in segment 145, on the north side of the crossing of the Clark Fork River, could also be affected. The indirect visual intrusion of the towers and conductors may be noticed, since the line would pass nearby. As the area is a religious shrine, any impact may interfere with use of this ceremonial location by the American Indians (see, under Consultation, Review, and Permit Requirements, the American Indian Religious Freedom Act). Any alteration would be long-term, and greatest near the site.

Mitigation: Avoidance of structures is highly desirable. Consultation with the Montana State Historic Preservation Officer may determine that visual impact on the Pardee-Keystone Historic District is unacceptable. Avoidance of the entire district may be necessary. Remains of the Martina townsite may be determined to be eligible for inclusion on the National Register of Historic Places. In this case, avoidance would then be necessary, after consultation with the Montana State Historic Preservation Officer.

Taft-Bell Section

Land Use

Urban/Residential: (Tables 4.2, 4.3; fig. 4.3) Two areas of greater concern exist in this section: the Bunn/Gem townsite areas in segments 28 and 31; and the Hayden Lake to Bell area in segments 47 and 50, discussed under the Hot Springs-Bell section. Construction and presence of the line would cause direct, short-term disturbance and indirect, long-term visual intrusion to residents of the Bunn/Gem area. Noise and electrical interference with TV and radio would constitute long-term effects as well. Because the valleys are steep and narrow, the lines could cross over very close to and above these communities, conflicting with their settings and the land use.

Mitigation: See Hot Springs-Bell section.

Forestry: (Tables 4.2, 4.3; figs. 4.3, 4.4) About 77 miles of forestland would be crossed. Areas of high or moderate forest productivity under intensive timber management are crossed everywhere but in segment 50, near Bell Substation. Between 44 acres (segment 26) and 157 acres (segment 47) could be removed from production for the life of the line, a considerable local impact. This impact could increase in significance where combined with effects on temporary increases in water yield (affecting stream channels), on wildlife habitat and potential for wildlife disturbance, and on alteration of recreational experiences for dispersed recreation in the forest. The treatment of some timbered stands immediately outside the affected area could have to be delayed in order to limit water yield increases.

Mitigation: See Hot Springs-Bell section.

Agriculture: (Tables 4.2, 4.3; fig. 4.3) About 24 miles of agricultural land could be crossed. From one to seven acres would be removed from production around tower bases. Notable impacts that would occur in segments 47 and 50 are discussed under the Hot Springs-Bell section.

Mitigation: See Hot Springs-Bell section.

Recreation: (Tables 4.2, 4.3; fig. 4.5) Noteworthy impacts will occur on both intensive and dispersed recreational use sites. In segment 25, the line would pass near the Lookout Pass Ski area. Dispersed use areas are found at various points along segments 25, 26, 31, 32, 37 and 43, along the Coeur d'Alene River and its tributaries.

The transmission line and right-of-way would create a discordant intrusion in natural surroundings, with considerable impact at or near intensive use sites and generally moderate impact at dispersed sites. At the same time, the access roads and right-of-way may provide increased access to the dispersed sites for recreation users. Impacts would primarily be visual (see Esthetics) and local; impacts on the ski area would be regional, as users converge there from all over the Inland Empire area.

Mitigation: Recreation impacts generally could be reduced by reducing visual impacts, by minimizing right-of-way clearing, and by using treated towers and non-specular conductors.

Corridor Development/Long-Range Plans: (Fig. 2.5) If a new line (in addition to the present proposal) were developed, the increases in impact in the Hayden Lake-Rathdrum Prairie and Pleasant Prairie impact-sensitive areas discussed for Hot Springs-Bell would apply to this plan as well. In addition, effects on visual and recreational resources and those on dispersed communities in the Lookout Pass-Mullan area would intensify, although new lines would not be impossible to build. There are no constraint areas in Plan C.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) Noteworthy areas of concern are found in segments 47 (westslope cutthroat trout) and 50 (upland sandpiper). These are discussed under the Hot Springs-Bell section.

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) The single area of concern occurs in segment 37, and is discussed in the Hot Springs-Bell section.

Water Resources: (Tables 4.2, 4.3; fig. 4.7) No noteworthy areas of concern are found along this section.

Soils/Geology: (Tables 4.2, 4.3; fig. 4.8) Noteworthy impacts occur primarily along segment 31, from Wallace to Bumblebee Peak, and segment 32, between Wallace and Character Peak. Both segments would encounter areas of moderate mass movement potential and steep slopes. Segment 32 would also encounter a small amount of problem soils near Gem; segment 31 has high access requirements. In these areas of overlapping geologic problems, increased erosion could occur, with consequences of short-term sedimentation of nearby water resources, and reduced ability of the area to revegetate.

Mitigation: See Hot Springs-Bell.

Esthetics

(Tables 4.2, 4.3; figs. 4.9-4.13) Three areas of particular concern are found within this section: segments 25 and 26, which proceed west from the Taft Substation to a point north of Mullan, one on the north side of the River, and the other on the south side; segment 32 in the Gem-Bunn townsite areas; and segments 31 and 37, at the crossing of the Coeur d'Alene River.

Segment 25 would have significant impacts. At the two crossings of I-90, westbound travelers would have extensive views of the line from all distances. The line would be in their view for approximately 2-1/2 miles. Visual impacts could increase if a potential recreation area on the river were to be developed.

In the Mullan-Lookout Pass area, segment 25 would cross a relatively undisturbed landscape of high scenic quality. Expansive vistas to travelers of I-90 would be frequent and of long duration. Established overlooks are well-used. Cutting across the hillside, the transmission line would be visible as a discordant element. The right-of-way would also be prone to extensive scarring unless special mitigation measures are employed. Impacts would be direct and long-term, and would have potential cumulative implications for recreation.

The transmission line would cross near the communities of Gem and Bunn, in segment 32. The narrow valleys in which the two communities are located would be spanned, limiting the visibility of the line. Although not in direct view of a large number of people, two or three towers would be skylined. The area has already been somewhat disrupted visually by mining activities.

The lines and towers of the transmission line would not be consistent with viewer expectations where it crosses the Coeur d'Alene River in segments 37 and 31; the river is under study by the State of Idaho for inclusion in a potential Wild and Scenic waterway system. The crossing would be visible to river users, highway users, and local residents. Skylined towers and possible airway markings on conductors would make it that much more visible.

Mitigation: Treated towers and non-specular conductors are necessary mitigation for each of these areas of concern. In addition, special clearing and access road construction will be needed in the Mullan/Lookout Pass area; limited clearing or access road construction should take place at the crossing of the Coeur d'Alene River. Such mitigation would reduce, though not eliminate, impacts.

Social and Economic Considerations

(Tables 4.2; 4.3; figs. 4.2-4.4) Few areas of concern are found in this section. The crossing of the Coeur d'Alene River in segments 31 or 37 could increase alienation, as viewer expectations would be high (see Esthetics). Impacts on segment 50 are discussed under the Hot Springs-Bell section.

Short-term economic stimulation from presence of construction line workers in communities such as Wallace (segments 28, 32) and Kellogg (segment 31) would be a positive impact.

Mitigation: See Hot Springs-Bell discussion.

Cultural Resources

(Tables 4.2, 4.3; fig. 4.5) There is one notable historic area in this section: the Jackass Trail along segment 32. This trail was used by miners in the late nineteenth century and has been identified by the Idaho State Historic Preservation Officer. The trail would be susceptible to direct impacts and possible consequent destruction of a portion thereof and to long-term visual intrusion, impacts of considerable intensity and local significance.

The prehistoric campsites north of Hayden Lake (discussed under the Hot Springs-Bell section) are a noteworthy area of concern for this plan as well.

Mitigation: Mitigation would be the same as that discussed for the Glidden Pass Trail and for campsites in the Hot Springs-Bell section.

WASHINGTON WATER POWER ALTERNATIVE PLANS 14/

ALTERNATIVE 1: THOMPSON FALLS PLAN

The discussions below present all noteworthy impacts for the plan which begins at a new six-acre 230-kV switching station near Thompson Falls, Montana, connects with a new six-acre substation at Wallace, Idaho, and terminates at the Pine Creek Substation, near Pine Creek, Idaho. Ways to avoid, minimize, or reduce impacts are presented at the end of each resource discussion. Impacts caused by substation construction and operation for this plan are summarized in table 4.11, Summary of Substation Requirements.

Land Use

Urban/Residential: (Tables 4.2, 4.3; fig. 4.3) There are no notable impacts on developed land, although construction activities would temporarily disturb scattered residences near Thompson Falls. Cumulatively, the multi-line corridor that would be formed by this line, the existing line, and BPA's proposed line could significantly conflict with existing urban-residential land uses or their future development. The six-acre Wallace Substation would be developed on WWP land adjoining a residential neighborhood. The substation would add a new source of noise, but would be developed consistent with EPA guidelines.

Mitigation: Between Wallace and Pine Creek Substations, the new line primarily would use existing WWP right-of-way, and thus avoid affecting residences or industrial development.

Forestry: (Tables 4.2, 4.3; figs. 4.3, 4.4) The line would cross about 40 miles of forest land with high and moderate productivity potential and under intensive timber management. Approximately 12 miles of forest land would not be available for timber management because of other uses (see Recreation and

14/ The Washington Water Power Company has concluded that the Thompson Falls and the Eagle Creek Plans should be removed from further consideration based on review of environmental, technical, and cost factors. Letter, D.L. Olson to M. Klinger (January 19, 1983).

Esthetics). Line and access road construction would create a significant local impact because it would reduce the timber base on more productive lands and increase the difficulty of managing adjacent timber stands on steep slopes.

Agriculture: (Tables 4.2, 4.3; fig. 4.3) Although there would be no significant impacts, the line would cross about 1.5 miles of non-irrigated agricultural land near Thompson Falls. In combination with BPA's parallel route here (segment 22), short-term construction disturbance, particularly, could be a noteworthy problem. The Thompson Falls Substation would occupy about six acres of agricultural/rangeland.

Mitigation: Tower locations on agricultural land would be discussed with the landowner to minimize disruption to farming. Construction would be scheduled, if possible, to avoid effects on crops. Crop damage would be compensated.

Recreation: (Tables 4.2, 4.3; fig. 4.5) Crossing an unroaded area (Glidden Gulch) managed by the U.S. Forest Service to retain its wilderness characteristics would adversely affect the values for which the land was set aside from multipurpose management. This would be a significant regional impact.

Mitigation: To avoid adversely affecting unroaded recreation lands, relocating part of the route would be considered by the land management agency.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) The route through the Canyon Creek area crosses possible grizzly bear habitat. Although new access requirements are minimal, as existing corridor is paralleled, short-term construction disturbance from workmen and equipment could still occur. However, no grizzly bears presently live in the area, and present human activity (roads, logging) make reintroduction of the species unsuitable. The grizzly bear, listed as a threatened species, would not be affected, nor would critical habitat be affected. Crossing the Clark Fork River near Thompson Falls will create the possibility for bald eagle collision, but both numbers of eagles and collision potential are low. The U.S. Fish and Wildlife Service has concurred with BPA's Biological Assessment of this potential problem. (See Endangered and Threatened Species discussion under Consultation, Review, and Permit Requirements.)

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) Vegetation removal and disturbance, and consequences for water resources, soils, wildlife, and esthetics from clearing and construction in the Glidden Creek area, particularly if the riparian zone should be crossed, would be of considerable consequence since the area, managed for its unroaded condition, has experienced no previous timber harvesting.

Mitigation: Clearing to mineral soil would be avoided and disturbed areas would be reseeded promptly. Low-growing plants would be protected. Only tree species which could threaten the line would be removed and only clearing necessary for spanning a canyon would be done. Construction activities would be scheduled, as possible, to cause the least damage to vegetation and soil.

Water Resources: (Tables 4.2, 4.3; fig. 4.7) Watersheds above Wallace, Kellogg, and Smelterville may experience a short-term increase in siltation and turbidity during construction.

Mitigation: See Vegetation discussion above.

Geology/Soils: (Tables 4.2, 4.3; fig. 4.8) Soil erosion and mass failure problems could be significant, depending upon how much access road construction is needed where this alternative parallels BPA segment 22 above Prospect Creek and in Glidden Gulch.

High erosion hazards would be possible west of Wallace Substation and near the South Fork of the Coeur d'Alene River crossing northwest of Osburn.

Mitigation: See Vegetation discussion.

Esthetics

(Tables 4.2, 4.3; figs. 4.9-4.13) Several problem areas exist along much of the route to Wallace. Near Thompson Falls, where this alternative would parallel two BPA lines, the multiple lines would dominate the landscape. The highly scenic area along Prospect Creek and Glidden Gulch is prone to scarring from construction. In the upper Glidden Gulch area, managed by the Forest Service to retain its natural undisturbed character, a transmission line would be a considerable visual intrusion. Viewers on a well-travelled scenic road would be exposed to long expanses of cleared right-of-way.

From Canyon Creek to Pine Creek Substation, an existing line has already disturbed the area. Visual impact would not appreciably change.

Social and Economic Considerations

(Tables 4.2, 4.3; figs. 4.2-4.5) Notable impacts would primarily be social; overall economic impacts, both beneficial and adverse, would be relatively small. Although 24.5 miles of private land would be crossed, positive fiscal impacts would occur, as WWP is a private utility and would pay taxes on the facilities. This alternative also includes 12.5 miles of line with high access needs and 17.4 miles with moderate access road needs, creating potential access for but also increased nuisance by recreationists in forest land of high and moderate productivity. A high percentage (over 30 miles) of new corridor would be established, with accompanying inconvenience to forested land (clearing) and to landowners previously unaffected by transmission lines. Only one mile of dryland agriculture would be crossed.

Mitigation: WWP would discuss location of towers on private land with the landowner to minimize land use impacts. Landowners would be compensated for the use of their land according to individual agreements.

Cultural

(Tables 4.2, 4.3; fig. 4.5) Archeological sites along this route would be highly localized and therefore possible to avoid, although encountering sites at the crossing of the Coeur d'Alene River is a concern. A number of large habitation sites are present along the lower Coeur d'Alene River and adjacent to Coeur d'Alene Lake. There would be, therefore, a high probability of locating an archeological site or sites at the Coeur d'Alene River crossing in this section.

There are also two noteworthy historic areas. The Glidden Pass Trail/Road, an early mining trail, which may be eligible for inclusion in the National Register of Historic Places, could experience both direct and visual impacts. The town of Gem is listed on the Idaho Inventory of Historic Places, and would be sensitive to both direct and visual impacts.

Other sites--Halfway House on the Glidden Pass Trail/Road, possible mining communities or mines--are decayed and probably do not represent serious problems for project development.

ALTERNATIVE 2: EAGLE CREEK PLAN

The discussions below present all noteworthy impacts for the plan which begins at a new 10-acre 500/230-kV substation near Eagle Creek, Montana, connects with a new six-acre substation at Wallace, Idaho, and terminates at the Pine Creek Substation, near Pine Creek, Idaho. Between Noxon and the Coeur d'Alene River a new single-circuit 230-kV line would be built parallel to the existing 230-kV single-circuit wood pole line. A double-circuit loop would be built between the existing line and Eagle Creek Substation. Ways to avoid, minimize, or reduce impacts are presented at the end of each resource discussion. Impacts caused by substation construction and operation for this plan are summarized in table 4.11, Summary of Substation Requirements.

Land Use

Urban/Residential: (Tables 4.2, 4.3; fig. 4.3) Construction noise, equipment, dust, and work activity in the Eagle Creek area may temporarily affect residents.

Forestry: (Tables 4.2, 4.3; figs. 4.3, 4.4) About 31 miles of forest land would be crossed. There would be no notable concerns along this route, as only limited clearing would be required along the rebuild portion of the line and because clearing has already occurred from past timber harvests.

Agriculture: (Tables 4.2, 4.3; fig. 4.3) The proposed Eagle Creek Substation and towers looping into it would take out of production about 10 acres of pasture land, an impact of local significance.

Mitigation: See Thompson Falls Plan.

Recreation: (Tables 4.2, 4.3; fig. 4.5) The Eagle Creek loop line and rebuild would have a high visual impact on recreational users at crossings of the Coeur d'Alene River, because such an intrusion is highly out of character with the setting. The impact could be significant because this is an important resource that may become part of a potential State of Idaho Wild and Scenic River System.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) No significant impacts would occur, although big game habitat would be removed for right-of-way and access along 4.5 miles of route.

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) A relatively undisturbed area would be crossed where this alternative intersects with BPA segments 34 and 35 along the Eagle Creek loop. In combination with the BPA line, vegetation disturbance and removal could increase erosion, with consequences for water, soils, and wildlife.

Mitigation: See Thompson Falls section.

Water Resources: (Tables 4.2, 4.3; fig. 4.7) Small portions of the Kellogg municipal watershed would be crossed, with short-term sedimentation from construction.

Mitigation: See Thompson Falls Vegetation discussion.

Geology/Soils: (Tables, 4.2, 4.3; fig. 4.8) Problems with erosion hazards are encountered in the Prichard and Murray areas and above Gem. Impacts could be similar to that discussed under Garrison-Hot Springs.

Mitigation: See Thompson Falls Vegetation discussion.

Esthetics

(Tables 4.2, 4.3; figs. 4.9-4.13) Areas of concern include the Eagle Creek area and the crossing of the Coeur d'Alene River where the line would parallel a BPA line and would intrude upon a scenic and sensitive area. Some towers would be skylined at the river crossing. The facilities would dominate the setting, altering the scenic character of the valley and adversely affecting viewers there, although vegetative screening would provide some buffer.

Social and Economic Considerations

(Tables 4.2, 4.3; figs. 4.2-4.5) Significant impacts would primarily be social; overall economic impacts, both beneficial and adverse, would be relatively small. Although about 18 miles of private land are crossed, positive fiscal impacts would occur, as WWP is a private utility and would pay taxes on the facilities. This alternative has generally low access road requirements, though any development of new roads will open up the area to recreationists, both a positive and negative long-term impact. It would affect approximately 320 acres of high productivity timber in the right-of-way, a land use inconvenience, particularly where new right-of-way must be established. Rebuilding the line for nearly 26 miles in the existing corridor would cause less impact than building a new line.

Mitigation: See Thompson Falls section.

Cultural

(Tables 4.2, 4.3; fig. 4.5) River crossings constitute potential problem areas for archeological impacts. Several sensitive historic sites have been identified along this alternative, including numerous mining sites. Eagle City and the Thiard townsite are both historically significant and highly sensitive to both disturbance and visual intrusion, as are the townsites of Delta and Gem, which are listed on the Idaho Inventory of Historic Places.

ALTERNATIVE 3: TAFT PLAN

The discussions below present all noteworthy impacts for the plan which begins at the proposed new BPA Taft Substation, connects with a new six-acre substation at Wallace, Idaho, and terminates at the Pine Creek Substation, near Pine Creek, Idaho. There are two route options between Taft and Wallace. One (the north option) would parallel BPA segment 25 north of I-90; the other (the south option) would cross the area to the south of I-90. Ways to avoid, minimize, or reduce impacts are presented at the end of each resource discussion. Impacts caused by substation construction and operation for this plan are summarized in table 4.11, Summary of Substation Requirements. This plan would have the least overall environmental impact.

Land Use

Urban/Residential: (Tables 4.2, 4.3; fig. 4.3) Both north and south routes avoid built-up areas, but construction within the relatively narrow valleys would be noticeable.

Forestry: (Tables 4.2, 4.3; figs. 4.3, 4.4) About 31 miles of forest land would be crossed. A greater concern involves clearing for new right-of-way along the southern option through mostly forested, highly productive lands. Although little prior clearing has taken place here, existing mineral exploration roads could provide access and thus reduce need for clearing.

Agriculture: (Tables 4.2, 4.3; fig. 4.3) No impacts would occur, as no farmlands are crossed.

Recreation: (Tables 4.2, 4.3; fig. 4.5) A line along either route could visually intrude on several recreation areas, depending on the amount of screening available (see Esthetics).

Mitigation: See Thompson Falls Recreation discussion.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) No noteworthy impacts would occur, although big game impacts, primarily from removal of habitat and disturbance during construction, would occur along three miles of the route.

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) No significant impacts would occur as no sensitive areas for vegetation are encountered.

Water Resources (Tables 4.2, 4.3; fig. 4.7) No noteworthy problem would occur other than possible temporary increases in turbidity where the Kellogg Watershed is crossed.

Geology/Soils: (Tables 4.2, 4.3; fig. 4.8) Erosion hazards could occur, depending on the amount of access road construction, in the Mullan Pass area and west along the upper South Fork of the Coeur d'Alene River.

Esthetics

(Tables 4.2, 4.3; figs. 4.9-4.13) There would be significant cumulative visual impacts along the north option, particularly around Lookout Pass, a scenic and recreational use area, as the additional lines would require additional right-of-way clearing. The larger swath would increase visibility for the many travelers on I-90.

The south route would be less visible, and for shorter stretches. Some towers would be skylined, and some seen in the foreground.

Social and Economic Considerations

(Tables 4.2, 4.3; figs. 4.2-4.5) Noteworthy impacts would primarily be social; overall economic impacts, both beneficial and adverse, are relatively minor. The route encompasses 267 acres of forest land of high productivity, a noteworthy land use inconvenience. Much of the route would establish new corridor, an inconvenience to landowners previously unaffected by a line.

Cultural

(Tables 4.2, 4.3; fig. 4.5) No sensitive archeological or historic resources are likely to be encountered along either route.

ALTERNATIVE 4: NOXON PLAN (PREFERRED BY WWP)

The discussions below present all noteworthy impacts for the plan which begins at the Noxon switchyard, connects with a new six-acre substation at Wallace, Idaho, and terminates at the Pine Creek Substation, near Pine Creek, Idaho. Between Noxon and the Coeur d'Alene River, an existing 230-kV wood pole line would be torn down and rebuilt on steel towers. Ways to avoid, minimize, or reduce impacts are presented at the end of each resource discussion. Impacts caused by substation construction and operation for this plan are summarized in table 4.11, Summary of Substation Requirements.

Land Use

Urban/Residential: (Tables 4.2, 4.3; fig. 4.3) The line may intrude visually on residents of the Beaver Creek Valley northwest of Wallace (see Esthetics), although rebuilding would not be a noteworthy increase in effect.

Forestry: (Tables 4.2, 4.3; figs. 4.3, 4.4) About 28 miles of forest land would be crossed. There are no noteworthy concerns for forestry.

Agriculture: (Tables 4.2, 4.3; fig. 4.3) No farmland would be affected.

Recreation: (Tables 4.2, 4.3; fig. 4.5) The Coeur d'Alene River, a potential candidate for inclusion in a potential Idaho State Wild and Scenic River System, would be crossed twice; one crossing would be new. At the existing crossing there may be an increase in local visual impacts, but there would also be an opportunity to remedy visual problems created by the original crossing. The second crossing, being new, would increase visual intrusion on recreational users.

Mitigation: Non-specular conductors, treated towers and selective clearing near the river could minimize these effects. Use of marker balls is not recommended.

Natural Resources

Wildlife: (Tables 4.2, 4.3; fig. 4.6) There are no significant impacts on wildlife along this alternative; three miles of big game sensitive habitat would be crossed.

Vegetation: (Tables 4.2, 4.3; figs. 4.3, 4.4, 4.8) No noteworthy concerns for vegetation would occur along this route.

Water Resources: (Tables 4.2, 4.3; fig. 4.7) Effects on watersheds are discussed under the Thompson Falls Plan. In addition, the present line is located on the Marten Creek floodplain and creek bottom. Rebuilding here would alleviate existing maintenance and environmental problems.

Geology/Soils: (Table 4.2, 4.3; fig. 4.8) Short-term erosion increases would be possible above Gem and near the Coeur d'Alene River.

Esthetics

(Tables 4.2, 4.3; figs. 4.9-4.13) Visual impacts would be low along the rebuild portion because the existing line has already altered the landscape and because much of the line would be isolated from viewers. An additional line and associated clearing would increase line and possible scarring visibility for residents and travelers along Beaver Creek who would have close views.

Social and Economic Considerations

(Tables 4.2, 4.3; figs. 4.2-4.5) Noteworthy impacts would primarily be social; overall economic impacts, both beneficial and adverse, would be relatively minor. Although about 19 miles of private land would be crossed, positive fiscal impacts would accrue, as WWP is a private utility and would pay taxes on the facilities. This alternative would affect 284 acres of high productivity timber in the right-of-way, a noteworthy land use inconvenience. Rebuilding the line for 28.5 miles in the existing corridor would reduce impacts on landowners previously undisturbed by line presence or construction. Although access road needs would primarily be low, any development of new roads will open up the area to recreationists, both a positive and negative long-term impact.

Cultural

(Tables 4.2, 4.3; fig. 4.5) The historic mining towns of Delta and Gem would experience visual intrusion, as the line would traverse the valley.

CONSULTATION, REVIEW, AND PERMIT REQUIREMENTS

This section discusses BPA responsibilities toward resources protected by law. The resources are addressed in Federal and State statutes, Executive Orders, and other administrative mandates. Each law requires that specific issues be addressed and/or that consultation procedures be followed. This section outlines these requirements and what BPA is doing to comply with them. Where requirements do not apply to this project, reasons are given.

ENVIRONMENTAL POLICY

The proposed project will be developed in a manner consistent with the National Environmental Policy Act following "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act." These rules were issued by the President's Council on Environmental Quality and are printed in the Code of Federal Regulations (40 CFR Parts 1500 - 1508).

ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT

On September 21, 1979, BPA requested from the U.S. Fish and Wildlife Service (USFWS) a list of proposed Threatened or Endangered plant and animal species that may occur within the Hot Springs-Bell portion of the Garrison-Spokane transmission line project. According to a January 20, 1981, USFWS letter, the listed and proposed Endangered and Threatened species and candidate species that may occur in the project area are as follows: Listed species: (1) bald eagle (Haliaeetus leucocephalus); (2) American peregrine falcon (Falco peregrinus anatum); (3) grizzly bear (Ursus arctos horribilis); and (4) gray wolf (Canis lupus). Proposed species: None. Candidate species: (Plants) (1) Spalding's Campion (Silene spaldingii). BPA conducted a Biological Assessment, and concluded (February 10, 1981) that the Hot Springs-Bell section of the proposed project was not likely to affect any of the listed and proposed Threatened and Endangered species, and candidate species, or their respective habitats. On May 27, 1981, the USFWS issued their concurrence with the findings of BPA's Biological Assessment.

On April 15, 1981, BPA requested from the USFWS a list of proposed Threatened or Endangered plant or animal species that may occur within the Garrison-to-Missoula portion of the proposed project. The USFWS responded in an April 24, 1981 letter, determining that the following listed and proposed Threatened and Endangered species, and candidate species that may be present in this segment of the project area: Listed species: (1) bald eagle (Haliaeetus leucocephalus); (2) peregrine falcon (Falco peregrinus); and (3) grizzly bear (Ursus arctos horribilus). Proposed species: None. Candidate species: None. BPA conducted a Biological Assessment for the proposed Garrison-to-Missoula portion of the 500-kV transmission line project on the Federally listed grizzly bear, peregrine falcon, and bald eagle and found that the project will not affect these species. The USFWS concurred with these findings (February 1982; May 1982).

Should any changes that may affect a listed species occur in the project, or if any other species known to occur in the study area becomes officially listed or proposed before completion of the project, BPA will reevaluate its responsibilities under the Endangered Species Act. Under the Endangered Species Act, Section 7(a), agencies of the Federal Government are to ensure that their actions do not "jeopardize the continued existence of any endangered species or threatened species."

If The Washington Water Power Company should need a Federal permit to complete its proposed action, they will submit a corresponding Biological Assessment through the lead Federal agency for this project.

FISH AND WILDLIFE COORDINATION

The proposed project will not alter the waters of any stream or other body of water for the purpose of impounding, deepening or controlling, but will require some modifying and diverting of several streams. The proposed Taft

Substation, located between segments 15 and 26, approximately 3000 feet west of the Hot Springs-Dworshak line, will cause some disturbance to Randolph Creek. Use of off-site borrow materials will be considered for fill material. Culverts will be required at other stream crossings for the project, depending on requirements for each site and existing access. The clearing criteria will allow most streams to be spanned, leaving a vegetative buffer zone along the stream banks to prevent erosion and to retain the natural riparian habitat. Wildlife will be temporarily disturbed during construction, but are expected to return after construction is completed. The Fish and Wildlife Coordination Act will require consultation with the Department of Fish and Game for each state crossed by the project, and with the U.S. Fish and Wildlife Service.

HERITAGE CONSERVATION

The State Historic Preservation Officers (SHPO's) of the States of Montana, Idaho, and Washington have been consulted regarding the eligibility of properties inventoried for their potential eligibility for inclusion in the National Register of Historic Places. The SHPO's have also been consulted for findings of effect of the proposed project prior to consultation with the Advisory Council on Historic Preservation. In cases where BPA and a SHPO may not concur on eligibility, the Keeper of the National Register of Historic Places will be consulted regarding eligibility.

There are no archeologic sites within the study area presently listed or determined as eligible for listing on the National Register of Historic Places.

The project will not threaten any historic properties currently listed in or determined eligible for listing in the National Register of Historic Places with direct impacts; visual impact or intrusion appears to be the only impact to the sites.

The following historic properties have been listed in the National Register of Historic Places and may be subject to visual impact by construction of the proposed BPA Garrison-Spokane transmission line:

- DeBorgia Schoolhouse - Mineral County, Montana, in DeBorgia - Segment 15
- Murray Courthouse - Shoshone County, Idaho, in Murray - Segment 22
- John C. Feehan House - Shoshone County, Idaho, in Murray - Segment 22
- United States Forest Service Remount Depot (Ninemile Ranger Station) - Missoula County, Montana, northwest of Huson - Segment 4.

Visual intrusion would not likely adversely affect the merits for which the properties above were listed because these properties were listed for their historical significance or their architectural qualities and integrity, not specifically for the quality of their settings.

Travelers's Rest in or near Lolo, a National Historic Landmark also listed on the National Register of Historic Places, will also be visually affected at a distance of about 3 miles (segment 139). However, the visual impact should not constitute an adverse impact on the site because of the property's lack of historic integrity and historic setting.

The project may increase public access to American Indian religious and ceremonial sites. Access to the following archeological sites, which may be American Indian religious and/or ceremonial sites, may be affected by the project:

in Segment 145:	Alberton pictograph (24M0505);
in Segment 14:	pictograph (24SA1116);
in Segment 18:	pictograph (24SA1022);
in Segment 5:	vision quest structure (24SA1020); stone cairn complex (58 cairns) (24SA502).

The proposed project may affect the following historic properties which may be eligible for inclusion in the National Register of Historic Places: Indian encampment area and Indian agency sites, Dixon vicinity (segment 5); mining town of Montreal, Pardee-Keystone Historic District (segment 13); Pardee-Keystone Historic District, town of Keystone (segment 15); probable visual impact on fur trade post sites east of Thompson Falls (segment 18); mining townsites along Prichard Creek, Glidden Pass Trail (segment 22); Mullan Road (segment 25); townsite of Duthie, mining sites (segment 29); mining district west of Kellogg, Jackass Trail (segment 31); Jackass Trail (segment 32); Martina townsite on upper Ninemile Creek (segment 148); visual impact on Pioneer mining town; Mullan Road (segment 101); Yam Hill mining townsite (segment 118); Martina mining townsite (segment 148); Master and Pineau mining camps (segment 131).

All prehistoric sites in the project area may be eligible for inclusion in the National Register of Historic Places. Field evaluations will be made at all sites along the selected route to determine their significance.

The proposed project may affect the following historic properties included in statewide listings of historic properties: Indian agency sites (segment 5); Pardee-Keystone Historic District (segments 13 and 15); Halfway House site and Mountain House site (segment 22); Salish House sites I and II (segment 18); town of Gem (segment 32); town of Murray (segment 22); Saint Michael's Mission sites (segment 50); Gold Creek Historic District and Pioneer mining town (segment 119); Mullan Road (various segments).

All recorded prehistoric sites in the project area are included in statewide listings.

The proposal will not have an effect on (1) property currently listed on the National Registry of National Landmarks; (2) property currently listed as a National Historic Landmark; (3) property currently listed on the World Heritage List; and (4) property currently listed on the National Registry of National Landmarks.

The proposed project may have an effect upon the excavation, removal, damage, alteration, or defacing of archeological resources located on public or Indian lands or on lands the title to which is held in trust by the U.S., administered by the Bureau of Indian Affairs.

Before construction of the transmission line and substations, a qualified archeologist/historian will survey the selected route and substation site to determine whether any previously unknown historic or archeologic sites are present and to determine the extent of known sites. A National Register of Historic Places eligibility determination request will be made in consultation with each State Historic Preservation Officer for any historic or archeologic site which may be affected by the project. Should any site be determined eligible for inclusion in the National Register, a request for determination of effect will be made in consultation with the Montana, Idaho, and Washington State Historic Preservation Officers and the Advisory Council on Historic Preservation. Consultation will also be requested concerning matters involving effect, adverse effect, and appropriate mitigation measures for any properties deemed eligible for inclusion on the National Register of Historic Places.

In consideration of resources of concern to the Confederated Salish and Kootenai Tribes, BPA will file a permit application for any work which may result in harm to or destruction of an Indian tribal religious or cultural site on public land. BPA will also provide written notification to the official designated by the governing body of the tribe to receive such notification as follows:

1. Notification of the nature and location of the project.
2. Notification of any other Indian Tribe known or believed to have religious or cultural interest in the area of the proposed work.
3. Notification of the Bureau of Indian Affairs and any additional Indian Tribes which may have religious or cultural interest in the area of the proposed project.
4. Consultation for notification purposes with those interested Indian groups which have been established within the Department of Interior pursuant to the American Indian Religious Freedom Act of 1978.

Before a permit is issued, BPA shall consider written or verbal comments submitted by any Tribe or group notified of the proposed project. Upon request, BPA will meet with any Indian Tribe or group to discuss their concerns, including ways to avoid or mitigate adverse impacts.

Before committing an act which might result in harm to, or destruction of, a site on public lands which has religious or cultural significance to any Indian tribe or group, BPA shall notify the chief executive officer of the tribe in writing.

Where a permit must be issued because of an imminent threat of loss or destruction of an archeological resource, BPA shall notify the BIA, the State Historic Preservation Officer and any Indian group known to or believed to consider the site as having religious or cultural importance of the permit application.

Should excavation or removal of any archeological resource located on Indian lands be necessary, BPA will first obtain the consent of the Indian landowner, the Indian Tribe having jurisdiction over such lands, and the State Historic Preservation Officer before issuance of a permit.

BPA may enter into agreements with the Tribes to establish formal and regular procedures for notification and discussion.

The Tribal official designated as the focal point for notification and discussion will be encouraged to assist BPA in identifying sites located on public lands which are of religious or cultural importance to the Indian Tribes.

If the area for which an application has been submitted is the subject of present day religious practice or has been the subject of traditional religious practices, these sites may be excluded from the permit. If they are not excluded, BPA shall consider ways to avoid or mitigate any adverse impacts which might result. (36 CFR 1215.6:Archeological Resources Protection Act of 1979).

Discovery Situations

If a previously unknown resource is discovered late or accidentally during construction, BPA will follow the procedures outlined in 36 CFR Part 66, including:

1. Halting work in the area of impact.

2. Notifying the Secretary of Interior through the Departmental Consulting Archeologist by telephone that potentially significant resources have been discovered during construction or project implementation. A telegraphic abstract of the conditions resulting in the discovery, the potential significance of the data, and the nature and extent of compliance activities and the availability of funds under section 7 (a) of Public Law 93-291 should follow immediately.

3. Arranging with the Departmental Consulting Archeologist for an on-site inspection, if necessary.

4. If required, redesigning the project to avoid the significant resource or undertaking data recovery. The assessment of preservation and data recovery alternatives should be made in accordance with the guidelines previously presented.

5. Seeking the comments of the Advisory Council on Historic Preservation, if warranted.

If any cultural resource is encountered during construction, BPA will comply with the guidelines and procedures of the Advisory Council (36 CFR, Part 800), the provisions of Section 106 of the National Historic Preservation Act (16 USC, Section 470f), Executive Order 11593 (May 13, 1977), the National Environmental Policy Act (42 USC 4321-4327), and the American Indian Religious Freedom Act (42 USC 1976).

STATE, AREAWIDE, AND LOCAL PLAN AND PROGRAM CONSISTENCY

The proposed action would be developed in a manner consistent with plans and laws guiding and governing land use development at the Federal, State, and local level within the study area (see Chapter III, AFFECTED ENVIRONMENT).

Lands administered by the U.S. Forest Service and by the Bureau of Land Management fall under provisions of the National Forest Management Act and of the Federal Land Policy Management Act. The proposed action would be consistent with the management objectives of each act.

At the State level, both Washington and Montana have laws governing the siting of major facilities, including transmission facilities. Congress has not authorized Federal agencies to be bound by these State statutes. However, the Federal agencies are attempting to meet the objectives of these laws, which are generally consistent with NEPA, in the siting of the project. These objectives are being achieved through close cooperation with the State agencies throughout the Federal siting process. In this respect, the Federal agencies will continue to endeavor to provide whatever information is requested by the States. Every effort is being made to reconcile any possible differences in applicable substantive standards. (See Appendix B for an index to environmental factors considered by States in siting facilities.)

Most counties through which alternative segments pass (see Chapter III, AFFECTED ENVIRONMENT) have adopted some form of land use plans. In one form or another, all of the plans specifically state that undeveloped landscapes are to be protected in order to maintain environmental quality and preserve existing rural atmospheres. These goals are similar to the evaluation criteria developed for this proposal. The proposed action would be developed in a manner consistent with the land use plans as much as possible.

COASTAL MANAGEMENT PROGRAM CONSISTENCY

The project does not affect the coastal zone, so that a determination of consistency or of no effect is not required. The study area is in Montana, Idaho, and the inland portion of Washington, and does not fall within or come near a coastal zone as defined by the Coastal Zone Management Act (USC 1951, et seq.).

FLOODPLAINS

The different alternative routings for the proposed project would involve crossing several floodplains. Alternative routes crossing the following 100-year floodplains were determined from the Flood Hazard Boundary Maps prepared by the U.S. Department of Housing and Urban Development and Topographic Maps prepared by the U.S. Department of the Interior, Geological Survey:

(1) Clark Fork River (segments 101, 124, 119, 122, 127, 125, 144, 145, 15, 18 and 29;
(2) Wallace Creek (segment 122);
(3) Blackfoot River (segments 113 and 112);
(4) Bitterroot River (segments 139 and 140);
(5) Prospect Creek (segment 22);
(6) Flathead River (segments 5 and 14);
(7) Tamarack Creek (segment 92);
(8) St. Regis River (segment 25);
(9) The Coeur d'Alene River and the, North and South Forks of the Coeur d'Alene River (segments 31, 35, 37 and 47).

Based on the current available floodplains information, the following 100-year floodplains must have one or more towers at each crossing (see fig. 4.14):

(1) Clark Fork River - Segment 18 (4 towers); segment 124 (1 tower); and segment 15 (1 tower);
(2) Prospect Creek - Segment 22 (2 towers);
(3) Wallace Creek - Segment 122 (1 tower).

Under Executive Order 11988, developments on 100-year floodplains are discouraged whenever there is a practical alternative. Because the alternatives between Garrison and Spokane are oriented perpendicular to a number of rivers and perennial streams, some floodplains must be crossed. Only those alternatives listed immediately above would require towers or access roads within the floodplains. Thus, these alternative routings would have the least possible effects on floodplains.

Towers within the floodplains would be built on concrete footings designed to withstand flooding. Soil and vegetation would be disturbed at tower sites, pulling sites, and access roads. Construction activities and the physical presence of the transmission line would not alter floodplain characteristics or create the potential for greater loss of property or life during flooding. Open tower structures do not constrict flood flows.

There are existing transmission lines, highways, and railroad tracks within many of the floodplain areas now. Therefore, any new transmission line structures will not substantially affect the natural beauty of these floodplain areas. Areas where the proposed rights-of-way are now being farmed can continue to be farmed, except where new tower sites will be located.

WETLANDS

U.S. Fish and Wildlife Service has not made a National Wetlands Survey of this area, so identification of wetlands was made using the U.S. Fish and Wildlife Service definition of wetlands, U.S. Geological Survey maps, and BPA preliminary field and aerial photography investigations.

A number of small wetland areas was identified along the corridors (see figure 4.3). Because of their small size, however, these wetlands will all be spanned by the transmission line and avoided by access roads. Therefore, the proposed action will not destroy or modify any wetlands.

FARMLANDS

BPA determined locations of Prime and Unique Farmlands and Farmland of Statewide Importance (Montana, Washington designations) from appropriate USDA Soil Conservation Service maps and through consultation with District Conservation Officers for each county within the study area. There are no farmlands identified as Unique within the study area except for a very small area just east of Spokane; it would not be crossed by the transmission line. A small amount of Prime and Unique Farmland would be converted to non-agricultural use by tower placement (Plan A = 2 to 10 acres; Plan B = 1 to 7 acres; Plan C = 1 to 6 acres) but adjacent Prime land within the right-of-way would not be converted to different land uses. BPA will not require permanent access roads across Prime Farmland.

RECREATION RESOURCES

Information consultation with the National Park Service and a review of the Wild and Scenic River System inventory of listed and proposed rivers (16 U.S.C. Section 1273(6)) indicates that, at the present time, no rivers or portions of rivers within the study area are components of the Wild and Scenic River System. The North Fork of the Coeur d'Alene River and the Flathead River are crossed by the proposed plans. These rivers are listed in the Nationwide Rivers Inventory: A Report on Natural and Free-Flowing Rivers in the Northwestern United States (HCRS 1980); they have potential classification under the National Wild and Scenic River Systems. A Wild and Scenic River assessment was completed December 17, 1980, for the western portion of the study area between Missoula and Spokane; it was submitted to the Heritage Conservation and Recreation Service (HCRS).

There are no legal restrictions on the crossing of Wild and Scenic Rivers (Osborne 1982, personal communication). It was BPA's opinion that the proposed project will not affect the North Fork of the Coeur d'Alene or the Flathead Rivers' potential classifications under the National Wild and Scenic River System. These rivers would probably receive a recreation classification because of the level of development that has occurred in the area surrounding the rivers (Osborne 1982, personal communication). A main dirt road along the Coeur d'Alene River is presently used for auto traffic. Extensive clear-cut logging has occurred in the mountains surrounding the area. The Flathead River is used heavily for recreational rafting and motor boating activities.

Mitigation measures to be implemented by BPA and to ensure minimum impact on the North Fork of the Coeur d'Alene and Flathead Rivers include: (1) crossing rivers at right angles instead of paralleling for any length; (2) spanning at the highest reasonable elevation to reduce or eliminate clearing of trees in the river canyon; (3) use of non-specular conductors (wire that has low reflective characteristics); (4) depending on FAA regulations, painting towers to blend with the natural setting; (5) retaining existing vegetative screening; and (6) minimizing new access and disturbance in the vicinity of the crossings.

National Historic Trails, as inventoried in the National Trails System (16 U.S.C. Sections 1242-1245) would be crossed by the proposed project. The Lewis and Clark National Historic Trail, which follows along the Bitterroot River, turns northeast of Missoula and continues up the Blackfoot River in a northeasterly direction, is presently a component of the National Trails System and is crossed in segments 139, 125, and 113. The Nez Perce (Nee-Me-Poo) Trail, a proposed National Historic Trail as part of the National Trails System, follows closely the route of the Lewis and Clark Trail. The Lolo Trail, classified as a National Historic Landmark, also follows a route similar to that of the Lewis and Clark Trail within the study area. However, neither of these latter trails is crossed by the project.

Travelers's Rest in or near Lolo, a National Historic Landmark also listed on the National Register of Historic Places, will also be visually affected at a distance of about 3 miles (segment 139). However, the visual impact should not constitute an adverse impact on the site because of the property's lack of historic integrity and historic setting.

The Pattee Canyon and Blue Mountain National Recreation Trails, part of the National Trails System (16 U.S.C. Sections 1242-1245), are in the study area near Missoula, Montana. Segment 142, located near Blue Mountain, would cross the Blue Mountain National Recreation Trail. The Stark Mountain Recreation Trail, a candidate for classification as part of the National Trails System, is crossed in segment 10 near Stark Mountain. BPA plans to use non-specular conductor, painted or darkened towers, and selective clearing to minimize visual impacts of the transmission line crossing of any trail location. These measures would make the project compatible to the extent practicable with the nature and purposes of the National Trails System.

The Rattlesnake drainage, north of Missoula, has been designated in part as a National Recreation Area and Wilderness, administered by the Forest Service (Lolo National Forest), protecting it against non-recreational development. A management plan for its administration is expected to be completed in two years. Although transmission lines may not be consistent with the management objectives of a National Recreation Area, such lines are not prohibited. 15/ The wilderness portion of the Rattlesnake drainage is not crossed by alternative transmission line segments.

Segments 119 and 132 would span Highway 10A (Pintlar Scenic Highway), a road between Drummond and Philipsburg designated as a scenic highway by the State of Montana. The crossing was located at a narrow portion of the Flint Creek Valley (the Maxville area) to minimize visual exposure. The use of non-specular conductor, painted or darkened towers, and careful tower placement

15/ See footnote 3, p. IV-2.

would additionally minimize visual impacts. Improved appearance towers are also being considered.

PERMIT FOR STRUCTURES IN NAVIGABLE RIVERS

No navigable rivers would be crossed by any of the alternatives in the study area as determined by consultation with the U.S. Army Corps of Engineers. Consequently, no Section 10 permit from the U.S. Army Corps of Engineers for structures in navigable rivers will be required in accordance with the Rivers and Harbors Appropriation Act, Section 10, 33 U.S.C. 403.

PERMIT FOR DISCHARGES INTO WATERS OF THE UNITED STATES

Any permanent discharge of dredged or fill material into the waters of the United States likely from this project would be permitted under CFR, Part 333.4. 16/ Therefore, no individual permit from the U.S. Army Corps of Engineers under Section 404 of the Federal Water Pollution control Act is required.

PERMIT FOR RIGHT-OF-WAY ON PUBLIC LAND

This project will cross lands administered by the Bureau of Land Management and the U.S. Forest Service. These agencies are participating by determining land use allocation on Federal lands for right-of-way use. BPA will obtain the necessary Federal land management agency right-of-way permits for the project. (See discussion under Decisions To Be Made.)

CLEAN AIR ACT

Impacts of the project on air quality would be short-term and would result primarily from dust, exhaust emissions from construction equipment and vehicles, and smoke from burning of clearing debris.

Any particulates from construction dust, nitrogen oxides and hydrocarbons from burning, and carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, or

16/ The following discharges are permitted: "Dredged or fill material placed as backfill or bedding for utility line crossings provided there is no change in preconstruction bottom contours (excess material must be removed to an upland disposal area). . . . Material discharged for bank stabilization, provided that the bank stabilization activity is less than 500 feet in length, is necessary for erosion prevention, and is limited to less than an average of one cubic yard per running foot along the bank, provided further that no material for bank stabilization is placed in any wetland area, and provided further that no material is placed in any locality or in any manner so as to impair surface water flow into or out of any wetland area." 33 CFR, Part 323.4.

particulates from vehicles and equipment would be well below primary and secondary limits prescribed by the National Ambient Air Quality Standards. Consequently, the project would not pose a health hazard to people in the area and would not cause environmental damage.

This project will conform to the Montana Cooperative Smoke Management Plan (revised January, 1981) requirements (State of Montana Air Quality Bureau). Open burning permits will be required from each county crossed in Montana. If burning takes place on the Flathead Indian Reservation, BPA will comply with the permitting procedures of the Bureau of Indian Affairs, Fire Management Office, including obtaining of burning permits during the fire season (April-October). Routing alternatives in the project area between Drummond and Ninemile, Montana and between Beaver Creek and Trout Creek, Montana along the Clark Fork Valley are within zones adjacent to Class I air quality areas as designated under the Clean Air Act (40 CFR Part 51). Fall and early winter burning is less desirable as this is a period of increased air inversions and higher pollution levels.

Idaho fire protection districts require permits for burning slash and other waste materials during the months of May through October because of fire hazard. Burning during rain or snow seasons, which lessens the fire potential, is encouraged. Air quality is a factor in the Idaho State-level permit process.

In Washington State, only a small amount of slash from forest waste will be necessary to burn. Washington State requires a permit for burning from either the local pollution district or the State Department of Natural Resources.

The BPA contractor shall obtain permits and comply with state and local air pollution control requirements and burning regulations prior to any burning. The debris shall be kept as clean and dry as possible, and burned in such a manner as to reduce smoke.

Because the substation and line would not produce any significant emissions, air standards addressed in the New Source Performance Standards or National Emission Standards for Hazardous Air Pollutants would not be applicable to this project.

To minimize burning emissions along all routes of the project, debris will be handpiled or bulldozed with a brush blade and will be cured for a specified time before ignition. Measures such as watering construction sites and watering or gravelling roads would be used as necessary to control dust. Exhaust emissions would be minimized by using vehicles and equipment that are properly maintained and operated.

FEDERAL WATER POLLUTION CONTROL ACT
CLEAN WATER ACT AND SAFE DRINKING WATER ACT

The risk of discharging oil or hazardous substances into water supplies is very low because of containment design incorporated into substation construction. BPA will use a containment system, such as excavation and removal of contaminated soil from each site, and mechanical methods using oil separation tanks in a lagoon collection system. The method selected for use at substations will depend upon land availability and results of geologic and soil analyses.

The project is not expected to affect any public water system under the terms of the National Interim Primary or Secondary Drinking Water Regulations (40 CFR, Part 141, 143). Although several municipal watersheds would be crossed by the transmission line, with short-term impacts from sedimentation, such sedimentation would not reach maximum allowable contaminant levels. BPA will comply with State and local public drinking water regulations. The proposed line would cross a Sole Source Aquifer (Spokane-Rathdrum Aquifer) which, as the primary source of drinking water in the Spokane-Coeur d'Alene area, falls under provisions of the Safe Drinking Water Act. Construction activities will not add pollutants to the aquifer and excavation for tower footings will not penetrate to the water table.

As required by the Montana, Idaho and Washington State Water Quality Standards, BPA will avoid adverse effects on fisheries and associated aquatic life. Necessary permits will be obtained from each State Fish, and Game Department for each fishery stream crossing. Mitigation such as culvert design and sedimentation control will be performed in accordance with the permits.

SOLID WASTE DISPOSAL ACT AND RESOURCE CONSERVATION AND RECOVERY ACT

The types of solid waste produced during construction and operation of the transmission line and substation can be classified as clearing, construction, domestic (municipal), and hazardous waste. These wastes would be collected, transported, stored, and disposed of according to applicable Federal and State laws.

Any hazardous waste accumulated during the construction and subsequent operation of the transmission line and substations would require special handling to avoid harm to individuals and the environment. These may include such materials as oil, pesticides or residue from pesticide spills, herbicides, and other chemicals (40 CFR, Part 261). All wastes in this category require special treatment, transportation, and/or special disposal facilities. All hazardous wastes will be disposed of according to applicable Federal and State laws.

NOISE CONTROL ACT

BPA will comply with the Noise Control Act (42 U.S.C. 4901) and the State of Washington Administrative Code, Chapter 17360. The States of Idaho and Montana have no noise standards. BPA will comply with EPA Noise Standards, Any hazardous waste accumulated during the construction and subsequent operation of the transmission line and substations would require special handling to avoid harm to individuals and the environment. These may include such materials as oil, pesticides or residue from pesticide spills, herbicides, and other chemicals (40 CFR, Part 261). All wastes in this category require special treatment, transportation, and/or special disposal facilities. All hazardous wastes will be disposed of according to applicable Federal and State laws.

NOISE CONTROL ACT

BPA will comply with the Noise Control Act (42 U.S.C. 4901) and the State of Washington Administrative Code, Chapter 17360. The States of Idaho and Montana have no noise standards. BPA will comply with EPA Noise Standards, which set 55 decibels (dB) as the maximum yearly average equivalent sound level allowed in residential areas with outside space or at farm residences. BPA policy is to meet such noise limits at the substation boundaries. Noise limitations will be met at all the new substations and at existing substations where additional areas would be developed. These substations include: Plan A: (1) Garrison; (2) Eagle Creek (possibly); (3) Hot Springs; and (4) Bell. Plan B: (1) Garrison; (2) Plains; (3) Eagle Creek (possibly); and (4) Bell. Plan C: (1) Garrison; (2) Taft; and (3) Bell. The WWP substation sites include Pine Creek and Wallace and one of the following: Eagle Creek, Taft, Noxon or Thompson Falls depending on the plan chosen.

Noise mitigation measures such as earthberms or soundwalls might be necessary to reduce the noise levels to acceptable EPA limits.

Transmission line noise would be audible to residents near the line (see Land Use: Urban-Residential section, for number of homes near the right-of-way). This could be annoying because of its pure tone characteristics and the relative absence of other noise in residential areas.

Transmission lines are a Class C noise source with respect to State of Washington noise regulations (Washington Administrative Code, Chapter 17360). The application noise limitations are 60 dBA during daytime and 50 dBA during nighttime at residential receiving properties, 65 dBA at commercial properties, and 70 dBA at industrial properties. Transmission line noise at the right-of-way edge may exceed the 50 dBA limitation for residential properties during and shortly after foul weather.

FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (as amended)

The EPA has established regulations to enforce this act (40 CFR, Part 162), including registration of certain pesticides and regulation of their use, storage, and disposal (40 CFR, Part 165). In addition, EPA sets protection standards for workers handling such pesticides (40 CFR, Part 170). BPA plans to treat the substations with a soil sterilant and use a herbicide for stump treatment of tall-growing deciduous species. BPA will also cooperate with landowners and local weed control districts to control noxious weeds along rights-of-way where active weed programs are in existence. Herbicide application for vegetation control (see Vegetation) specifies a 10-foot buffer zone between sprayed areas and water bodies for ground application. BPA does not expect to use aerial spraying in this area except under unusual circumstances. All herbicide applicators are trained in proper herbicide application procedures and meet the requirements of the state in which they operate. Applications are made either by a licensed applicator or under the supervision of a licensed applicator. BPA's 1982 Transmission Facilities Vegetation Management Program, draft EIS (USDOE 1982) discusses vegetation control methods, including types of herbicides, and rate and method of application. Right-of-way maintenance plans governing future vegetation management within areas of mutual concern (i.e., BPA rights-of-way across public lands) are developed between BPA and Federal land-managing agencies.

BPA will comply with all regulations pertaining to the purchase, use, storage, and disposal of any pesticides (and pesticide containers) used in the construction and maintenance of the transmission line substation. Chapter V of the BPA Right of Way Management Standards (Standard No. 63040-50) details the various procedures and practices for BPA use of herbicides.

TOXIC SUBSTANCES CONTROL ACT

This legislation includes coverage of the processing, distribution, and use of polychlorinated biphenyls (PCB's) (40 CFR, Part 761). EPA regulations on PCB's directly affect BPA because these chemicals have been used as cooling and insulating agents for substation capacitors and have been found as contaminants in transformers. Studies identifying PCB's as health hazards have led to their elimination from use in new transformers and capacitors.

Continued use of PCB transformers, PCB-contaminated transformers, and PCB capacitors is presently permitted under EPA's Regulations. However, it is BPA policy to prevent PCB capacitors from being introduced into a PCB-free environment. BPA's policy also applies to other oil-filled electrical equipment showing greater than 500 PPM PCB. To accomplish this in the new substations, the following measures will be undertaken: (1) transformers out of existing stock, if used, will be tested before they are moved; (2) technical specifications for new transformers and new transformer oil require that they be certified to be free of PCB; (3) new capacitor installations will use only non-PCB capacitors; (4) failed capacitors will be replaced only with non-PCB capacitors.

ENERGY CONSERVATION AT FEDERAL FACILITIES

The project will not involve the operation or maintenance of an existing Federal building. If the project requires additional maintenance buildings at the substation sites, they will be designed to minimize energy consumption.

Corridors/Routes/Segments

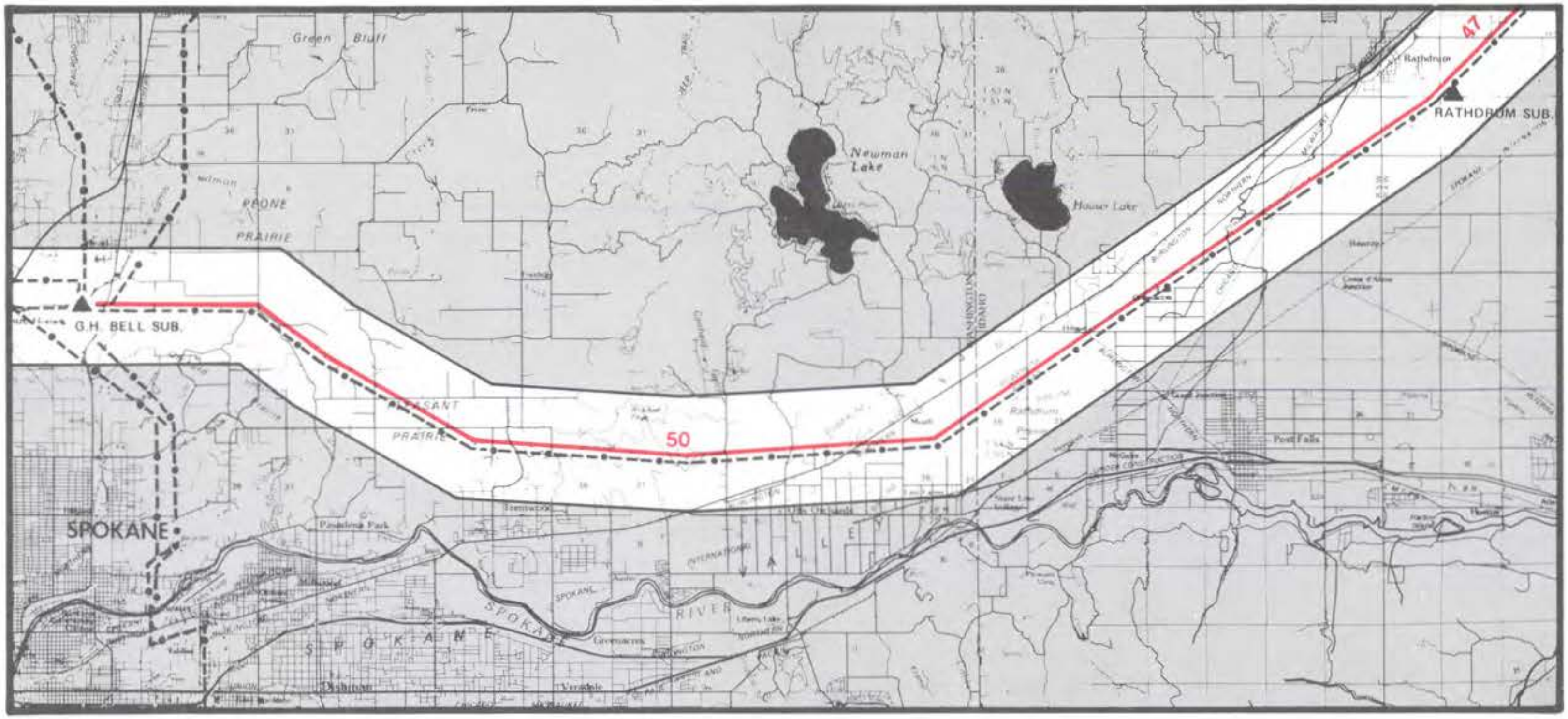
BPA Route/Segment Numbers 136

Corridor

Existing Transmission Lines

Existing Sub

NOTE: The proposed route parallels an existing utility right-of-way from the vicinity of Chilco, Idaho, into Bell Substation. The line would be built adjacent to a BPA transmission line on an unused vacant right-of-way easement.



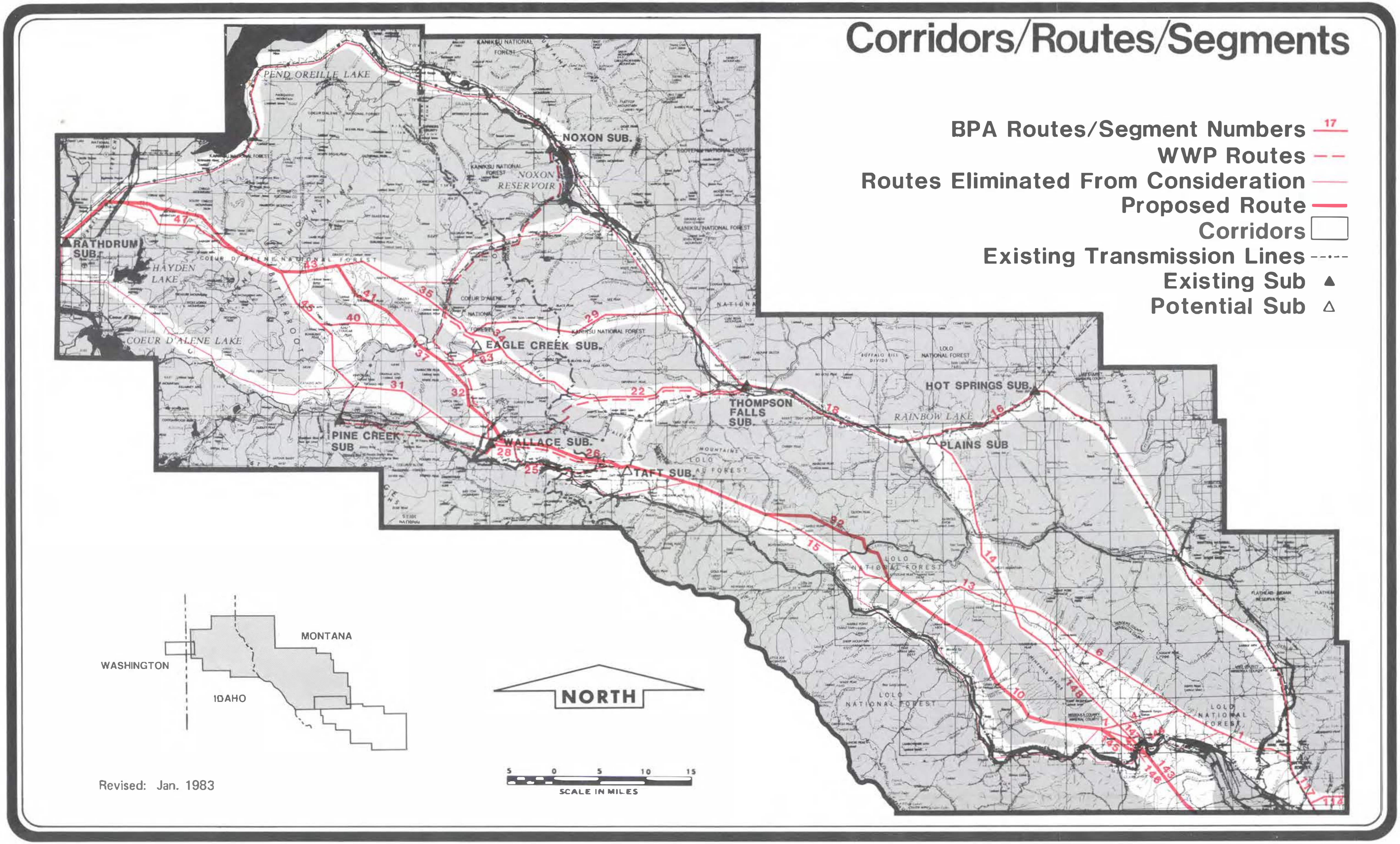
NORTH

0 1 2 3 4 5
SCALE IN MILES

Revised: Jan. 1983

Figure 4.1
Garrison-Spokane Project
76-6

Corridors/Routes/Segments



Revised: Jan. 1983

Figure 4.1
Garrison-Spokane Project
76-6

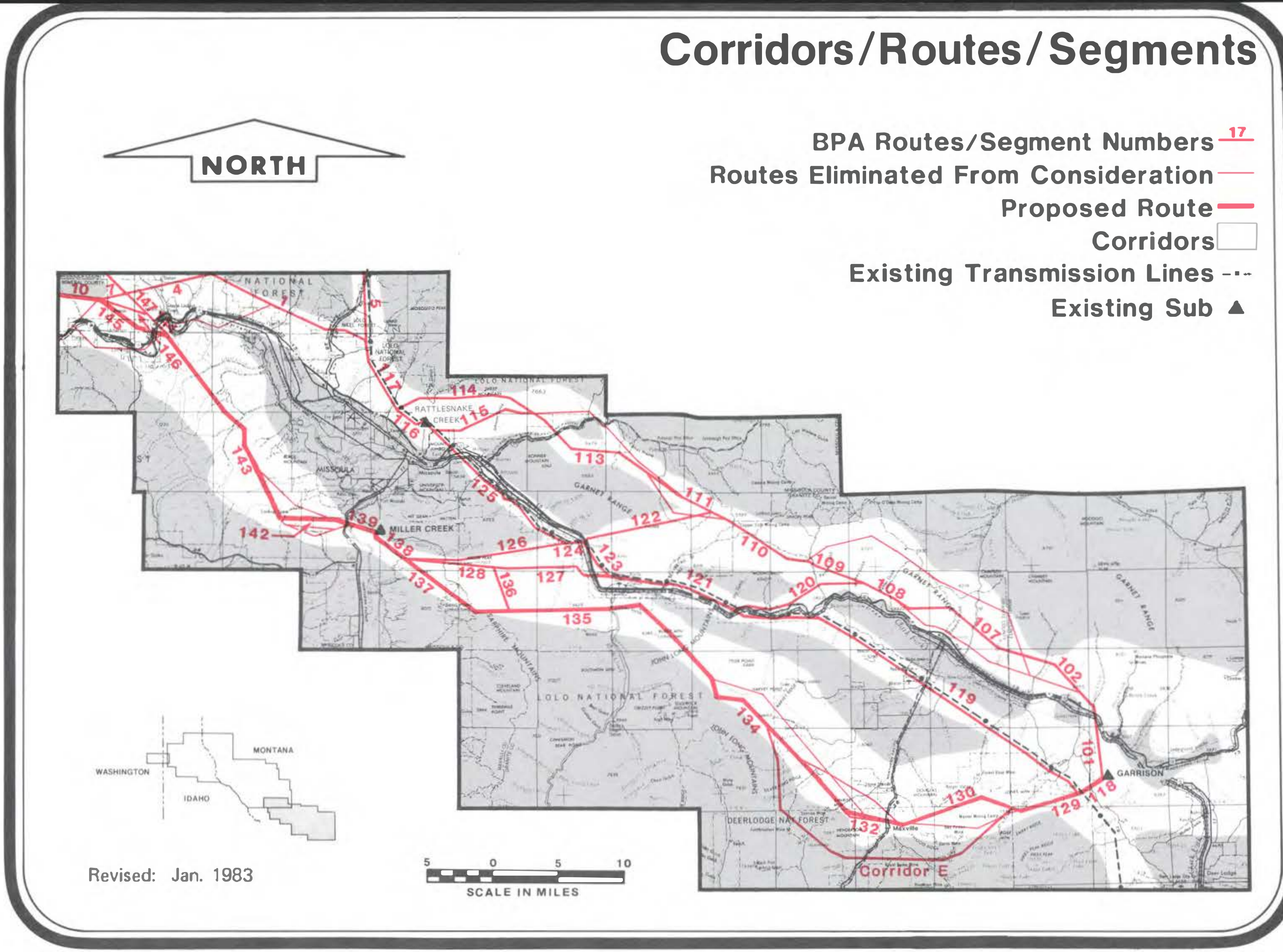


Figure 4.1

Garrison-Spokane Project

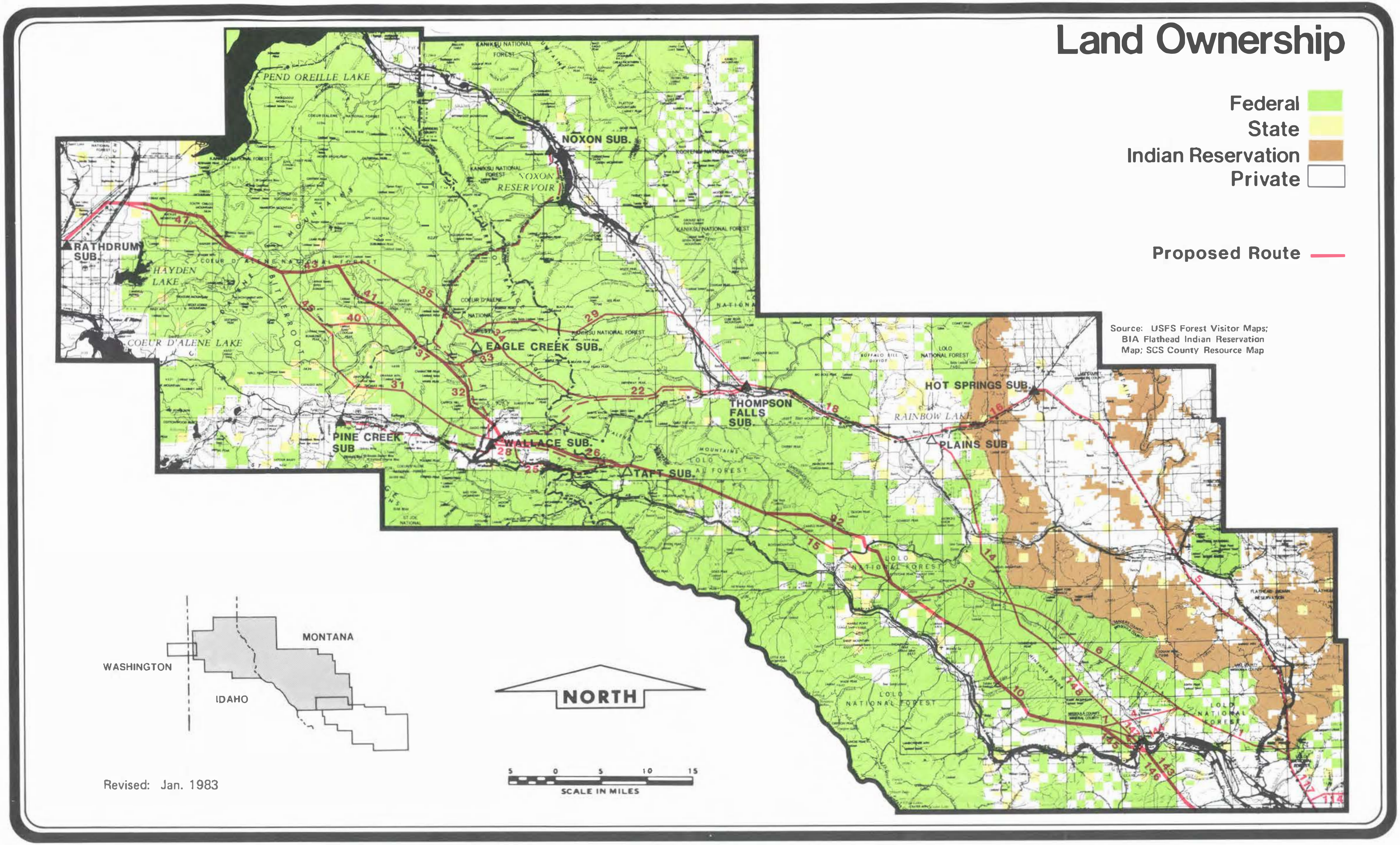
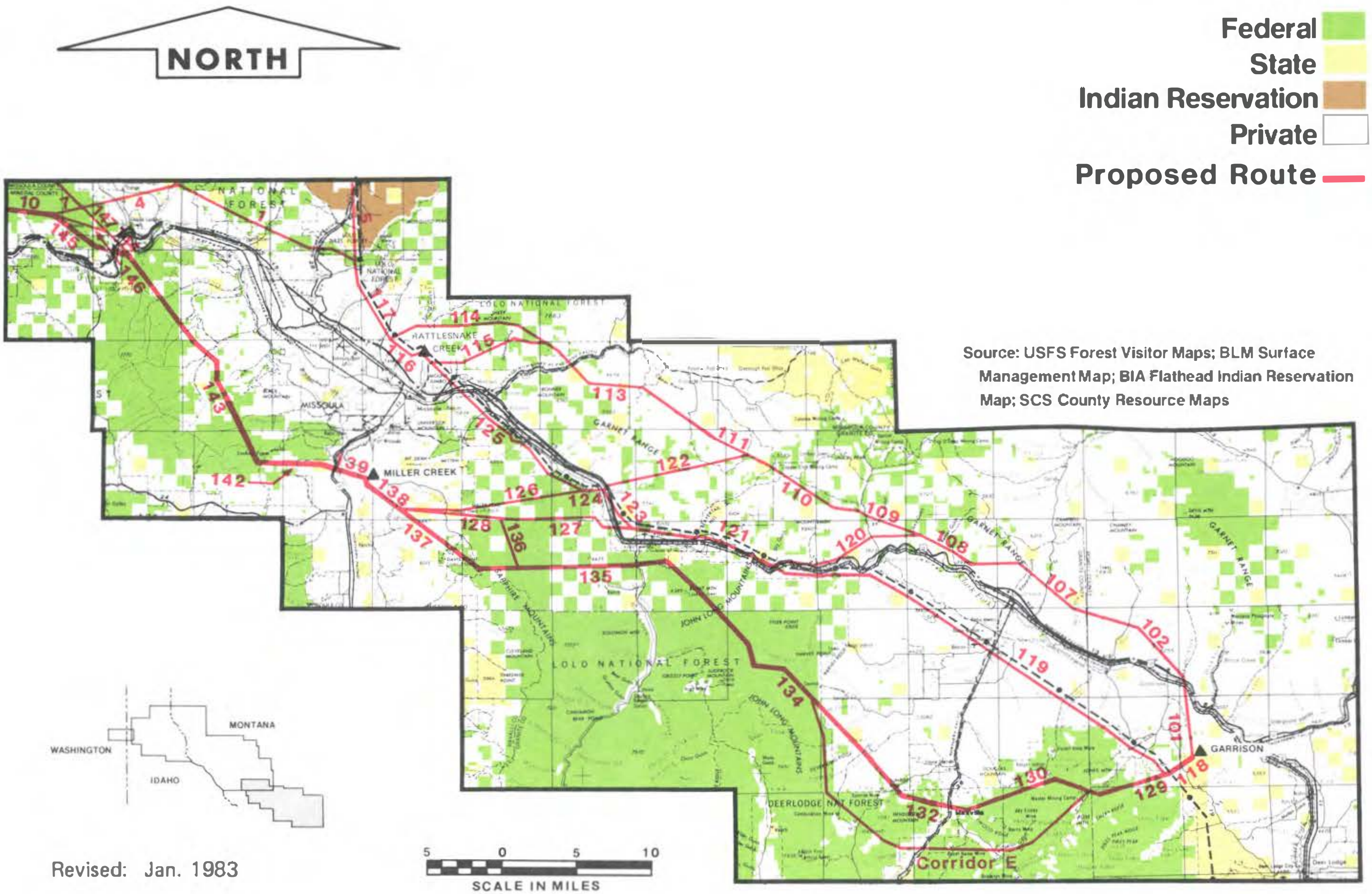


Figure 4.2
Garrison-Spokane Project
76-6

Land Ownership



Source: USFS Forest Visitor Maps; BLM Surface Management Map; BIA Flathead Indian Reservation Map; SCS County Resource Maps

Revised: Jan. 1983

Figure 4.2

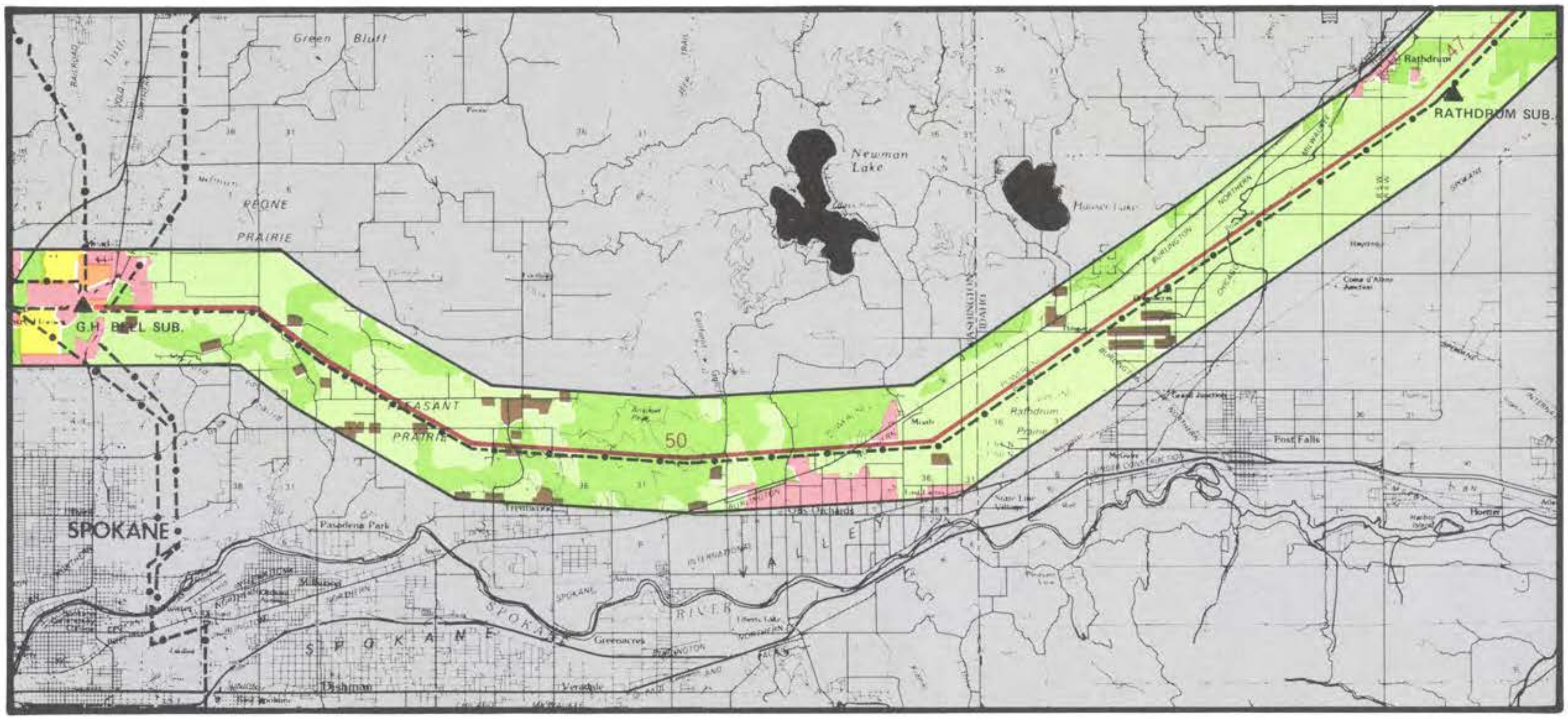
Garrison-Spokane Project

Land Use / Land Cover

Forest		Urban / Residential	
Range		Dispersed Development	
Barren Land		Agricultural Land	

NOTE: The proposed route parallels an existing utility right-of-way from the vicinity of Chilco, Idaho, into Bell Substation. The line would be built adjacent to a BPA transmission line on an unused vacant right-of-way easement.

Source: USGS 1:100,000 Series Bases; Spokane and Kootenai Counties; Air Photos



NORTH

0 1 2 3 4 5

SCALE IN MILES

Revised: Jan. 1983

Figure 4.3

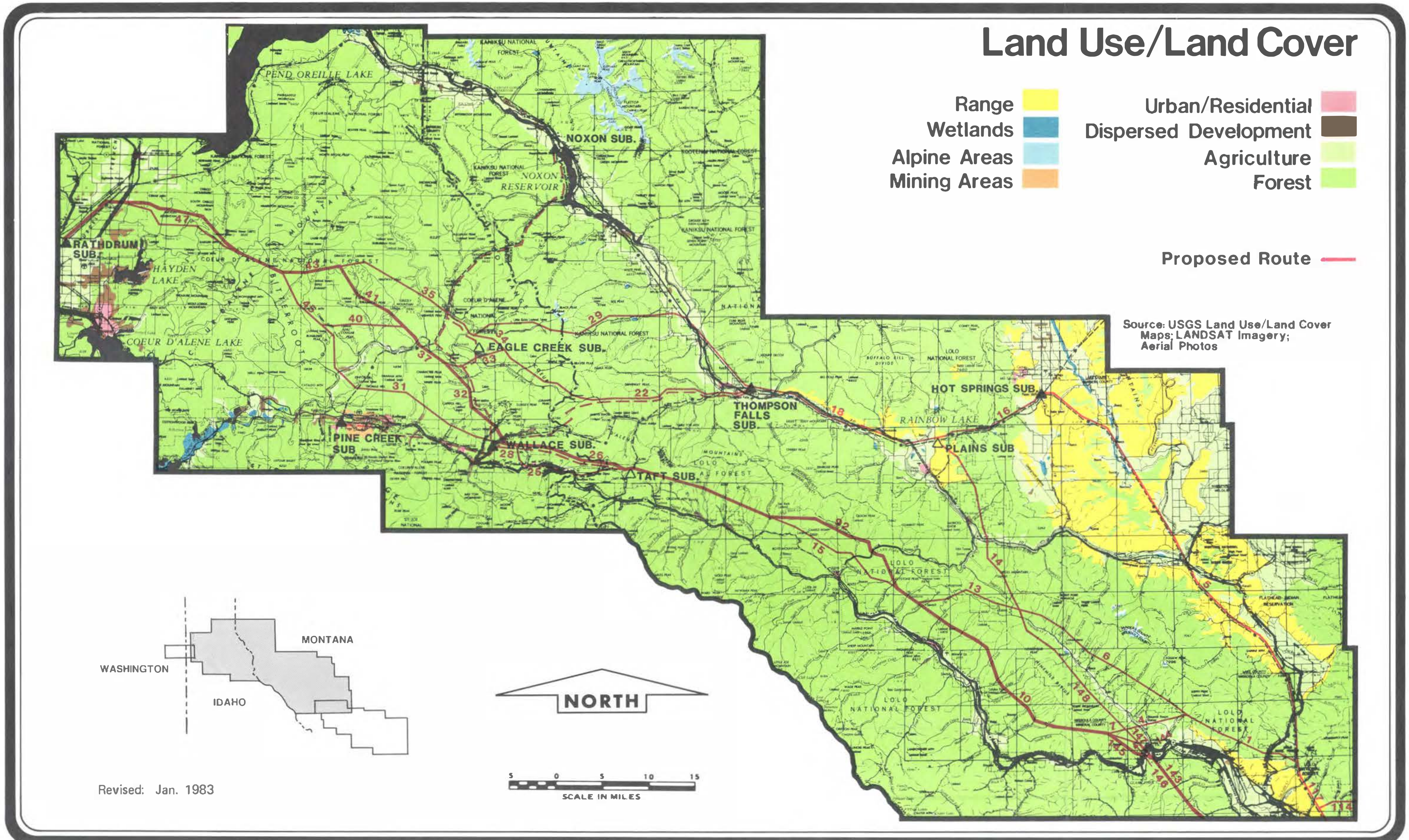


Figure 4.3
Garrison-Spokane Project
76-6

Land Use / Land Cover

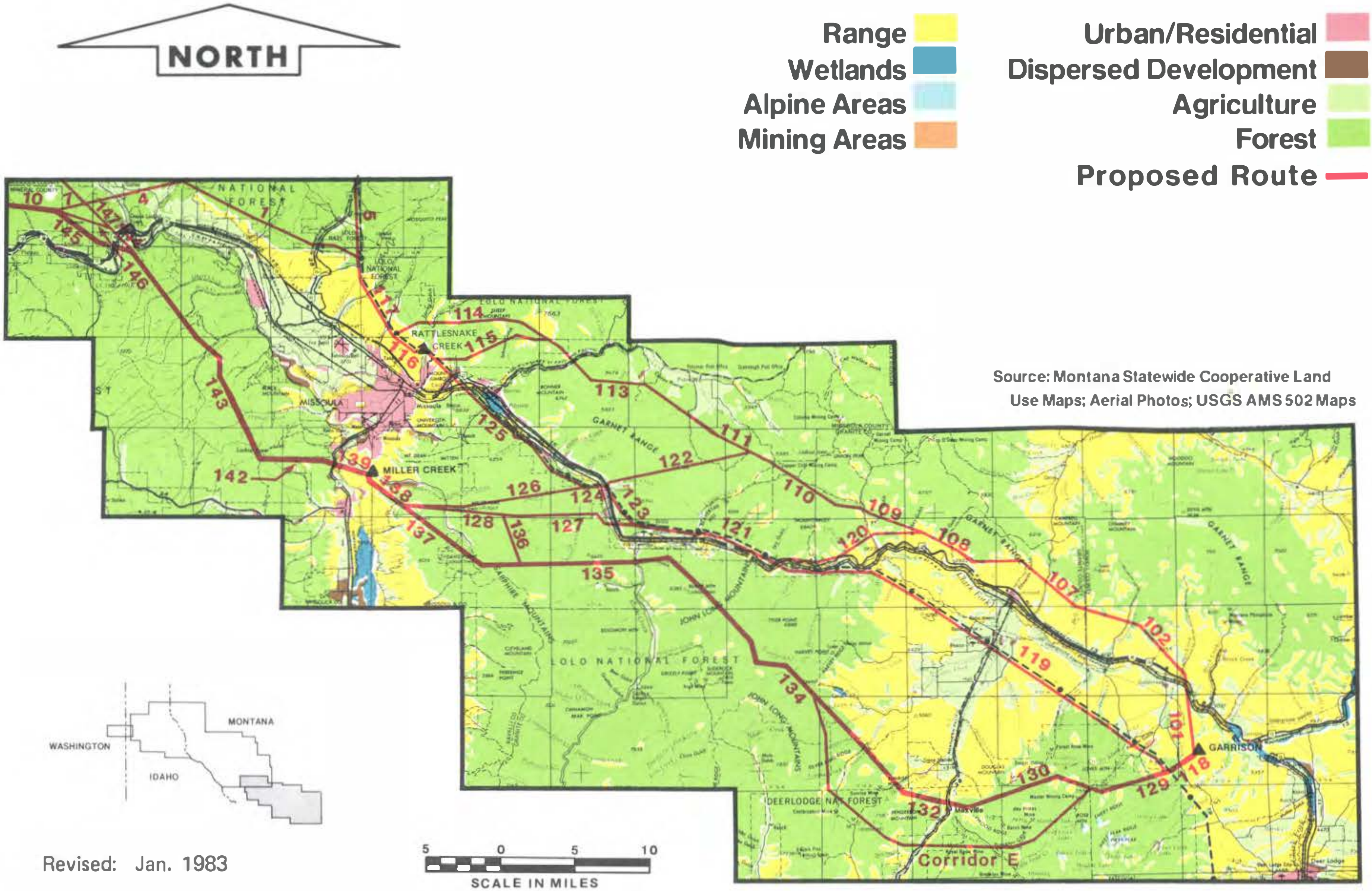


Figure 4.3
Garrison-Spokane Project
76-6

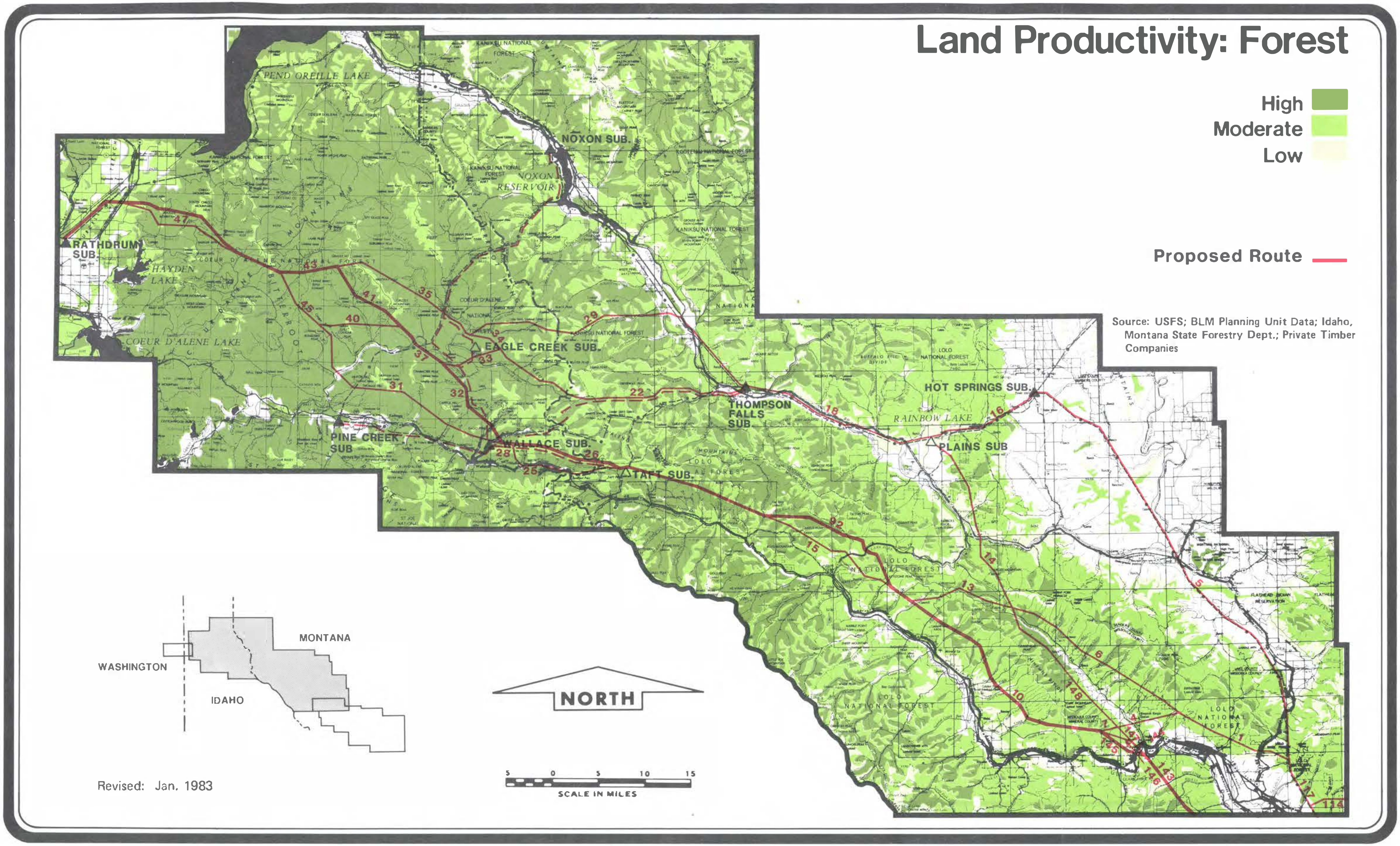


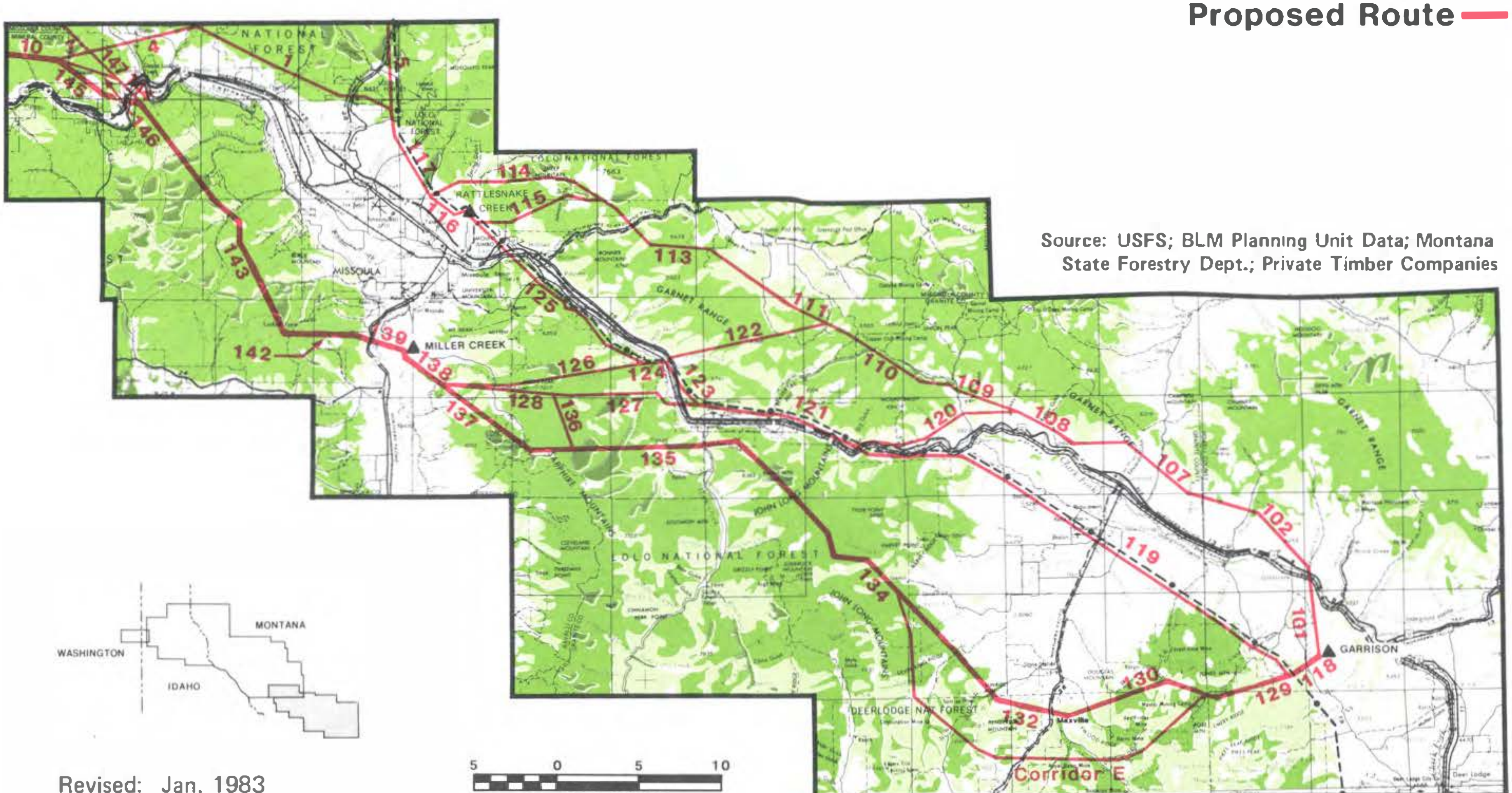
Figure 4.4
Garrison-Spokane Project
76-6

Land Productivity: Forest

NORTH

High
Moderate
Low

Proposed Route



Source: USFS; BLM Planning Unit Data; Montana State Forestry Dept.; Private Timber Companies

Revised: Jan. 1983

5 0 5 10
SCALE IN MILES

Figure 4.4
Garrison-Spokane Project
76-6

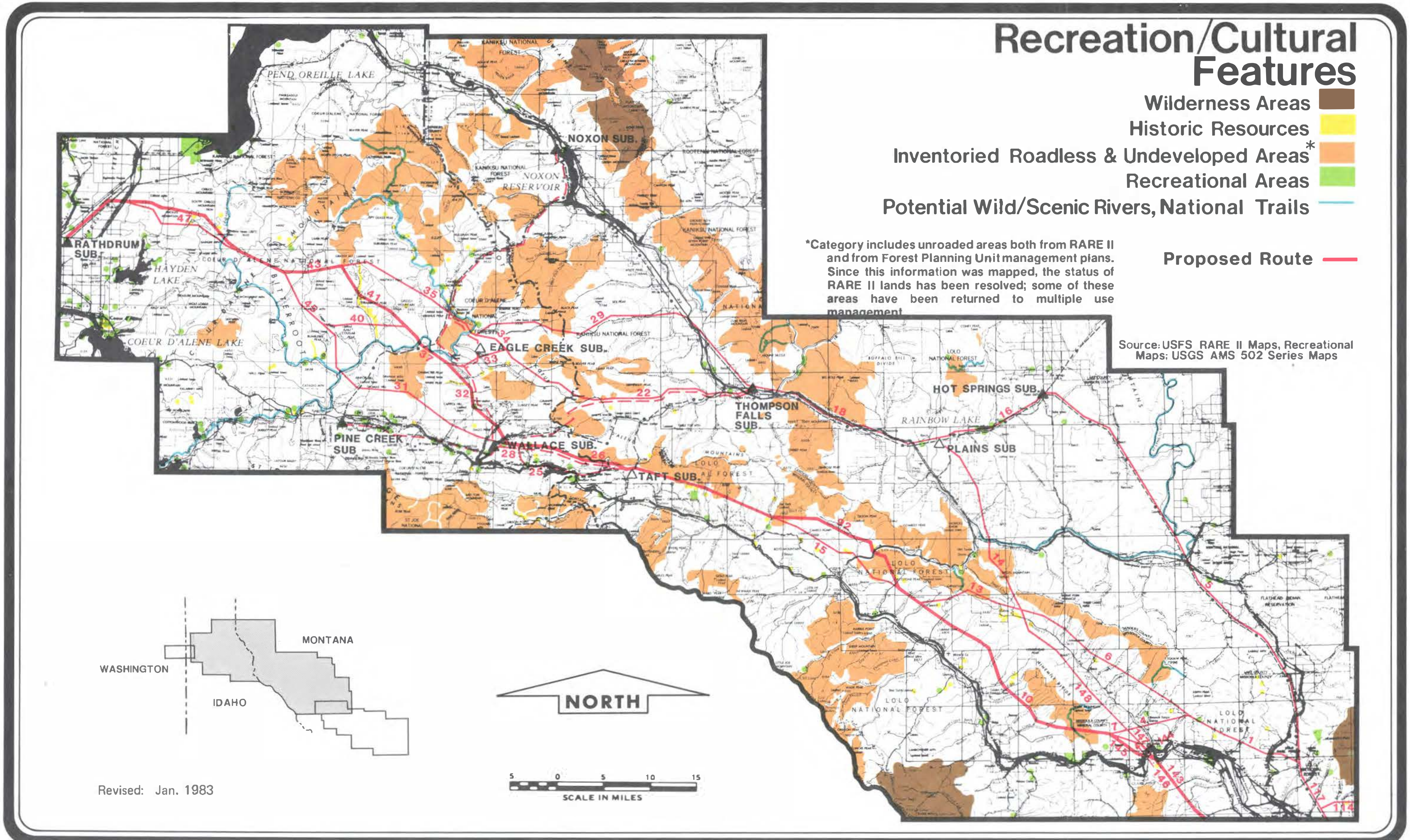


Figure 4.5
Garrison-Spokane Project

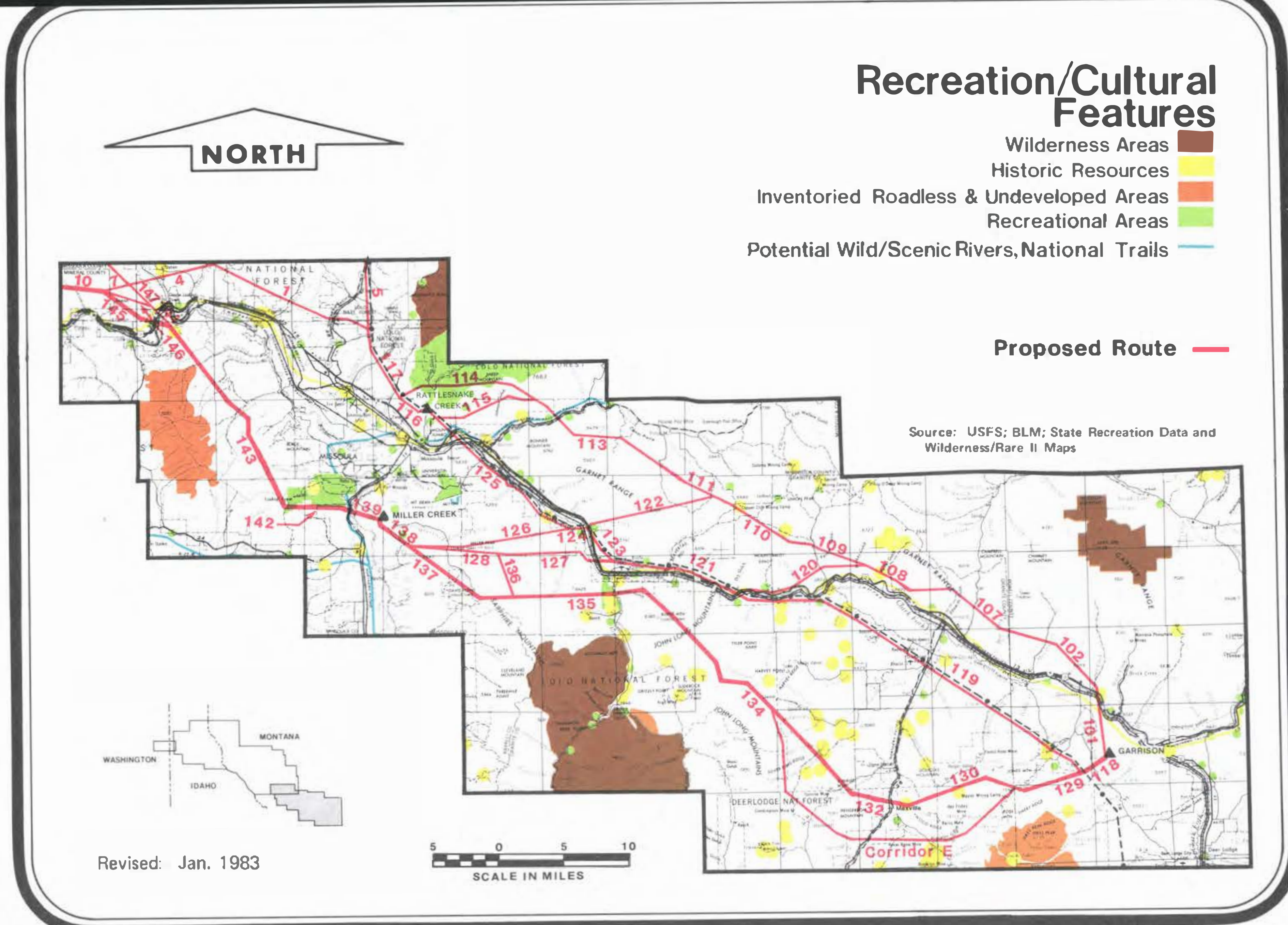


Figure 4.5
Garrison-Spokane Project
76-6

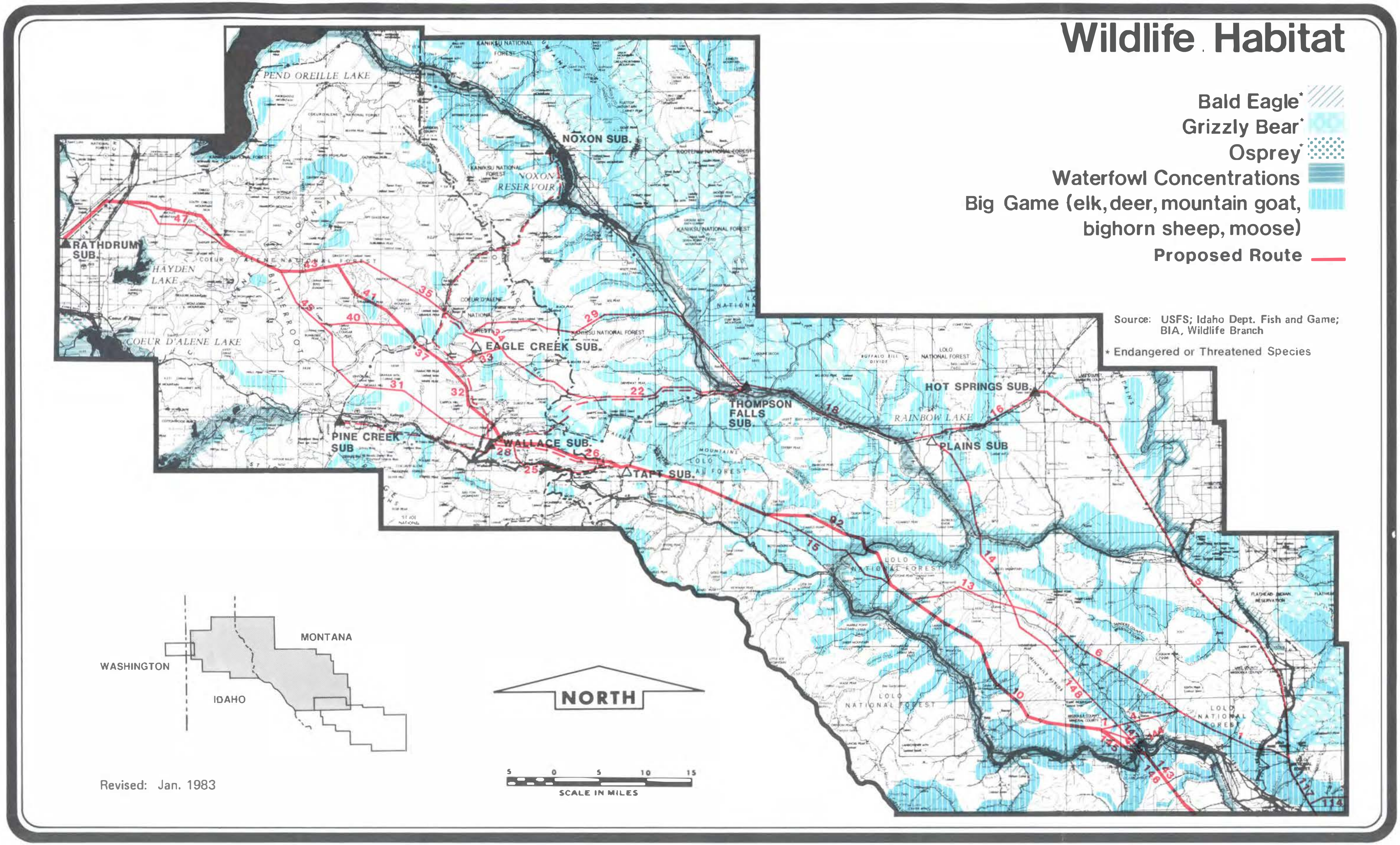


Figure 4.6
Garrison-Spokane Project

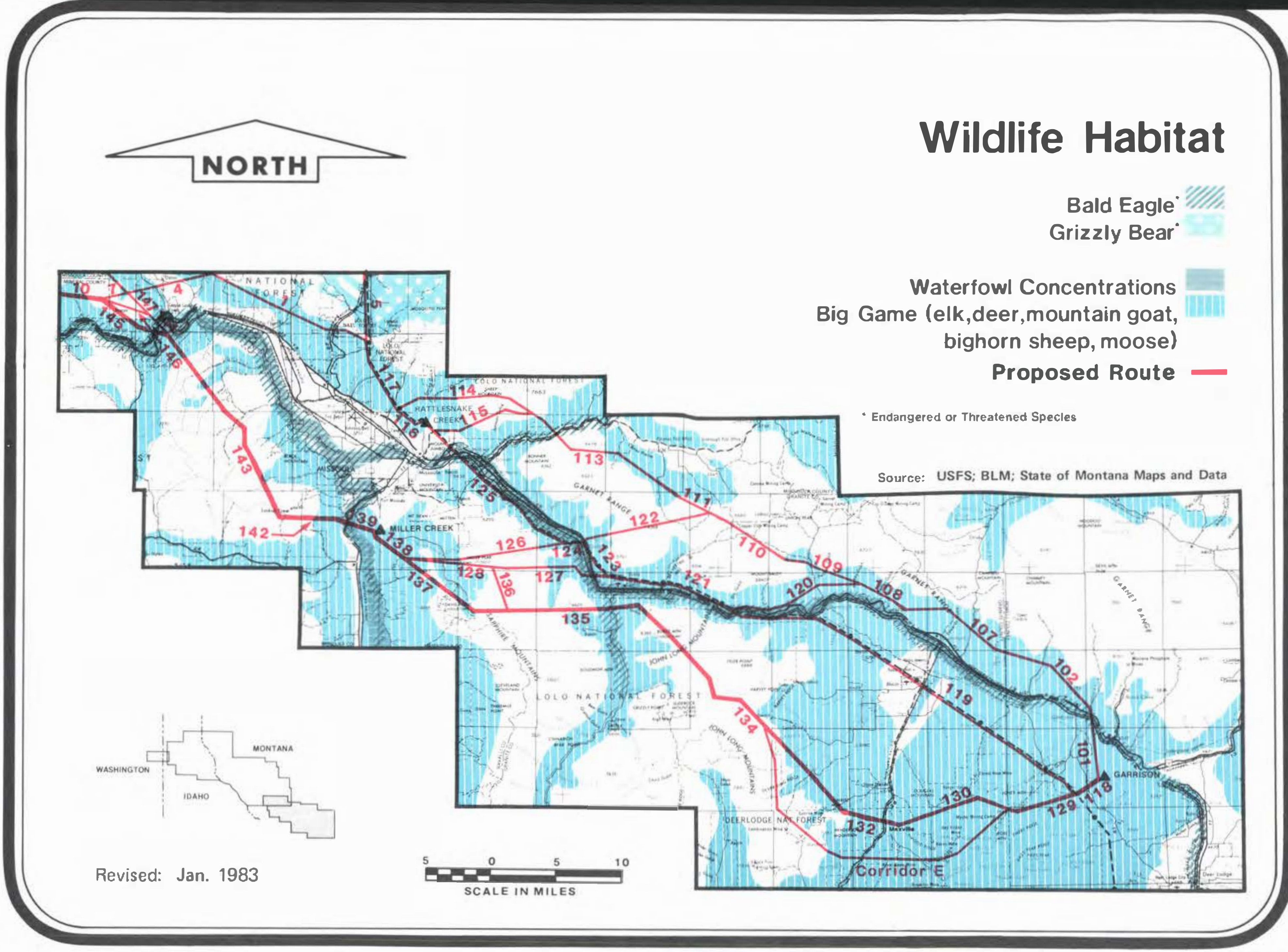


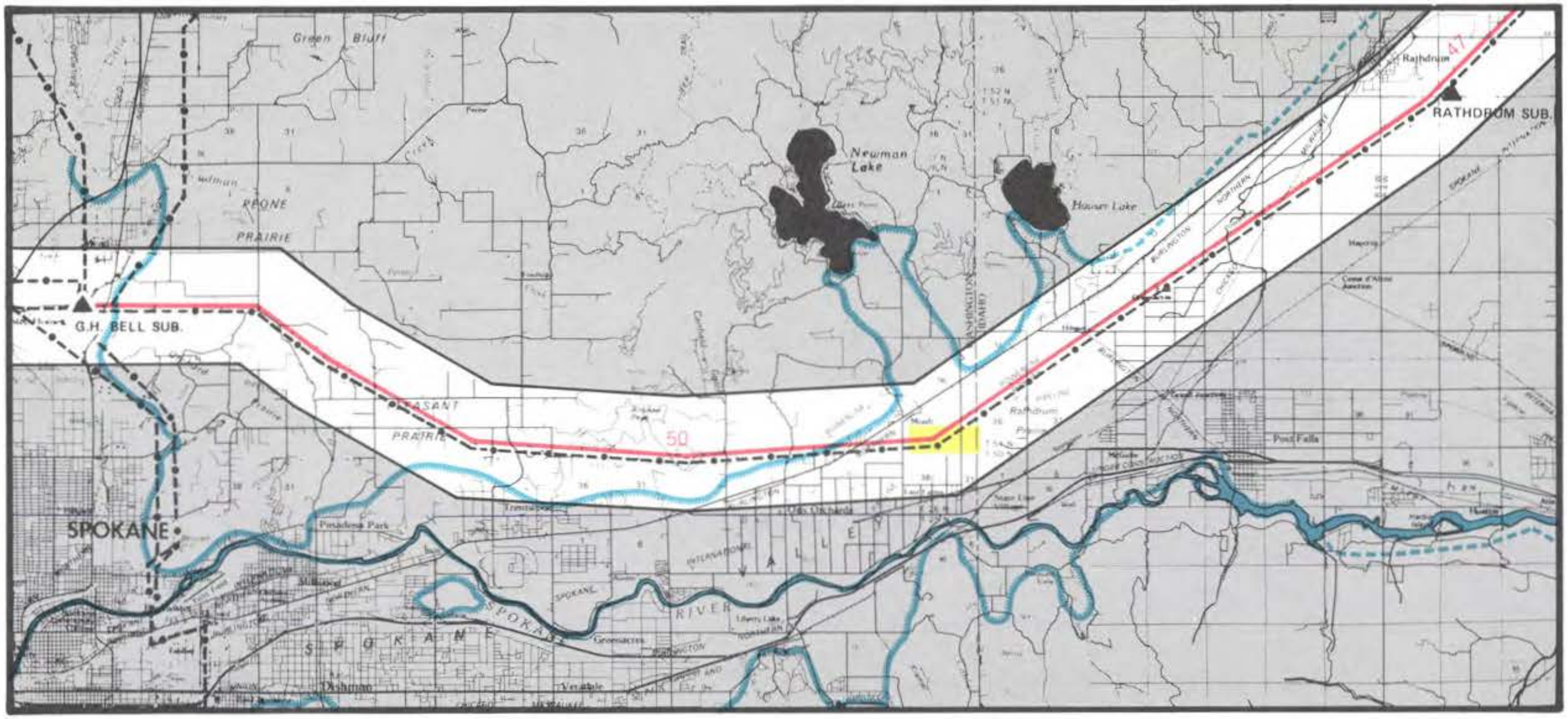
Figure 4.6
Garrison-Spokane Project
76-6

Natural Resources: Special Features

Game Refuge/Management Areas
Sole Source Aquifer
High Value Fishery Stream

NOTE: The proposed route parallels an existing utility right-of-way from the vicinity of Chilco, Idaho, into Bell Substation. The line would be built adjacent to a BPA transmission line on an unused vacant right-of-way easement.

Source: USFS; Spokane County Data



NORTH

0 1 2 3 4 5
SCALE IN MILES

Revised: Jan. 1983

Figure 4.7

Garrison-Spokane Project
76-6

Natural Resources: Special Features

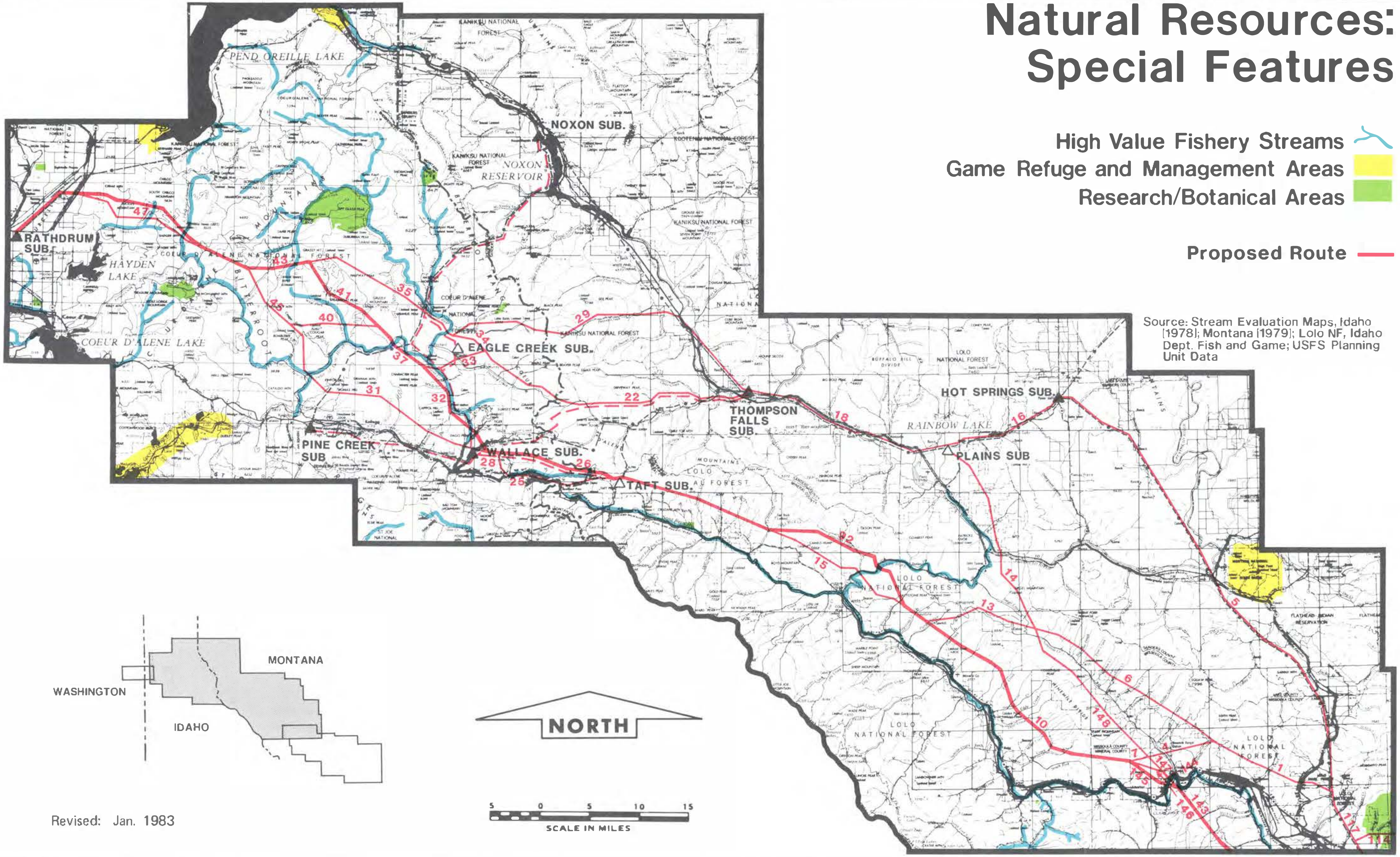
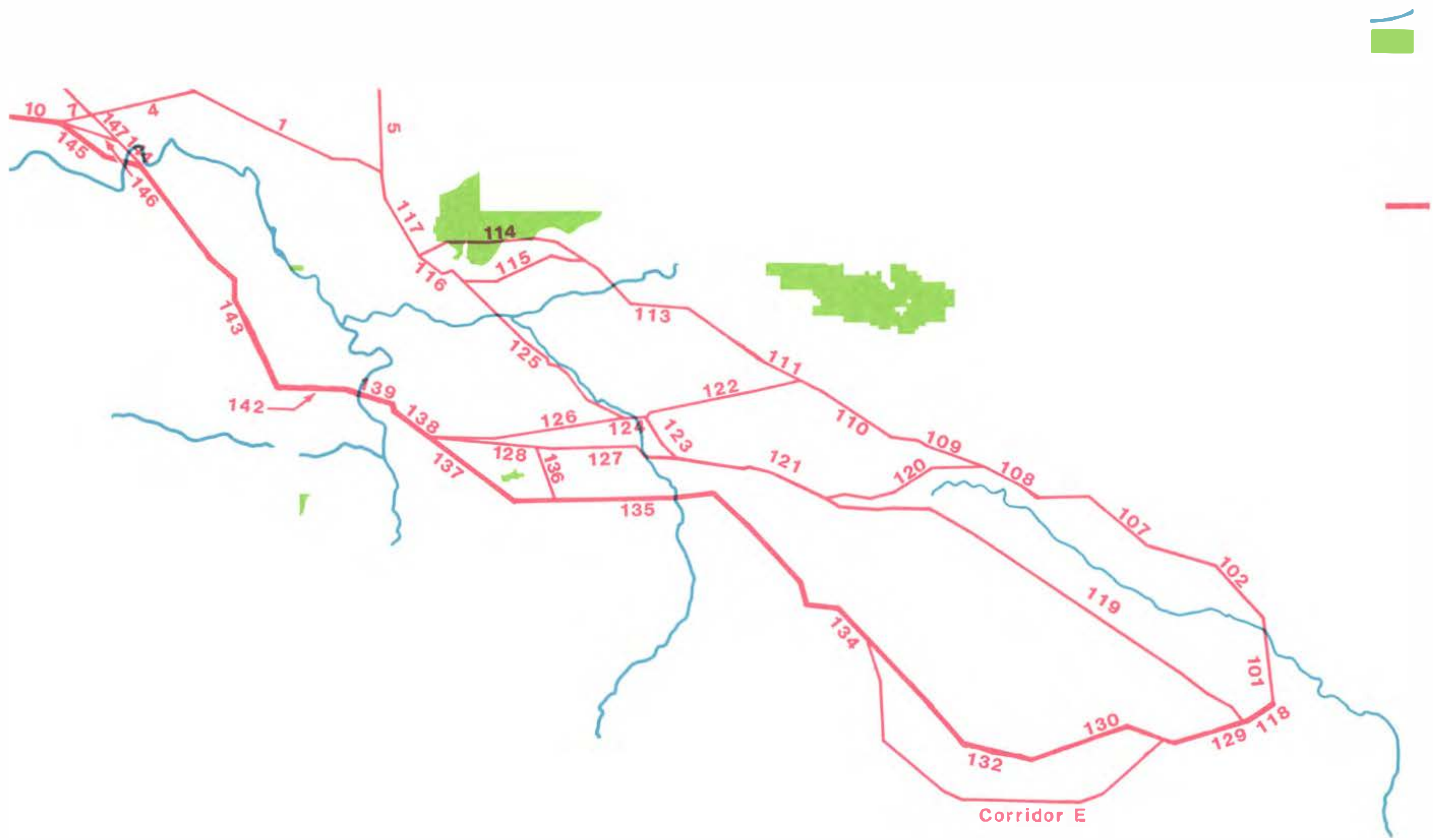


Figure 4.7
Garrison-Spokane Project
76-6


10
7
4
1
5
147
14
145
146
117
114
115
116
113
111
143
125
122
142
139
138
126
124
123
110
109
128
136
127
121
120
108
137
135
107
102
119
134
101
130
118
129
132
Corridor E

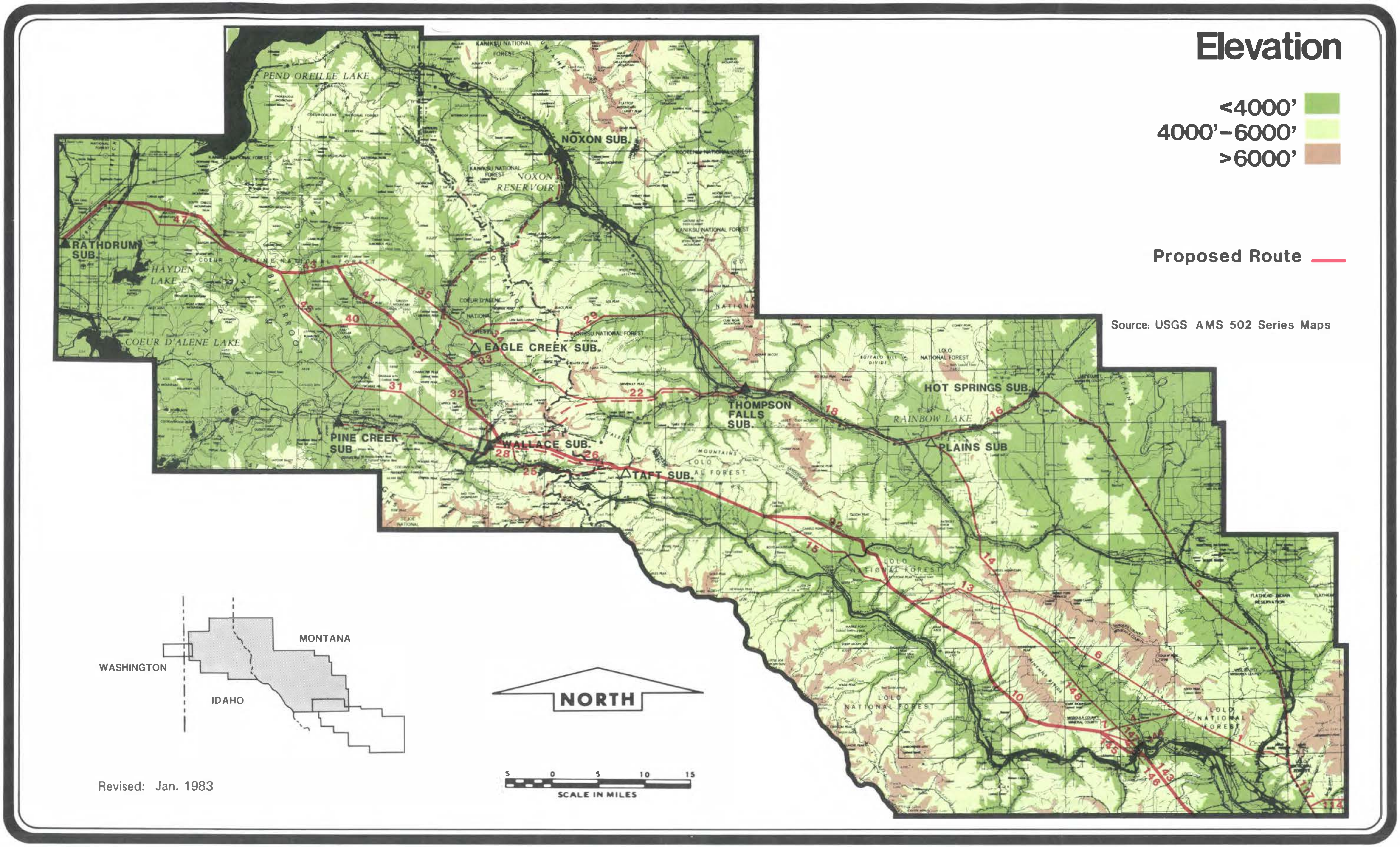
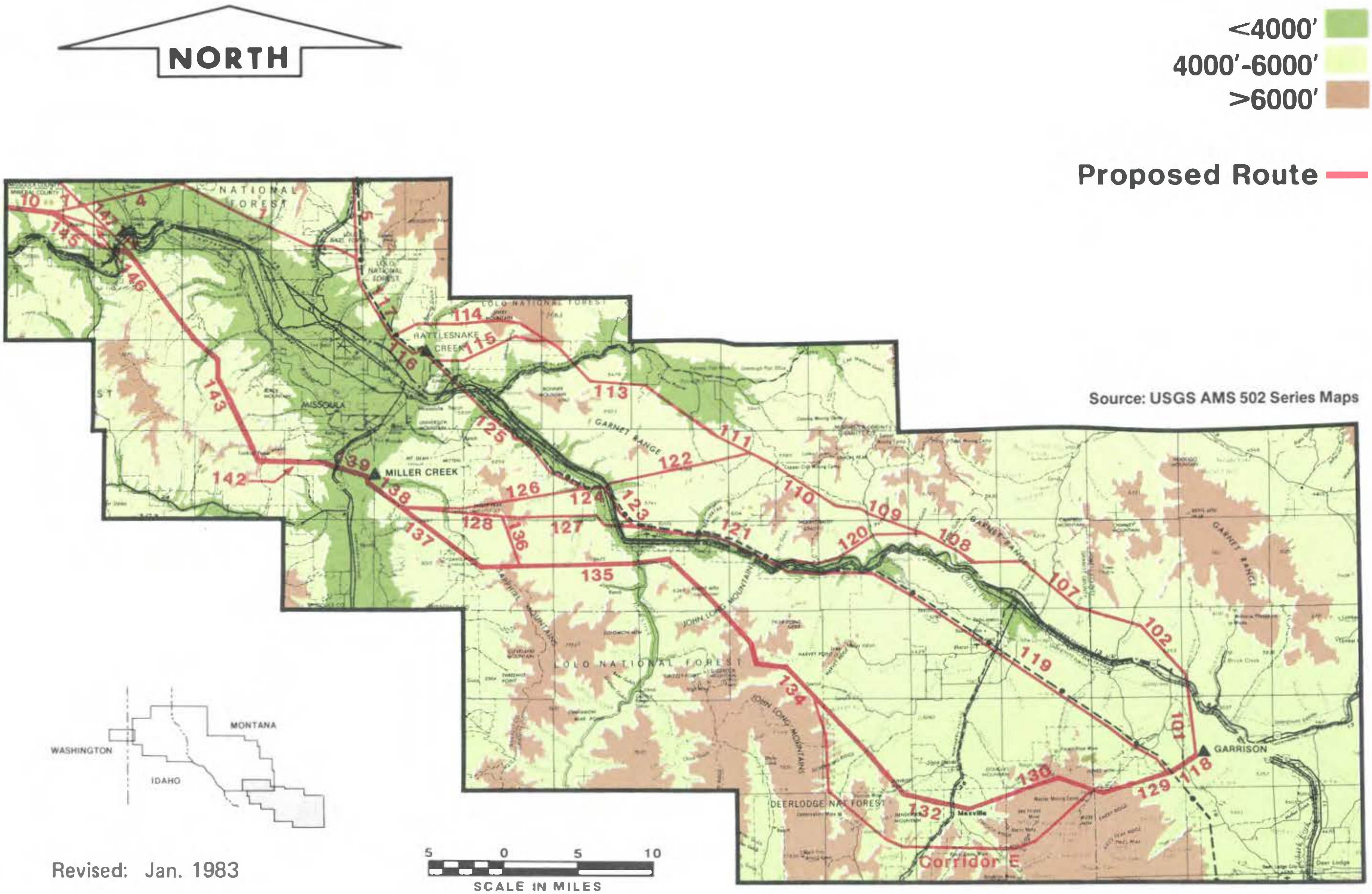


Figure 4.8
Garrison-Spokane Project
76-6

Elevation



Revised: Jan. 1983

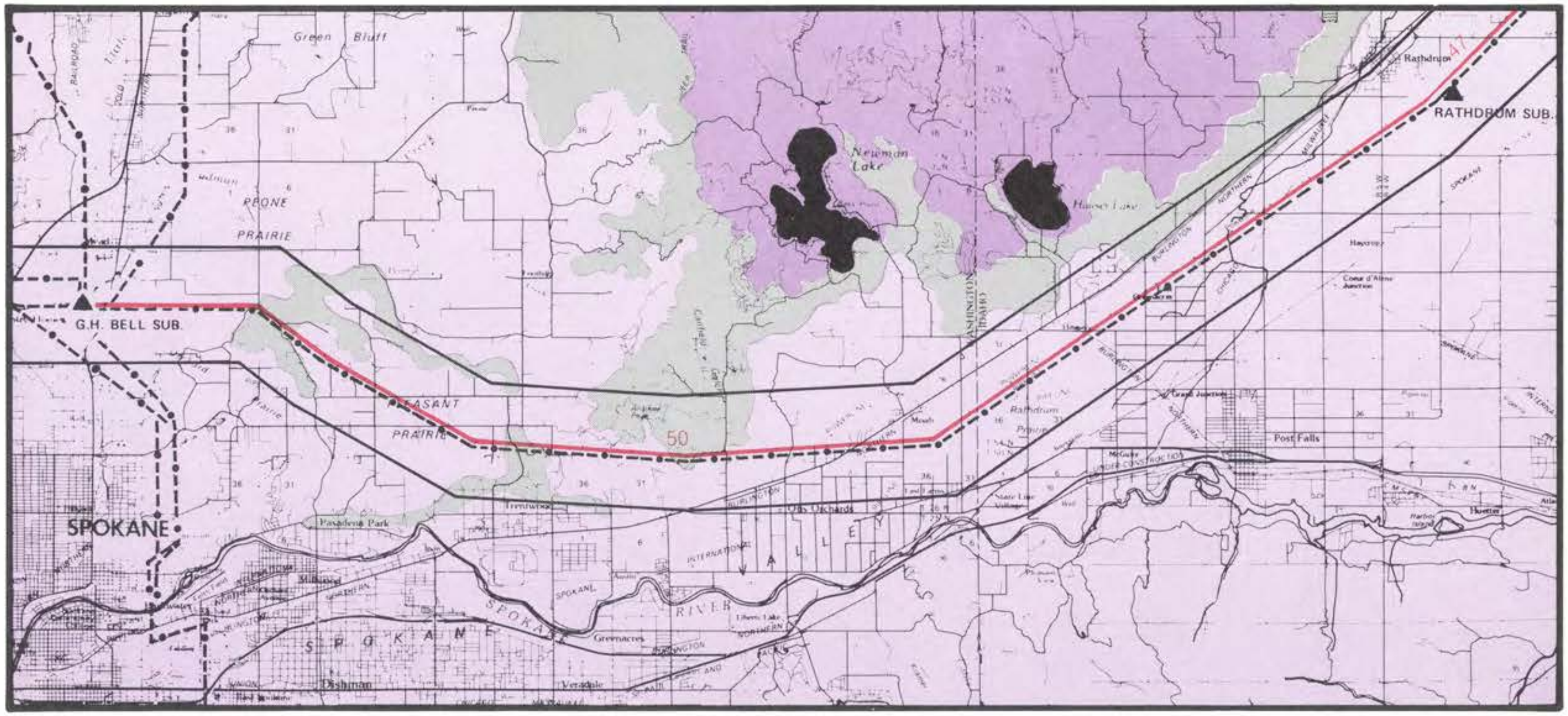
Figure 4.8
Garrison-Spokane Project
76-6

Visual Quality

High
Moderately High
Moderate

NOTE: The proposed route parallels an existing utility right-of-way from the vicinity of Chilco, Idaho, into Bell Substation. The line would be built adjacent to a BPA transmission line on an unused vacant right-of-way easement.

Source: Jones & Jones Visual Impact Studies; USFS Land Use Planning Data; USGS AMS 502 Series Maps and Raised Relief Maps



NORTH

0 1 2 3 4 5
SCALE IN MILES

Revised: Jan. 1983

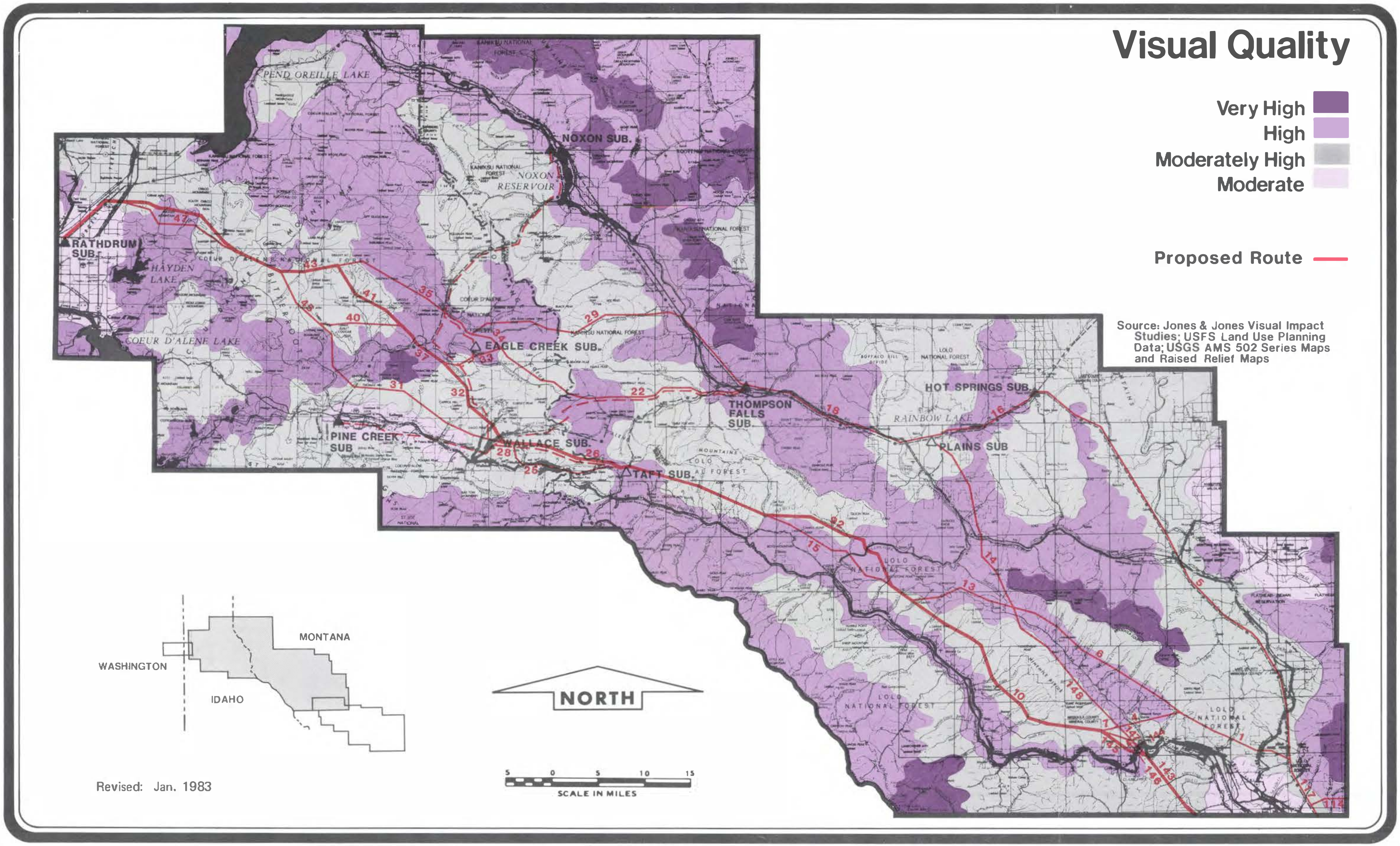
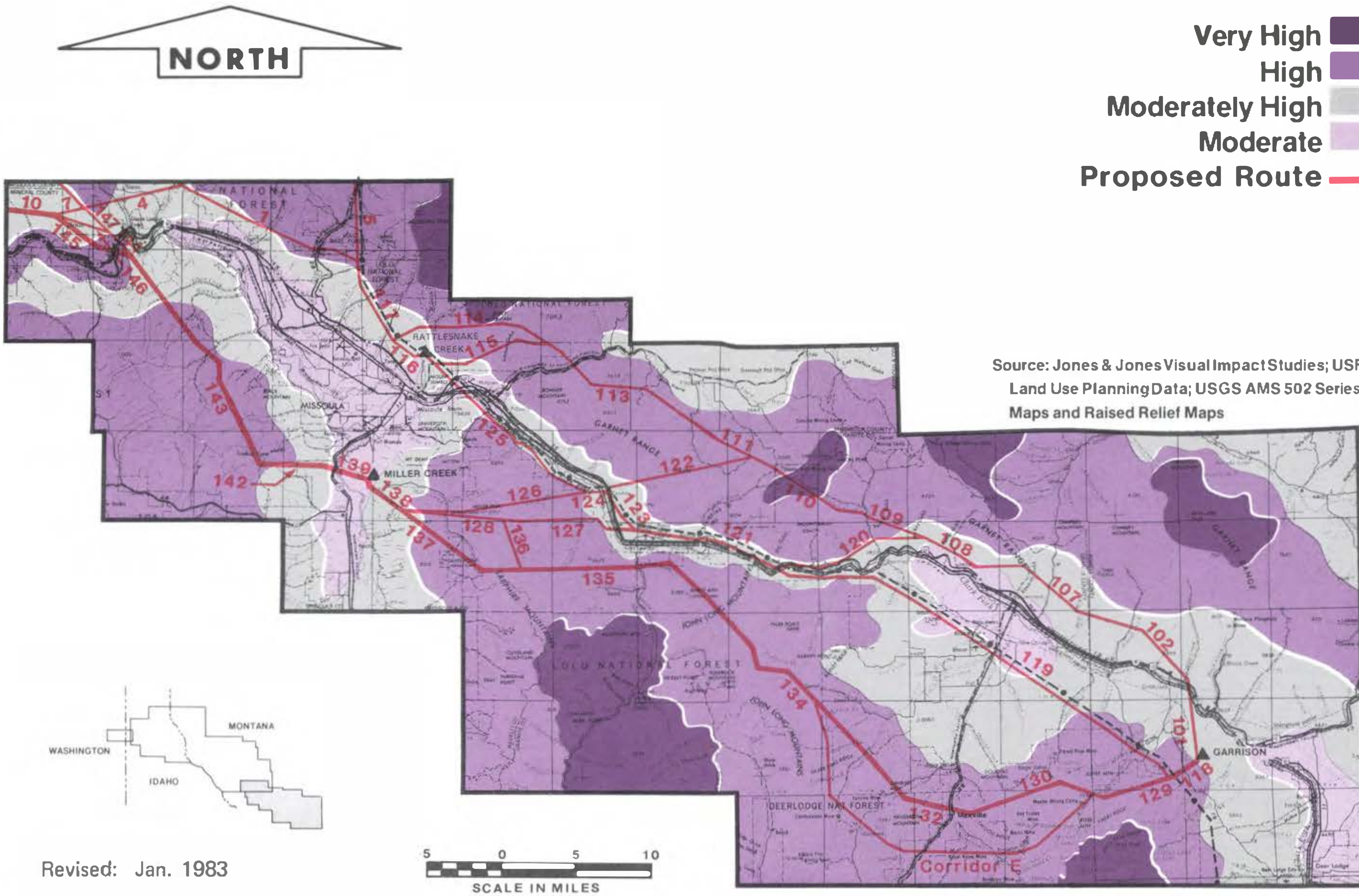


Figure 4.9
Garrison-Spokane Project

Visual Quality



Source: Jones & Jones Visual Impact Studies; USFS Land Use Planning Data; USGS AMS 502 Series Maps and Raised Relief Maps

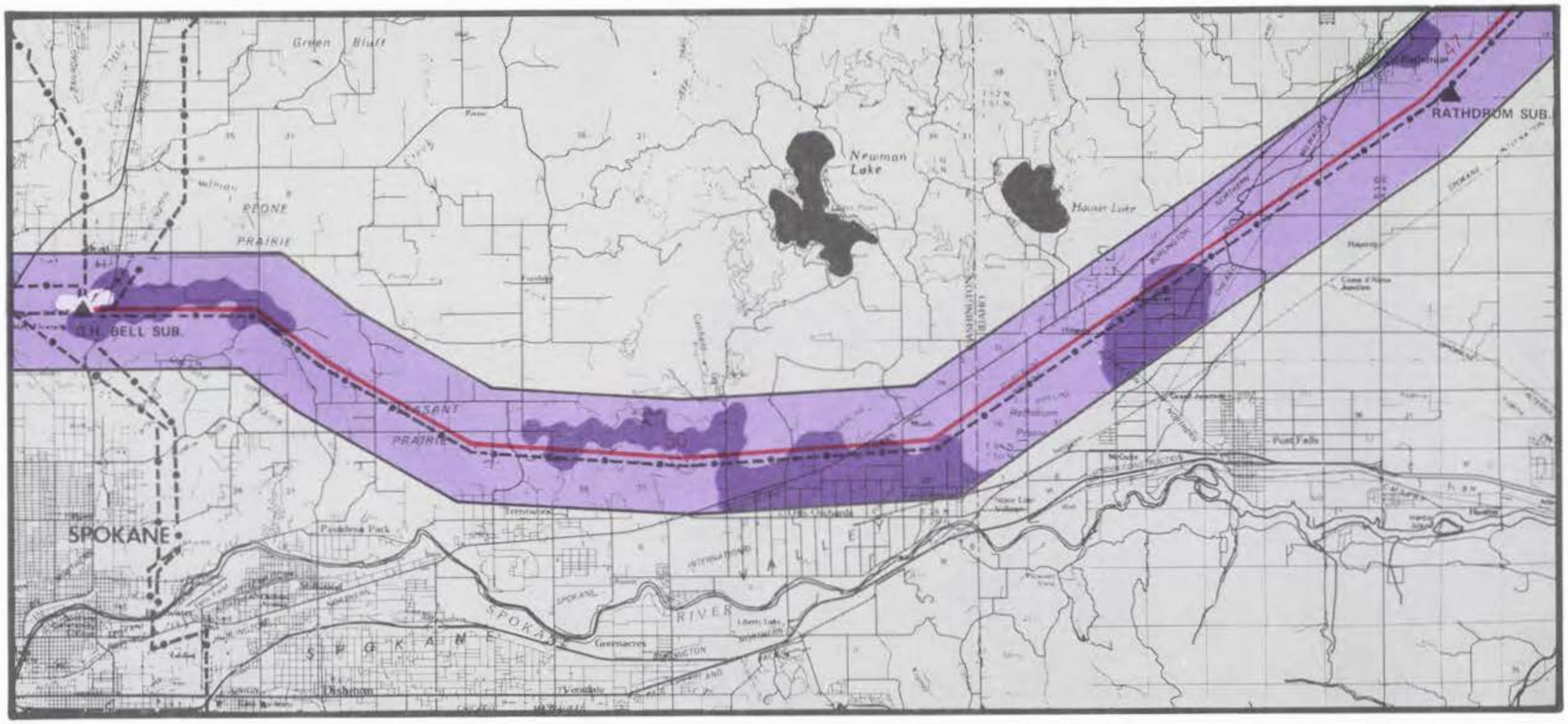
Revised: Jan. 1983

Figure 4.9
Garrison-Spokane Project
76-6

Visual: Viewer Sensitivity

High
Moderate
Low

NOTE: The proposed route parallels an existing utility right-of-way from the vicinity of Chilco, Idaho, into Bell Substation. The line would be built adjacent to a BPA transmission line on an unused vacant right-of-way easement.



NORTH

0 1 2 3 4 5
SCALE IN MILES

Revised: Jan. 1983

Figure 4.10
Garrison-Spokane Project
76-6

Visual: Viewer Sensitivity

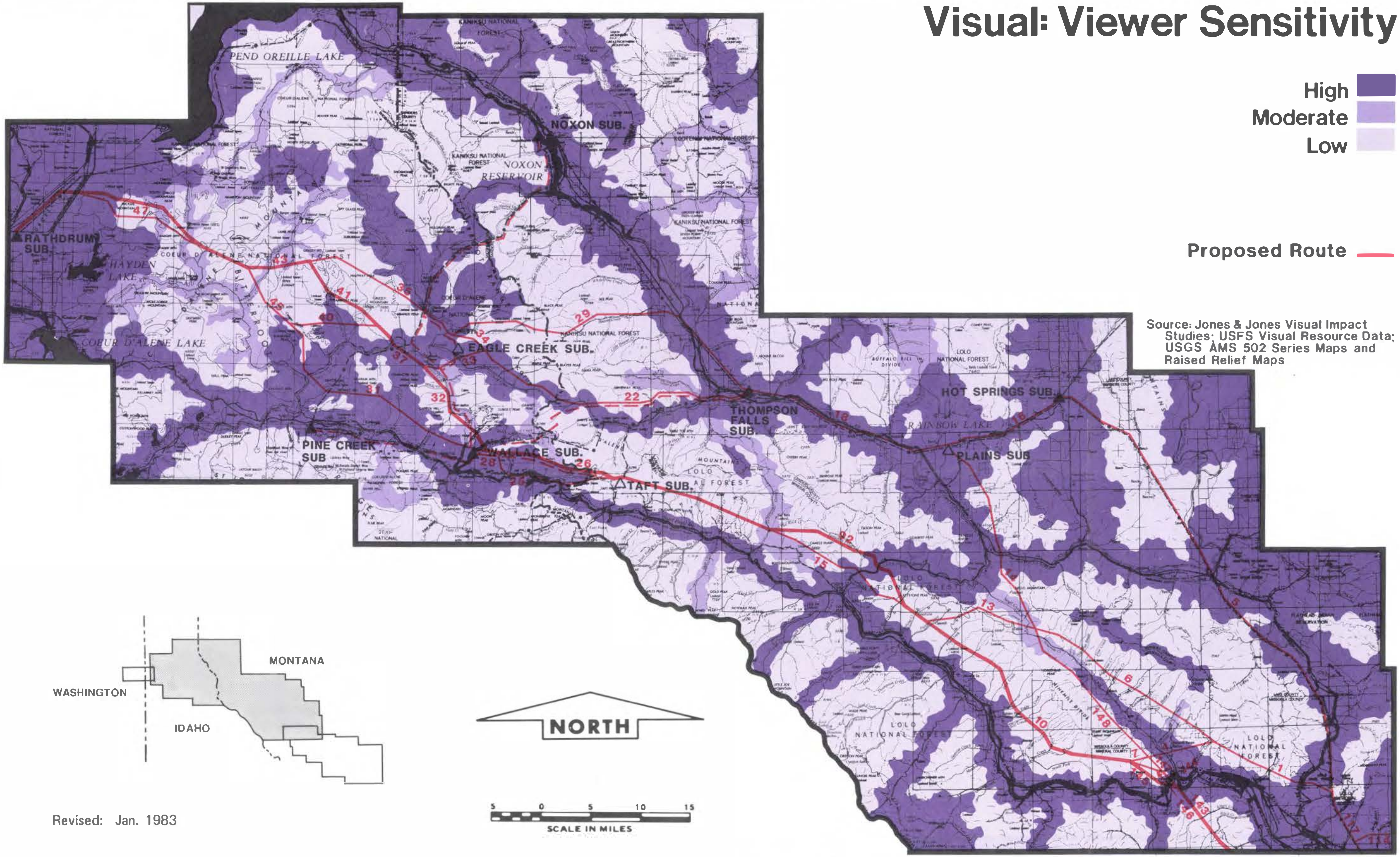


Figure 4.10

Garrison-Spokane Project

76-6

Visual: Viewer Sensitivity

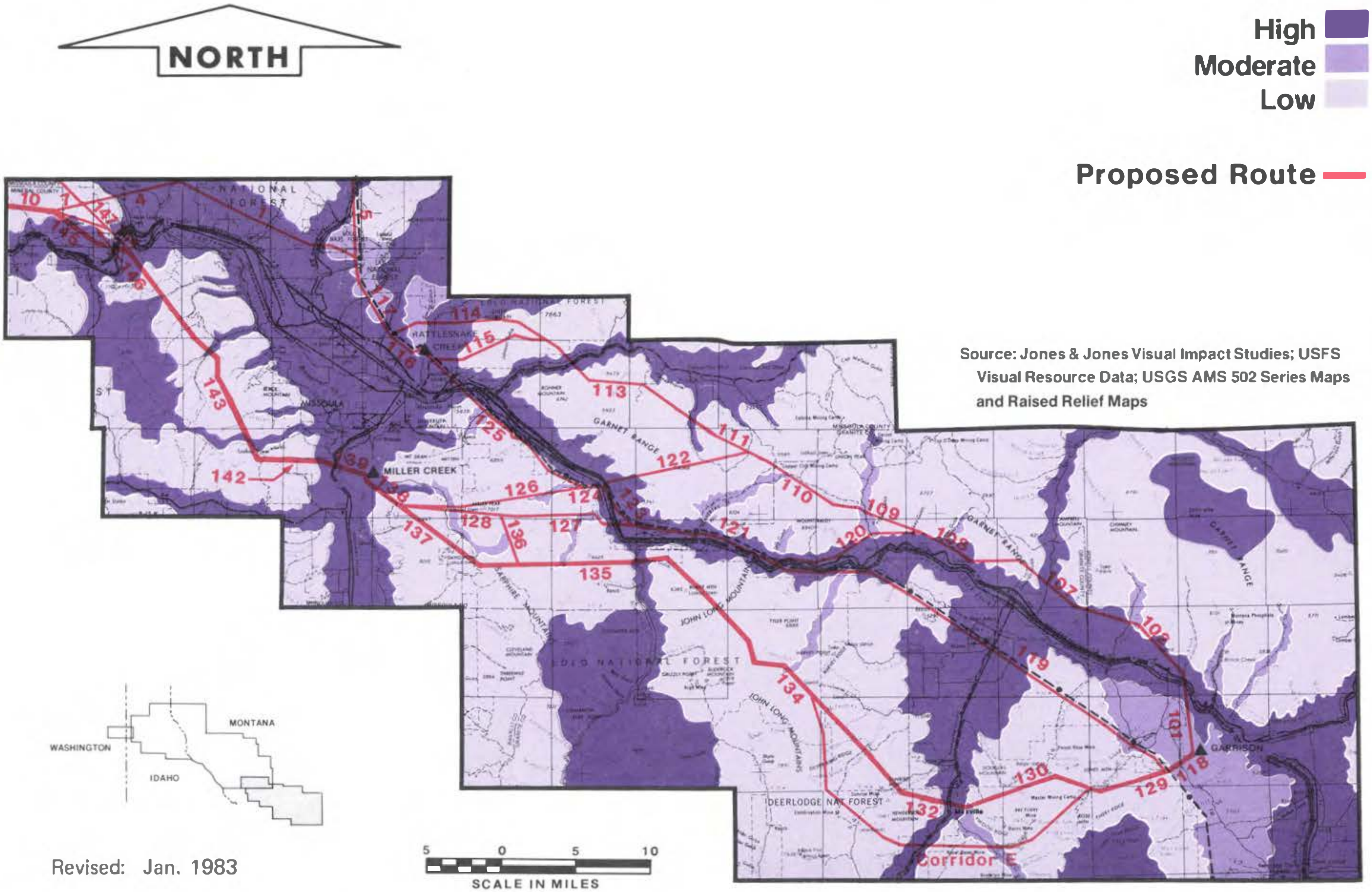
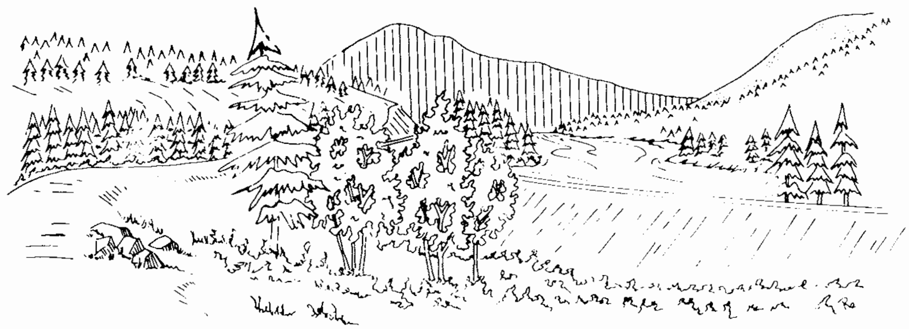
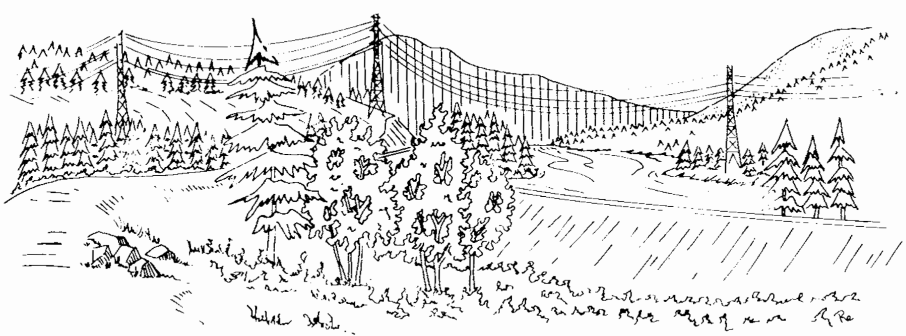


Figure 4.10



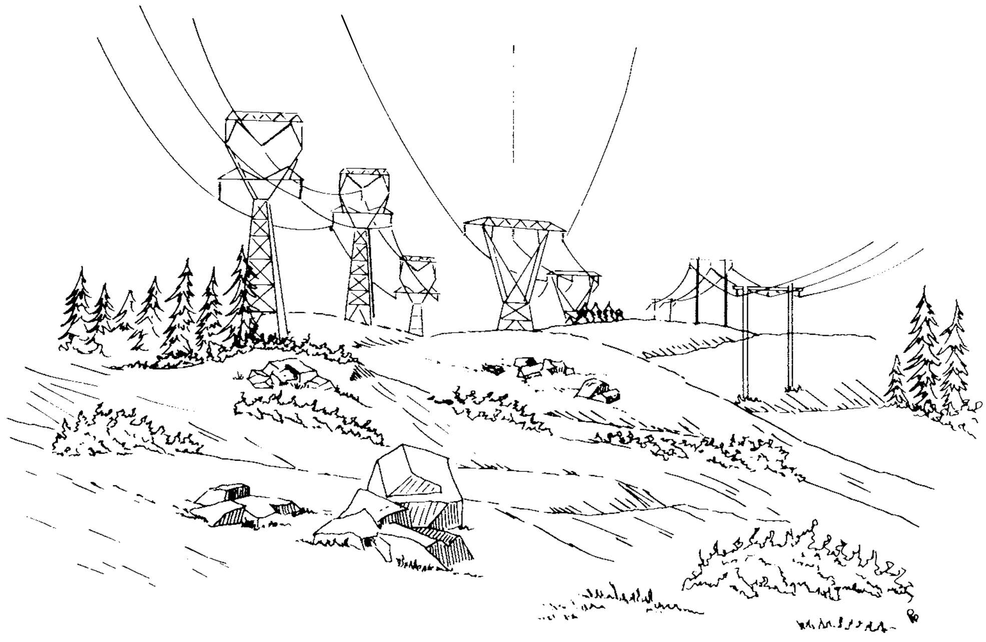
River Crossing Without Transmission Line



River Crossing With Transmission Line

Figure 4.11

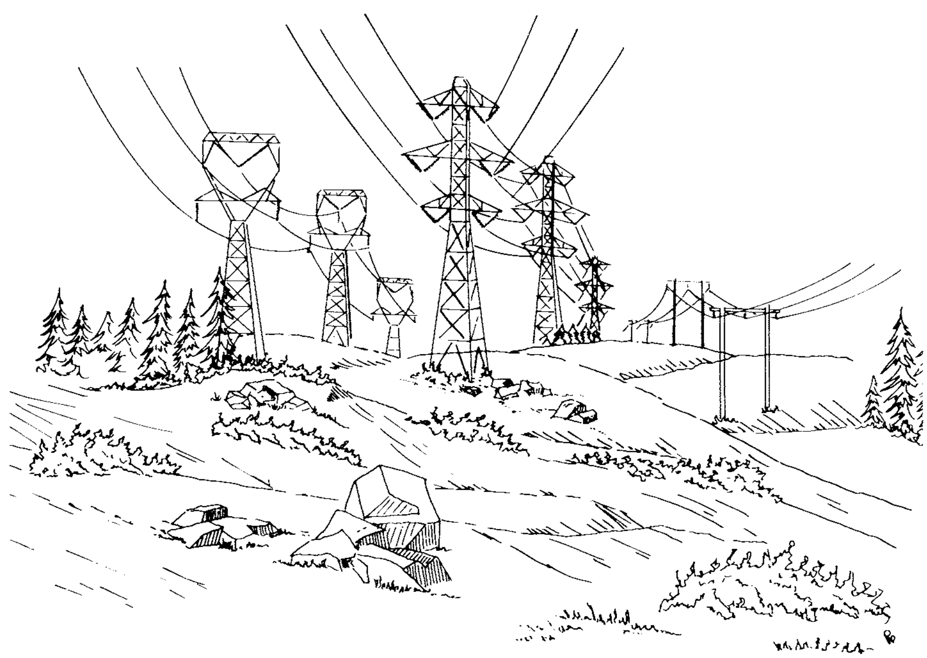
Potential River Crossing With/Without Transmission Line



Hot Springs
Dworshak 500 kV
single circuit line

Hot Springs-Bell
230-kV line

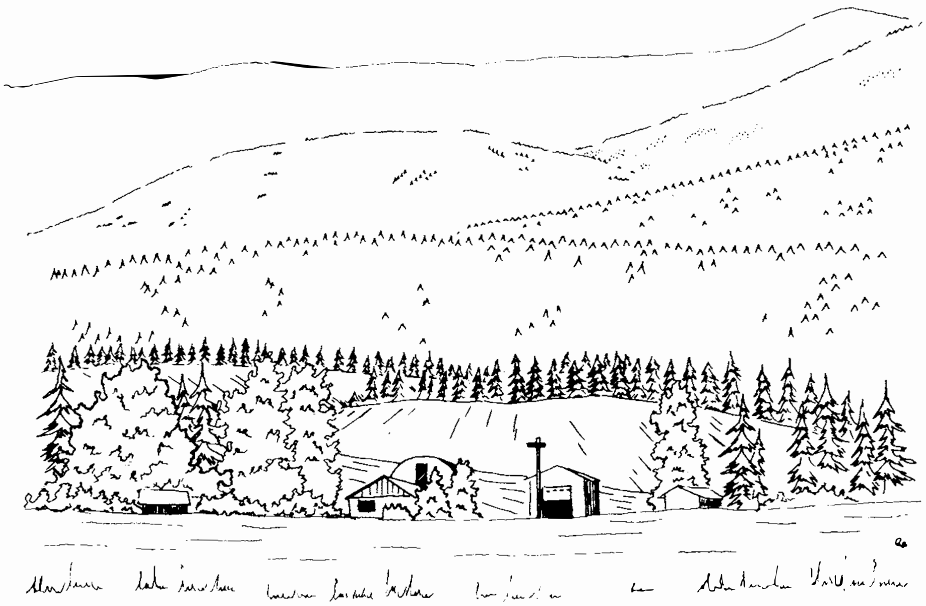
Hot Springs
Noxon (WWP)
230-kV line



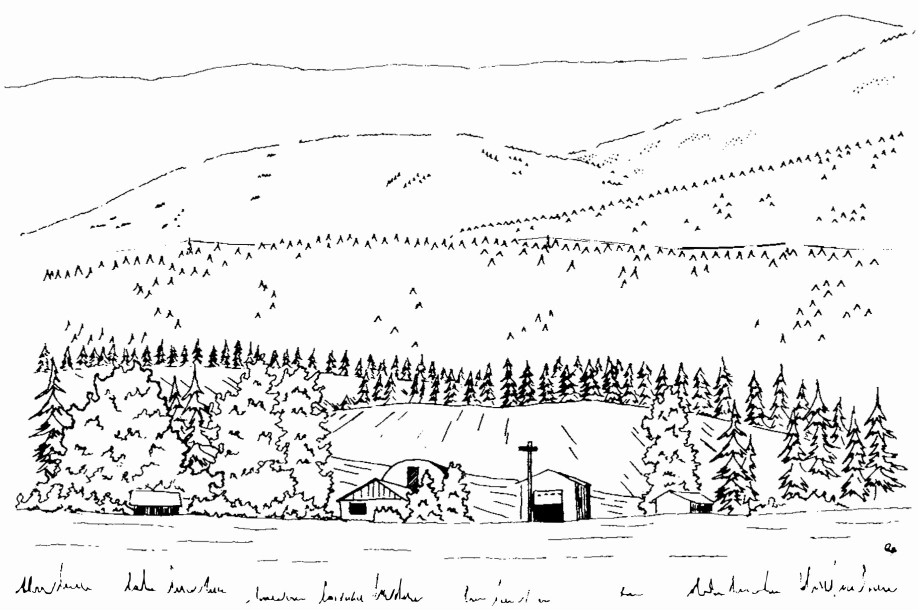
Hot Springs-Bell 230-kV replaced with 500-kV Double Circuit

Figure 4.12

Rebuild on Existing Right-of-Way, Before/After



Forested Valley/Hillside typical of study area.



Transmission line follows natural land form. Both foreground and background screening available.

Figure 4.13

Forested Area With/Without Transmission Line

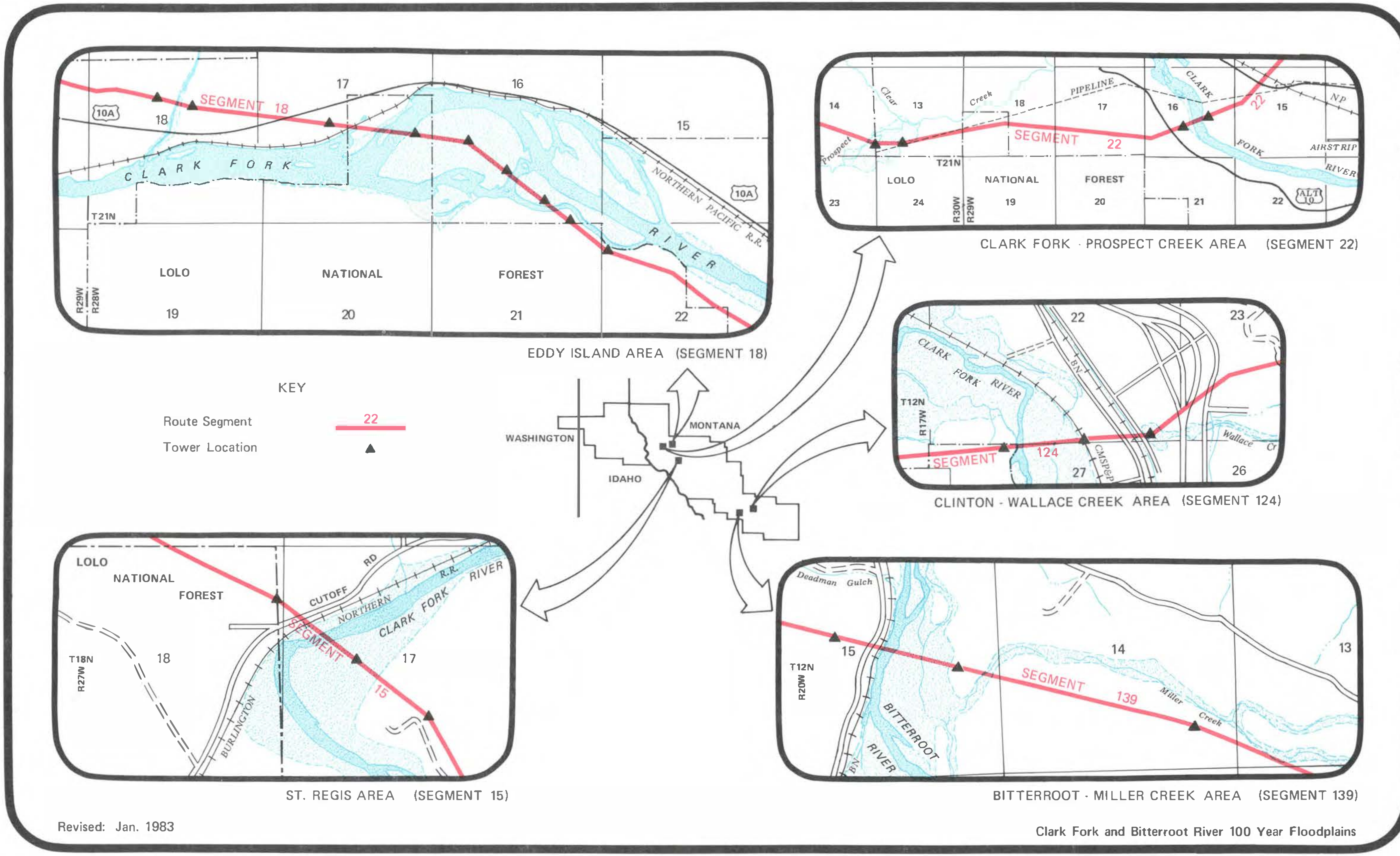


Figure 4.14
Garrison-Spokane Project

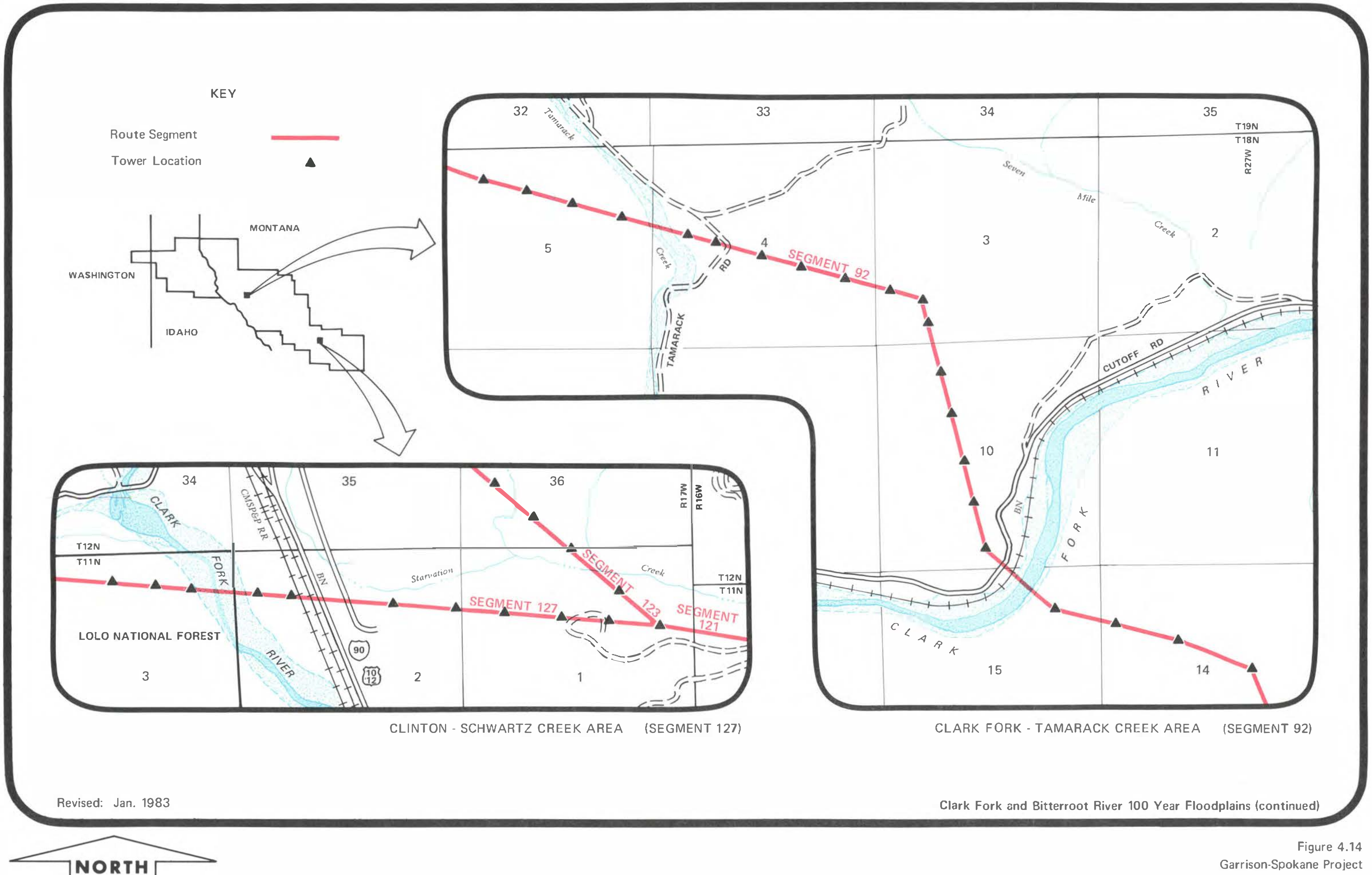


Figure 4.14
Garrison-Spokane Project
76-6

List of Preparers

LIST OF PREPARERS

MARJORIE ALLAN, Word Processing Specialist. Word processing; secretarial support. Similar duties at BPA since 1981.

ANGELO D. BECCASIO, Geologic Consultant, Dames & Moore. Photogeologic analysis for underground transmission. M.S. Geology, New York University, 1961. B.S. Geology, City College of New York, 1957. Similar duties on previous projects.

*DANIEL J. BISENIUS, Project Team Leader. Management of EIS production; data collection; impact analysis of land use, recreation, and agricultural resources; writing/editing. B.S. Geography, Portland State University, 1974, M. S. Geography, Portland State University, 1980. Eight years environmental experience at BPA as resource specialist and team leader.

*KRISTI M. BRANCH, Sociological Consultant, Mountain West Research, Inc. Socioeconomic analysis. B.A. Chemistry and English, College of Wooster, 1966. M.A. Sociology, Harvard University Graduate School of Education, 1971. Certificate of Advanced Study, Harvard University, 1972. Similar duties on past energy-related projects.

L. LINDA BURBACH, Management Assistant. Editorial review, EIS production, comment identification. Processing environmental documents with BPA's Environmental Manager's Office since 1979.

JAMES A. CHALMERS, Economic Consultant, Mountain West Research, Inc. Economic analysis. B.A. Economics, University of Wyoming, 1963. Ph.D. Economics, University of Michigan, 1969. Similar duties on past projects.

*WAYNE T. CHOQUETTE, Archeologic Consultant, Northwest Institute for Advanced Study, Eastern Washington University. Data collection; corridor archeological surveys. B.A. Anthropology, University of Calgary, 1971. M.A. Anthropology, University of Idaho, 1977. Similar responsibilities on energy-related projects since 1968.

THOMAS J. COMITTA, Methodology Consultant, Comitta Frederick Associates. Spatial resource analysis. B.S. Landscape Architecture, Pennsylvania State University, 1971. M.L.A. Harvard University, 1973. Comprehensive land use planning and impact analysis experience since 1973.

*LAURENS C. DRIESSEN, Reconnaissance Engineer. Civil engineering and route location. B.S. Civil Engineering, Oregon State University, 1970. Registered Professional Engineer - Oregon. Participant on transmission projects at BPA since 1968.

*Core EIS Team

ROBERT R. EDDY, Project Manager. Management of route location analysis; transmission engineering and economics. B.S. Civil Engineering, University of Washington, 1964. Similar responsibilities for transmission line projects with BPA since 1965.

ROBERT F. EHRHARDT, Consultant, Dames & Moore. Analysis of undergrounding transmission. M.A. Science, Technology, and Public Policy, George Washington University, 1974. B.S. Chemistry, Saint Joseph's University, 1972. Similar duties on previous research projects.

*RICHARD C. EMBREE, Project Team Member. Project scoping; data collection; route location; visual analysis. B.S. Landscape Architecture, Oregon State University, 1974. Participant on transmission EIS teams at BPA since 1974, performing visual analysis and site location work.

GARY FELTZ, Environmental Assistant. Data collection, mapping, data processing. B.S. Geography, Portland State University, 1981.

ELMER F. FISCHER, Electrical Engineer. Power system planning. B.S. Electrical Engineering, Oregon State University, 1961. System planning engineer at BPA since 1964.

*JOHN C. FISHER, Project Team Member, US Forest Service. Data collection; route location; reviewer/advisor. B.S. Forestry, University of New Hampshire, 1958. Forest management and planning since 1960; similar specialist/coordinator duties on previous energy-related projects.

CARMEN FLORES, Graphics Support. Cartography and graphics assistance. Similar duties at BPA since 1980.

CHARLES J. FREDERICK, JR., Methodology Consultant, Comitta Frederick Associates. Spatial resource analysis. B.S. Landscape Architecture, Rutgers University, 1970. M.L.A., Harvard University, 1972. Teaching, research, and impact analysis since 1977.

GUNNAR FRIDRIKSSON, Economic Consultant, Mountain West Research, Inc. Economic analysis. B.A. Economics, Adlai E. Stevenson College, University of California, Santa Cruz, 1973. M.A.. Similar duties on previous energy related projects.

MARADEL K. GALE, Socioeconomic Consultant, Mountain West Research, Inc. Community impact study. B.A. Social Science, Washington State University, 1961. M.A. Michigan State University, 1967. J. D., University of Oregon, 1974. Teaching and research in land use planning fields since 1974.

DAVID S. HARTY, Hydrologic Consultant, Dames & Moore. Surface water hydrology and hydraulic engineering for underground transmission. B.A. Mathematics and System Science, U.C.L.A., 1975. Similar duties on previous underground cable projects.

*CRAIG E. HOLSTINE, Historic Consultant, Northwest Institute for Advanced Study Eastern Washington University. Historic resource data collection and impact assessment. B.A. Political Science, Washington State University, 1975. M.A. History, Washington State University, 1978. Since 1978, similar responsibilities on other projects.

ROBERT L. HORTON, Sociologic Consultant, Mountain West Research, Inc. Sociologic analysis. B.S. University of Missouri, 1964. M.A. Western Michigan University, 1966. Ph.D. Western Michigan University, 1973. University level research and teaching of sociology.

BARBARA HULL, Word Processing Specialist. B.S. Business Administration, Portland State University, 1982. Word processing; proofreading review. Similar duties at BPA since 1979.

*MARVIN L. JEFFERS, Project Team Member. Data collection; wildlife and hydrology analysis; biological assessment. B.S. Botany, Fort Hayes Kansas State College, 1963. M.S. Plant/Wildlife Ecology, Fort Hayes Kansas State College, 1964. Resource analysis for transmission project EIS's at BPA since 1974.

FREDERICK M. KESSLER, Noise Consultant, Dames & Moore. Noise control, mechanical, and acoustical engineering for underground transmission. B.S. Mechanical Engineering, City College of New York, 1954. M.S. ELectrical Engineering, Rutgers University, 1967. Ph.D. Electrical Engineering, Rutgers University, 1971. Similar duties on previous underground transmission projects.

SUSAN J. KRAUSS, Economic Consultant, E.C. Jordan Co. Data collection; preliminary economic data collection and analysis. B.A. Economics, George Washington University, 1965. M.S. Economics, Colorado State University, 1974. Similar duties on previous projects.

CHERYL L. LAVORATO, Word Processing Specialist. Coordination of word processing; typing/secretarial support; Legal Secretary Certificate, Northwestern College of Business, 1969. Similar duties at BPA for past five years.

JACK M. LEE, JR., Project Team Member. Biological effects analysis. B.S. Wildlife Science, Oregon State University, 1971. M.S. Wildlife Management, Virginia Poly Tech., 1973. Participant on transmission EIS teams at BPA since 1973. From 1975-1980, chairman of the BPA Biological Studies Task Team, studying environmental effects of BPA transmission lines.

GLORIA J. J. LENZ, Project Team Member. Data collection; mapping. B.S. Geography, Portland State University, 1980.

WILLIAM M. LEVITAN, Biological Consultant, Dames & Moore. Aquatic ecologic assessment for underground transmission. B.S. Natural Sciences, John Hopkins University, 1975. M.S. Marine Biology, University of Delaware, 1978. Similar duties on previous underground studies.

*MICHAEL MACFADYEN, Economic Consultant, Mountain West Research Inc. Socioeconomic data collection and analysis. B.A. Geography, University of California, 1976. M.B.A. Business and Public Administration, Cornell University, 1980. Similar responsibilities on previous energy related projects since 1980.

PATRICIA MACPHERSON, Word Processing Specialist. List processing of mailing list. At BPA since 1982.

KATHRYN S. MAKEIG, Hydrogeologic Consultant, Dames & Moore. Hydrologic and geologic assessment for underground transmission. B.S. Geology, University of Michigan, 1973. M.S. Hydrogeology, University of Minnesota, 1978. Similar duties on past projects.

DAVID M. MALONEY, Underground Transmission Consultant, Dames & Moore. Analysis of underground transmission systems. B.S. Physics, Mathematics, Boston College, 1966. Ph.D., Physics, Brown University, 1971. Similar responsibilities on previous extra high voltage cable projects.

*JAY G. MARCOTTE, Project Team Member. Management of data collection and mapping; route location; urban/residential, soils/geology and vegetation analysis; writing/editing. B.S. Geography, Portland State University, 1976. Resource analysis and writing/editing for transmission project EIS's at BPA since 1975.

*ALEXINA MCCULLOUGH, Project Team Member, Bureau of Land Management. Forestry and recreation impact assessments. B.A. Sociology and Economics, University of Montana, 1950. Five years with the BLM.

ERIC ROBIN MEALE, Economic Consultant, Mountain West Research, Inc. Economic analysis. B.S. Mathematics and Economics, College of Idaho, 1973. M.S. Economics, Utah State University, 1975. Similar duties on past energy related projects.

*JAMES R. MEYER, Project Team Member. Data collection; wildlife analysis; biological assessment. B.S. Environmental Science/Wildlife Biology, Washington State University, 1976. M.S. Environmental Science/Wildlife Biology, Washington State University, 1980. Similar responsibilities at BPA since 1977.

*JUDITH H. MONTGOMERY, Editing Consultant. Writing/editing and comment identification coordination. B.A. (cum laude), English Literature, Brown University, 1966. M.A. English Literature, Syracuse University, 1969. Ph.D., American Literature, Syracuse University, 1971. Five years university level teaching; editor for BPA since 1980.

*JAMES R. MOORE, Economic Consultant, Mountain West Research, Inc. Socioeconomic data collection and impact analysis. B.A. Engineering and Applied Physics, Harvard College, 1970. M.B.A. and Master's in Regional Planning, Harvard Graduate School of Design, 1975. Similar responsibilities on previous energy related projects.

STEPHANIE F. MORROW, Land Use Planning Consultant, Dames & Moore. Transportation, socioeconomics, and land use analysis for underground transmission. B.A. Sociology, Cornell University, 1973. M.R.P. Urban Planning, Cornell University, 1975. Similar duties on prior projects.

TIMOTHY J. MURRAY, EIS Project Manager. Overall management of project environmental studies. B.S. Landscape Architecture, University of Wisconsin, 1967. M.L.A. Harvard University, 1969. Research, resource analysis, teaching; management of environmental studies at BPA since 1974.

JUDITH A. NISPEROS, Graphics Support. Cartography and graphics. Similar responsibilities on transmission EIS's with BLM and BPA since 1967.

KATHERINE S. PIERCE, Environmental Specialist. Comment identification. B.S. in Forestry and Wildlife Ecology, Rutgers College of Agriculture and Environmental Science, 1972. M.F. (Master of Forestry), Yale School of Forestry and Environmental Studies, 1975. Environmental analysis with BPA since 1981.

LEROY P. SANCHEZ, Graphics Support. Coordination of EIS graphics. Cartographic technical duties, including Federal transmisson EIS's since 1970.

STEPHEN SHERER, Project Team Member. Management of data processing. B.S. Geography, University of Oregon, 1974. Resource specialist, geographic computer application at BPA since 1975.

WAYNE A. SITKEI, Graphics Support. Cartography and graphics. B.S. Geography, Oregon State University, 1980. Interplanetary mapping with U.S.G.S.; at BPA since 1981.

*EARL O. SKOGLEY, Agriculture Consultant, Montana State University. Agriculture and soils data collection and analysis. B.S. Soils, North Dakota State University, 1955. M.S. Soil Fertility, North Dakota State University, 1957. Ph.D. Soil Fertility, North Carolina State University, 1962. Teaching and research; similar responsibilities on past EIS projects.

*PHILIP W. SMITH, Soil Science Consultant, Montana State University. Soils/Geology data collection and analysis. B.S. Agronomy, Colorado State University, 1976. M. S. Soil Science, Montana State University, 1981.

LINDA F. TAYLOR, Word Processing Specialist. Word processing/typing/ secretarial support. Similar duties at BPA since 1977.

JACK TOMASIK, Economist Consultant, Mountain West Research, Inc. Socioeconomic analysis. B.A. Case Western Reserve University, 1974. M.C.R.P. Ohio State University, 1978. Similar duties on previous energy related projects.

*RONALD W. WACHSMUTH, Project Team Member, U.S. Forest Service. Project liaison with USFS; forestry and recreation data collection and analysis. B.S. Forestry, University of Montana, 1965. Recreation analysis and environmental and land management planning with the U. S. Forest Service.

MEG WEIST, Environmental Assistant. Data collection, mapping, data processing. B.A. Valparaiso 1974.

*FRANKLIN S. WORTH, Reconnaissance Engineer. Civil Engineering/Geology. B.S. Geology, University of Oregon, 1968. B.S. Civil Engineering, Oregon State University, 1973. Registered Professional Engineer - Oregon No. 9363. Registered Professional Geologist - Oregon No. E346. Participant on transmission projects at BPA since 1973.

List of Agencies, Organizations, and Persons to Whom Copies of the Statement are Sent

Garrison-Spokane
Wg:0079H:ATS:01-31-83

LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE STATEMENT ARE SENT 1/

FEDERAL AGENCIES

U.S. Department of Agriculture

U.S. Department of Agriculture, Washington, DC
Forest Service, Washington, DC
Region 1, Missoula, MT
Region 2, Lakewood, CO
Region 6, Portland, OR
National Forests
Beaverhead National Forest, Dillon, MT
Deer Lodge National Forest, Butte, MT
Gallatin National Forest, Bozeman, MT
Kootenai National Forest, Libby, MT
Lewis & Clark National Forest, Great Falls, MT
Lolo National Forest, Missoula, MT
Panhandle National Forest, Coeur d'Alene, ID
Ranger Districts
Butte District, Butte, MT
Deer Lodge Ranger District, Deer Lodge, MT
Helena Ranger District, Helena, MT
Jefferson Ranger District, Whitehall, MT
Lincoln Ranger District, Lincoln, MT
Missoula Ranger District, Missoula, MT
Plains Ranger District, Plains, MT
Townsend Ranger District, Townsend, MT
Wallace District, Silverton, ID
White Sulphur Springs Ranger District, White Sulphur Springs, MT
Ranger Stations
Fernan Ranger Station, Coeur d'Alene, ID

1/ We are sending a letter announcing availability of the final EIS to interested persons (listed under the following headings: BUSINESS, LANDOWNERS, and INDIVIDUALS). A list of the numerous public review locations for the final EIS is included with the letter. Copies of the EIS may be requested from BPA's headquarters in Portland, Oregon, from BPA's Missoula District office, or from all other BPA offices.

Rural Electrification Administration, Washington, DC
Soil Conservation Service, Washington, DC
District Offices:
Boise, ID
Deer Lodge, MT
Missoula, MT
Plains, Mt
State Conservationist, Spokane, WA

U.S. Department of Commerce

National Oceanic & Atmospheric Administration, Rockville, MD
National Oceanic & Atmospheric Administration, Washington, DC
Joyce Wood, Chief, Ecology and Conservation Division
Weather Service, Western Region, Salt Lake City, UT

U.S. Department of the Army

Office of the Chief of Engineers, Washington, DC
Louisville District, Louisville, KY
North Pacific Division, Corps of Engineers, Portland, OR
Seattle District Corps of Engineers, Seattle, WA
Dept. of Military Affairs, Helena, MT

U.S. Department of Energy

U.S. Department of Energy, Washington, DC
Western Area Power Administration
Billings Area Office, Billings, MT
Bonneville Power Administration
Anaconda Substation, Anaconda, MT
Conkelly Substation, Columbia Falls, MT
Hot Springs Substation, Hot Springs, MT
Montana District, Missoula, MT
Federal Energy Regulatory Commission, Washington, DC
Argonne National Laboratory, Argonne, IL

U.S. Department of Health and Human Services

Office of the Secretary, Washington, DC
Public Health Service Center for Disease Control, Atlanta, GA
Regional Office, Denver, CO
Regional Office, Seattle, WA

U.S. Department of Housing and Urban Development

Office of the Secretary, Washington, DC
- Region VIII, Denver, CO
- Region X, Seattle, WA
- Service Office, Helena, MT

U.S. Environmental Protection Agency

Administrator, Washington, DC
- Area Office, Helena, MT
- Region VIII, Denver, CO
- Region X, Seattle, WA

U.S. Department of the Interior

Bureaus:
- Bureau of Indian Affairs
  - Division of Water and Land, Washington, DC
    - Area Director, Billings, MT
    - Flathead Agency, Pablo, MT
    - Flathead Irrigation Project, Polson, MT
    - Northern Idaho Agency, Lapwai, ID
    - Spokane Agency, Wellpinit, WA
- Bureau of Land Management
  - Director, Washington, DC
  - Public Affairs Office, Washington, DC
    - Area Offices:
      - Area Manager, Coeur d'Alene, ID
      - Environmental Coordinator, Billings, MT
      - Oregon/Washington, Portland, OR
      - Public Affairs Office, Billings, MT
    - District Offices:
      - Butte District, Butte, MT
      - Spokane District, Spokane, WA
    - Resource Area:
      - Headwaters Resource Area, Butte, MT
    - State Offices:
      - Idaho State Office, Boise, ID
      - State Director, Billings, MT
- Commissioner, Bureau of Reclamation, Washington, DC
  - Lower Missouri Region, Denver, CO
  - Pacific Northwest Region, Boise, ID
  - Upper Missouri Region, Billings, MT
- Director, Bureau of Mines, Washington, DC
  - Western Field Operations Center, Spokane WA

Director, National Park Service, Washington, DC
Regional Director, Denver, CO
Regional Director, Seattle, WA
Director, U.S. Fish & Wildlife Service, Washington, DC
Endangered Species Commission Library, Washington, DC
Regional Director, Denver, CO
Regional Director, Portland, OR
Area Manager, Billings, MT
Area Manager, Boise, ID
Endangered Species Coordinator, Boise, ID & Billings, MT
Ecological Services, Billings, MT
Office of Surface Mining, Reclamation and Enforcement, Washington, DC
Region V, Denver CO
U.S. Geological Survey
Central Region, Denver, CO
National Center, Reston, VA
Public Inquiries Office, Denver, CO
USGS Survey Library, Denver, CO
USGS Resource Evaluation, Albuquerque, NM
Water Resources Division, Boise, ID
Interagency Archeological Services, San Francisco, CA
Office of Environmental Project Review, Washington, DC
Office of the Secretary, Portland, OR
Office of the Secretary, Washington, DC

U.S. Department of Transportation

Federal Aviation Administration
Assistant Secretary for Environment, Washington, DC
Northwest Region, Seattle, WA
Federal Highway Administration
Division of Administration, Helena, MT
Regional Headquarters, Portland, OR
Regional Headquarters, Denver, CO

Boards, Committees, Commissions

Advisory Council on Historic Preservation, Washington, DC
Western Region, Golden, CO
Columbia River Inter-Tribal Fish Commission, Portland, OR
Federal Regional Council
Region VIII, Denver, CO
Region X, Seattle, WA
Tennessee Valley Authority, Knoxville & Norris, TN
Water Resources Council, Washington, DC

STATE GOVERNORS

Honorable Ted Schwinden, Helena, MT
Honorable John V. Evans, Boise, ID
Honorable John D. Spellman, Olympia, WA

STATE OF IDAHO

CONGRESSIONAL DELEGATION

Senator James A. McClure
Senator Steven D. Symms
Representative Larry E. Craig
Representative George Hansen

STATE SENATORS

Kermit V. Kiebert
Vernon T. Lannen
William E. Moore
Terry Sverdaten

STATE REPRESENTATIVES

Frank Findlay
Dean Haagenson
Louis J. Horvath
Hilde Kellogg
Dorothy McCann
Robert M. Scates
James F. Stoicheff

IDAHO AGENCIES

Bureau of Mines and Geology, Moscow
Department of Aeronautics and Public Transportation, Boise
Department of Fish and Game, Boise
    Regional Manager, Coeur d'Alene
Department of Health and Welfare, Coeur d'Alene
    Environmental Services-Air Quality Control, Boise
Department of Lands, Boise & Coeur d'Alene
    Regional Manager, Sandpoint
Department of Transportation, Boise & Coeur d'Alene
Department of Water Resources, Boise

Division of Financial Management, A-95 Coordinator, Boise
Division of Policy Planning and Coordination, Boise
Historical Society, Boise
Idaho State Energy Office, Boise
Military Division, Boise
Office of Energy, Boise
Public Utilities Commission
    Director of Rates & Engineering, Boise

IDAHO PLANNING BOARDS/COMMISSIONS/DEPARTMENTS/MISCELLANEOUS

Board of Commissioners, Bonner County Courthouse, Sandpoint
Board of Commissioners, Kootenai County Courthouse, Coeur d'Alene
Chamber of Commerce, Kellogg
Chamber of Commerce, Wallace
City of Hayden Lake
City of Kellogg
City of Mullan
City of Osburn
City of Rathdrum
City of Wallace
County Planning Commission, Bonner County Courthouse, Sandpoint
Kootenai County General Services Department, Coeur d'Alene
Old Mission State Park, Cataldo
Panhandle Area Council, Coeur d'Alene
Planning Department City of Coeur d'Alene
Shoshone County Planning Commission, Wallace

STATE OF MONTANA

CONGRESSIONAL DELEGATION

Senator Max Baucus
Senator John Melcher
Representative Pat Williams
Representative Ronald Marlenee

STATE SENATORS

M. K. Daniels
Michael Halligan
John E. Healy
Judy H. Jacobson
John E. Manley

George McCallum
Bill Norman
Jean A. Turnage
Fred Van Valkenburg

STATE REPRESENTATIVES

Verner L. Bertelsen
Joe Brand
Fred Daily
Ralph S. Eudaily
Joe Hammond
Stella Jean Hansen
William Ray Jensen
Mike Kadas
Daniel Kemmis
Earl C. Lory
Bob Ream
Carl A. Seifert
Chris H. Stobie
Dennis L. Veleber
Steve Waldron

MONTANA AGENCIES

Board of Natural Resources and Conservation, Charlo, Helena
    Great Falls, Greenough & Kalispell
Bureau of Mines & Geology, Billings & Butte
Department of Agriculture, Helena
Department of Community Affairs, Helena
Department of Environmental Quality, Helena
Department of Fish and Game, Helena & Missoula
Department of Fish, Wildlife and Parks
    Design and Construction Bureau, Parks Division, Helena
    Fisheries Division, Helena
    Butte
    Missoula
    Parks Division, Helena
    Wildlife Division, Helena
    Regional Coordinators:
    Superior
    Thompson Falls
    Warm Springs
Department of Health & Environmental Sciences, Helena
Department of Highways, Helena

Department of Justice, Helena
Department of Labor and Industry, Helena
Department of Natural Resources
    Director, Helena
    Energy Planning Division, Helena
    Facility Siting Division, Helena
Department of State Lands, Helena & Anaconda
Environmental Quality Council, Helena
Montana Division of Forestry, Missoula
Montana Historical Society, Helena
Montana State Prison, Deer Lodge
Office of Lieutenant Governor, Helena
Office of the Governor
    Office of Budget and Program Planning, Helena
Office of the Secretary of State, Helena
Public Service Commission, Helena & Missoula
University Affiliates:
    Cooperative Fishery Unit, Montana State University, Bozeman
    Cooperative Wildlife Research Unit, University of Montana, Missoula
    Sanders County Extension Agent, Thompson Falls
    Statewide Archaeological Survey, University of Montana, Missoula

MONTANA PLANNING BOARDS/COMMISSIONS/DEPARTMENTS/MISCELLANEOUS

Alberton School, Alberton
Anaconda-Deer Lodge County Planning Board, Anaconda
Billings Area Chamber of Commerce
Butte-Silver Bow Government, Butte
Butte-Silver Bow Planning Board, Butte
Deer Lodge County Commission, Anaconda
Flathead County Areawide Planning Organization, Kalispell
Flathead County Board of Commissioners, Kalispell
Flathead Planning Project, Pablo
Granite County Commissioners, Philipsburg & Drummond
Granite County Planning Board, Philipsburg
Helena/Lewis & Clark Consolidated Planning Board, Helena
Jefferson County Commissioners, Boulder
Jefferson County Planning Board, Boulder
Joint School District #2, Alberton
Lake Board of County Commissioners, Polson
Lake County Planning Board, Polson
Mayor of Alberton
Mayor of Missoula
Mayor of Superior
Mayor of Thompson Falls

Mineral County Assessor, Superior
Mineral County Attorney, Superior
Mineral County Board of County Commissioners, Superior
Mineral County Commissioner, Superior
Mineral County Commissioner, Alberton
Mineral County Planner, Superior
Mineral County Planning Board, Superior
Mineral County Planning Office, Superior
Mineral County Planning Board, St. Regis
Mineral County Public Health, Superior
Missoula Area Chamber of Commerce, Missoula
Missoula City-County Health Department, Missoula
Missoula County Attorney's Office, Missoula
Missoula County Board of Commissioners, Missoula
Missoula County Commissioners, Missoula
Missoula County Planning Board, Missoula
Missoula Planning Office, Missoula
Missoula Rural Fire District, Missoula
Montana Association of Counties, Helena
Montana Chamber of Commerce, Helena
Powell County Commissioners, Deer Lodge
Powell County High School, Deer Lodge
Powell County Planning Board, Deer Lodge
Powell County Planning Office, Deer Lodge
Sanders County Board of Commissioners, Thompson Falls
Sanders County Chamber of Commerce, Plains
Sanders County Planning Board, Thompson Falls
School District #3, Superior
Sheriff, Superior
Superior Chamber of Commerce
Thompson Falls City Planning Board, Thompson Falls
Thompson Falls-Trout Creek-Noxon Chamber of Commerce, Thompson Falls
Town of Drummond
Town of Superior

STATE OF OREGON

OREGON AGENCIES

Department of Environmental Quality, Portland
Intergovernmental Relations Division, Salem
Metropolitan Service District, Portland
Oregon Department of Energy, Salem

STATE OF WASHINGTON

CONGRESSIONAL DELEGATION

Senator Slade Gorton
Senator Henry M. Jackson
Representative Don Bonker
Representative Norman D. Dicks
Representative Thomas S. Foley
Representative Mike Lowry
Representative Sid Morrison
Representative Jack Pritchard

STATE SENATORS

Scott Barr
Dick Bond
Louis M. Egger
Steve Fuhrman
James E. West

STATE REPRESENTATIVES

Richard Barrett
Dennis A. Dellwo
Mike Paddem
Jean Silver
Lois Stratton
Ken Taylor

WASHINGTON AGENCIES

Department of Ecology, Olympia & Spokane
Department of Game, Olympia
    Region 1, Spokane
Department of Natural Resources, Olympia
Department of Transportation, Olympia & Spokane
Office of Archaeology & Historic Preservation, Olympia
Office of Community Development, Olympia
Office of the Governor, Olympia
Vera Irrigation District #15, Veradale

Garrison-Spokane
Wg:0079H:ATS:01-31-83

WASHINGTON PLANNING BOARDS/COMMISSIONS/DEPARTMENTS/MISCELLANEOUS

City of Spokane, Planning Commission
Energy Facility Site Evaluation Council, Olympia
Mayor of Spokane
Planning & Community Affairs Agency, Olympia
Spokane Area Chamber of Commerce
Spokane Area Development Council
Spokane City & County Council for Land Care & Planning, Mead
Spokane County Commissioners
Spokane County Engineering Department
Spokane County Planning Department
Spokane Regional Planning Conference
Spokane Valley Chamber of Commerce
State Conservation Commission, Olympia
State Parks & Recreation Commission, Olympia
Utilities & Transportation Commission, Olympia

COLLEGES/UNIVERSITIES/SCHOOLS

Eastern Washington State University, Cheney, WA
Idaho State University, Pocatello, ID
Miles City Community College, Miles City, MT
Montana State University, Bozeman, MT
    Agricutural Experiment Station
    Department of Biology
    Department of Planting and Soils
    Department of Agricultural Economics
    Research Administration
    Water Resources Center
Northern Montana College, Havre, MT
Oregon State University, Corvallis, OR
Pennsylvania State University, University Park, PA
Rachel Carson College, Amherst, NY
University of Idaho, Moscow, ID
University of Montana, Missoula, MT
    Cooperative Wildlife Research Unit
    Department of Anthropology
    Department of Botany
    Department of Geology
    Department of Sociology
    School of Forestry
    School of Law

University of Northern Iowa, Cedar Falls, IA
University of Wisconsin, Madison, WI
Washington State University, Archaeology Research Center, Pullman, WA

LIBRARIES

Boise Public Library, Boise, ID
Boise State University Library, Boise, ID
Boulder Community Library, Boulder, MT
Butte Free Public Library, Butte, MT
Carroll College Library, Helena, MT
College of Idaho Terteling Library, Caldwell, ID
College of Southern Idaho Documents Library, Twin Falls, ID
Colorado State University Library, Fort Collins, CO
Drummond Public Library, Drummond, MT
Eastern Montana College Library, Billings, MT
Eastern Washington State College Library, Cheney, WA
Great Falls Public Library, Great Falls, MT
Hot Springs Public Library, Hot Springs, MT
Idaho State Library, Boise, ID
Lewis & Clark Library, Helena, MT
Library Association of Portland, Portland, OR
Mineral County Public Library, Superior, MT
Missoula City-County Library, Missoula, MT
Montana College of Mineral Sciences & Technology Library, Butte, MT
Montana Historical Society Library, Helena, MT
Montana State Library, Helena, MT
Montana State University Library, Bozeman, MT
Northern Montana College, Havre, MT
Oregon State Library, Salem, OR
Parmly-Billings Library, Billings, MT
Plains Public Library, Plains, MT
Polson City Library, Polson, MT
Portland State University Library, Portland, OR
Ricks College, David O. McKay Library, Rexburg, ID
Ronan City Library, Ronan, MT
Seattle Public Library, Seattle, WA
Spokane Public Library, Spokane, WA
Thompson Falls Public Library, Thompson Falls, MT
University of Idaho Library, Moscow, ID
University of Montana Environmental Library, Missoula, MT
University of Montana Library, Missoula, MT
University of Washington School of Law Library, Seattle, WA
Washington State University Library, Pullman, WA
William K. Kohrs Memorial Library, Deer Lodge, MT

Garrison-Spokane
Wg:0079H:ATS:01-31-83

INDIAN TRIBES

Conferederated Salish & Kootenai Tribes of the Flathead Reservation, Pablo, MT
Conferederated Salish & Kootenai Tribes of the Flathead Reservation, Ronan, MT
Kootenai Tribe of Idaho, Bonners Ferry, ID
Spokane Tribe of Indians, Wellpinit, WA

NEWSPAPERS

Associated Press, Helena, MT
Billings Gazette, Billings, MT
Borrowed Times, Missoula, MT
Boulder Monitor, Boulder, MT
Char-Koosta, Flathead Subagency, Pablo, MT
Coeur d'Alene Press, Coeur d'Alene, ID
Daily Inter-Lake, Kalispell, MT
Flathead Courier, Polson, MT
Independent Record, Helena, MT
Issues and Ideas, Kalispell, MT
Kaimin, Missoula, MT
Kellogg Evening News, Kellogg, ID
Kellogg News Wardner, Kellogg, ID
Kootenai County Leader, Coeur d'Alene, ID
Lee Newspapers, Helena, MT & Missoula, MT
MTN News, Butte, MT
Mineral Independent, Superior, MT
Mission Valley News, St. Ignatious, MT
Montana Maverick, Clancy, MT
Montana Standard, Butte, MT
North Idaho Press, Wallace, ID
North Idaho Publishing Company, Wallace, ID
Plainsman, Plains, MT
Robert N. Gilbert, Editor, Helena, MT
Ronan Pioneer, Ronan, MT
Sanders County Ledger, Thompson Falls, MT
Spokesman Review, Spokane, WA
The Anaconda Leader, Anaconda, MT
The Missoulian, Missoula, MT
The Philipsburg Mail, Drummond & Philipsburg, MT
The Silver State Post, Deer Lodge, MT
The Spokane Daily Chronicle, Spokane, WA
Townsend Star, Townsend, MT
Tri City Herald, Hermiston, OR

Tribune Capitol Bureau, Helena, MT
U.P.I., Helena, MT & Spokane, WA
Western Livestock Reporter, Billings, MT
Westmont Word, Helena, MT

RADIO/TV

KANA Radio Station, Anaconda, MT
KARR Radio, Great Falls, MT
KBLL Radio, Helena, MT
KBOW Radio, Butte, MT
KCAP Radio, Helena, MT
KDRG Radio, Deer Lodge, MT
KECI-TV, Missoula, MT
KERR Radio, Polson, MT
KGRZ-AM, Missoula, MT
KGVO Radio, Missoula, MT
KHQ Radio, Spokane, WA
KHQ-TV, Spokane, WA
KHTC-FM, Radio Station, Helena, MT
KPAX-TV, Missoula, MT
KREM-TV 2, Spokane, WA
KTCM-TV, Helena, MT
KTVG-TV, Helena, MT
KTVM/WMN, Butte, MT
KUFM Radio, Missoula, MT
KURL-TV, Billings, MT
KVNI Radio, Coeur d'Alene, ID
KWAL Radio, Osburn, ID
KXLF Radio, Butte, MT
KXLY Radio, Spokane, WA
KXLY-TV, Spokane, WA
KYLT-AM/FM, Missoula, MT
KYSS Radio, Missoula, MT

UTILITIES

Basin Electric Power Corporation, Bismarck, ND
Citizens Utility Company, Wallace, ID
Flathead Electric Co-op. Inc., Kalispell, MT
Glacier Electric Co-op. Inc., Cut Bank, MT
Inland Power & Light Company, Spokane, WA
Kootenai Electric Co-op. Inc., Hayden Lake, ID
Lincoln Electric Co-op. Inc., Eureka, MT
Los Angeles Department of Water & Power, Los Angeles, CA

Missoula Electric Co-op. Inc., Missoula, MT
Montana Associated Utilities, Great Falls, MT
Montana Power Company, Butte, Colstrip, Missoula, & Helena, MT
Mountain Bell, Helena, MT
Northern Lights, Inc., Sandpoint, ID
Pacific Power & Light Company, Portland, OR
Puget Sound Power & Light Company, Bellevue, WA
Ravalli County Electric Co-op., Corvallis, MT
The Washington Water Power Company, Spokane, WA; Mead, WA; Kellogg, ID; & Coeur d'Alene, ID
Upper Missouri Electric Generation & Transmission Cooperative, Sidney, MT
Utility Data Institute, Inc., Washington, DC
Vigilante Electric Co-op. Inc., Dillon & Townsend, MT
Western Energy Company, Billings & Colstrip, MT
Yellowstone Pipeline Company, Billings, MT

BUSINESSES

Aerospace Corp., Washington, DC
Allan & Shelley, Missoula, MT
Arco Aluminum, Columbia Falls, MT
B & J Construction Company, St. Regis, MT
B & S Enterprises, Clinton, MT
Battelle Pacific Northwest Laboratories, Richland, WA
Bearmouth Land & Cattle Company, Missoula, MT
Bechtel Power Corporation, San Francisco, CA
Big Horn Ranch Property Owners, Missoula, MT
Black Pine Mining Company, Philipsburg, MT
Boulder Creek, Inc., Dillon, MT
Broken Heart Guest Ranch, Haugan, MT
Brownell Insulation, Bozeman, MT
Business SPC 12A, Lakeside, CA
COMINCO American, Garrison, MT
Cabinet Mountain Outfitters, Plains, MT
Cant Dresser & McKee, Wheat Ridge, CO
Carl Nelson Ranch, Drummond, MT
Carpenter's Local 28, Missoula, MT
Castle Mountain Ranch, Deer Lodge, MT
Cavanaugh Martin & Associates, Missoula, MT
Cee Jay Frederick Associates, West Chester, PA
Champion International, Bonner & Milltown, MT
Champion Timberlands, Missoula, Plains, & Thompson Falls, MT
Charles T. Main, Inc., Portland, OR
Coeur d'Alene Mining Company, Wellesley Hills, MA
D & N Mining, Clancy, MT

Garrison-Spokane
Wg:0079H:ATS:01-31-83

Deer Lodge Wood Products, Deer Lodge, MT
Diamond International, Superior, MT
Dutton Hereford Ranch, Goldcreek, MT
Ecology & Environment, Inc., Buffalo, NY
El Gordos, Inc., Missoula, MT
Electric Power Research Institute, Palo Alto, CA
Emerick Construction Co., Portland, OR
Energy Impact Association, Pittsburgh, PA
Energy Research Associates, Milwaukee, WI
Engineering Science, Denver, CO
Enman and Nakken, Drummond, MT
Environmental Impact Services, Tucson, AZ
Environmental Management Services Co., Ft. Collins, CO
Environmental Science and Engineering, Inc.,
Tampa & Gainesville, FL & St. Louis, MO
Envirosphere, Santa Ana, CA & Bellevue, WA
Fidelity Real Estate, Missoula, MT
Flansburg Ranch Company, Clinton, MT
Floyd C. Bossard & Associates, Butte, MT
Forest Products Company, Kalispell, MT
Forest Rose Corporation, New Wilmington, PA
Francisco Pharmacy & Gift Shop, Townsend, MT
G.R. Kirk Company, Puyallup, WA
HKM Associates, Billings, MT
Harding & Muller, Claremont, CA; Missoula & Pablo, MT
Headwaters R.C. & D., Butte, MT
Hecla Mining Company, Wallace, ID
Historical Research Associates, Missoula, MT
Holland Oil Company, Plains, MT
Independence Lead Mines Inc., Spokane, WA
Information on Demand, Berkeley, CA
Iver Johnson Ranch, Philipsburg, MT
J & J Enterprises, Missoula, MT
J & P Ranch Company, Helena, MT
Jensen Ranch Company, Hall, MT
John Marywell Company, Hall, MT
Johnson Brothers Construction, Frenchtown, MT
Johnson Tuning Fork Ranch, Hall, MT
Joseph Industries, Missoula, MT
Kimpton Ranch Company, Toston, MT
L. Dyer & Sons, Inc., Drummond, MT
Ladner Environmental, British Columbia, Canada
Lakefront Investments, Polson, MT
Lambros Realty, Missoula, MT
Lane Ranch Company, Hall, MT

Garrison-Spokane
Wg:0079H:ATS:01-31-83

Lane Ranch, Philipsburg, MT
Lawyer Nursery, Plains, MT
Lefever Land Company, Inc., Aurora, CO
Long Machinery, Butte, MT
Lynch Creek Vet Clinic, Plains, MT
Lyon Ranch Company, Drummond, MT
Madsen Smith Partnership, Tempe, AZ & Missoula, MT
Maloney Ranch Corporation, Missoula, MT
Maxville Mining Company, Billings, MT
Midwest Environmental Services, Grand Forks, ND
Morrison Knudsen Company, Inc., Boise, ID
Multitech, Inc., Butte MT
Needlegun Mine, Butte, MT
Nelson Ranch, Drummond, MT
O Bar E Ranch, Drummond, MT
OPR ENG Local 400, Missoula, MT
Open Cross Ranch Company, Hall, MT
Palin Ranch Enterprises, Lolo, MT
Pilgeram Ranches, Goldcreek, MT
Poor Henry's Bar, Clinton, MT
Power Engineers, Hailey, ID
Ranko International, New York, NY
Reese Brothers, Kelso, WA
Rivercrest West Ranch, Inc., Toledo, OH
Robinson Family Trust, Claremont, CA
Rodeo Ranch No. 6, Missoula, MT
Round Grove Ranch, Townsend & Helena, MT
Sammons Trucking Company, Plains, MT
Sexton Trucking, Townsend, MT
Skinner Ranch, Hayden Lake, ID
Sorenson & Company, Missoula, MT
Southern Cross Engineering & Construction, Butte, MT
Stauffer Chemical Company, Butte, MT
Steinbrenner Company, Missoula, MT
Thompson Falls Vet Clinic, Thompson Falls, MT
Timberland Resources, Inc., Spokane, WA
Universal Field Services, Billings, MT
Valley Mining Company, Drummond, MT & Milwaukee, WI
Van Isko Ranches, Deer Lodge, MT
Washington Corporation, Missoula, MT
Weaver Ranch, Clinton, MT
West End Repair, Drummond, MT
Western Analysis, Helena, MT
Western Forest Industries Association, Portland, OR
Western Interstate Energy Board, Denver, CO

Wilkinson, Cragun & Barker, Washington, DC
Williams Construction Company, Helena, MT
Wills Cattle Company, Bonner, MT
Wirth Associates, Phoenix, AZ

RAILROADS

Burlington Northern Timberlands, Inc., Missoula, MT
Burlington Northern, Billings & Missoula, MT

INTEREST GROUPS

American Fisheries Society, Missoula, MT
Anaconda Sportsmen's Club, Anaconda, MT
Audubon Society, Spokane, WA & New York, NY
Basic Power Alliance, Missoula, MT
Security Agency Inc., Board of Realtors, Missoula, MT
California Energy Commission, Sacramento, CA
Clark Fork Basin Protective Association, Missoula, MT
Clearwater Economic Development Association, Moscow, ID
Common Cause, Portland, OR
Deer Lodge Valley Resource Association, Deer Lodge, MT
Ecology & Environment, Buffalo, NY
Elk Unlimited, Coeur d'Alene & Osborn, ID
Environmental Defense Fund, New York, NY
Environmental Information Center, Helena, MT
Environmental Quality Council, Helena, MT
Federation of Western Outdoor Clubs, Columbia Falls, MT
Fire Valley Appaloosa Club, Missoula, MT
Flathead Citizens for Safe Energy, Whitefish, MT
Flathead Resource Organization, St Ignatius, MT
Flathead River Basin Study, Kalispell, MT
Friends of the Earth, Santa Cruz & San Francisco, CA
Friends of the Rattlesnake, Missoula, MT
Granite County Alliance, Hall, Maxville, & Philipsburg, MT
Idaho Citizens Coalition, Boise, ID
Idaho Conservation League, Boise, ID
Idaho Environmental Council, Idaho Falls, ID
Idaho Pine Timber Association, Wilsonville, OR
Idaho State Grange, Meridian, ID
Idaho Wildlife Federation, Coeur d'Alene, ID
Inland Forest Resource Council, Missoula, MT
Kootenai Environmental Alliance, Coeur d'Alene, ID
Lincoln Hills Homeowners, Missoula, MT
Miller Creek Landowners Association, Missoula, MT

Garrison-Spokane
Wg:0079H:ATS:01-31-83

Montana 4 x 4 Association, Billings, MT
Montana Association of Conservation Districts, Deer Lodge & Havre, MT
Montana Association of Counties, Helena, MT
Montana League of Conservation Voters, Helena, MT
Montana Mining Association, Missoula Chapter, Missoula, MT
Montana People for Progress, Colstrip, MT
Montana Stockgrowers Association, Helena, MT
Montana Water Development Association, Billings, MT
Montana Wilderness Association, Helena, MT
Montana Wildlife Federation, Helena, MT
National Parks & Conservation Association, Washington, DC
National Wildlife Federation, Missoula, MT & Washington, DC
Natural Resource Defense Council, San Francisco, CA
Ninemile Stockmen's Association, Huson, MT
North Boulder Protective Association, Boulder, MT
North Idaho Forestry Association, Coeur d'Alene, ID
Northern Plains Resource Council, Billings & Helena, MT
Northwest Environmental Defense Center, Portland, OR
Northwest Power Planning Council, Helena, MT
Noxon Rod and Gun Club, Noxon, MT
Panhandle Environmental League, Sandpoint, ID
Pondersosa Acres, Alberton, MT
Rimrock Property Owners Association, Hayden Lake, ID
Shoshone County Sportsmen, Osburn, ID
Sierra Club, Billings & Helena, MT; San Francisco, CA; Seattle, WA; & Spokane Group, Spangle, WA
Skyline Sportsmen's Club, Butte, MT
Southern Cross Wilderness Preservation Assoc., Anaconda, MT
Student Environmental Research Center, Missoula, MT
The Nature Conservancy, Arlington, VA
The Wilderness Society, Washington, DC; Seattle, WA; & Portland, OR
Touchette Hill Homeowner's Association, Frenchtown, MT
Trout Unlimited, Missoula, MT
Upper Blackfoot Preservation Assoc., Helmville, MT
Upper Clark Fork Valley Protective Association, Drummond, MT
Valley's Preservation Council, Huson, MT
W.O.O.D., Townsend, MT
Washington Environmental Council, Seattle, WA
Western Environmental Trade Association, Columbia Falls & Helena, MT
Western Montana Fish & Game Association, Missoula, MT
Western Montana Scientists Committee for Public Information, Missoula, MT
Wildlife Management Institute, Washington, DC

LANDOWNERS

4 E Endeavors
William Abey
Abot Mining Company
Joe R Acuff
Johnny Adams
Richard H & Janet Adamson
Steve Aga
Joan Ahl
Ronald L Ahl
Tom Aker
John H Albers
Richard Alberts
Norman R Albrecht
Donald H Alderman
Donald J Alderman
George N Alford
Mark W Allen
Don L Alsbury
American Smelting & Refining Co
Glen J Anderson
Thomas A Anderson
Marion G Anson
Sergio Aquinde
Myrtle D Arends
Ralph A Armbruster
Arnold J Armstrong
Randy Arnold
Jim D Ashford
Larry L Ashwell
Frank Avery
James F Baker
Theodore Bakken Jr
William R Ballard
Dale A Barcklay
Floyd M Barnes
Leland N Barnes
Ronald E Barret
Dwaine D Bauer
Andrew S Baxter
Henry L Baxter
William D Beach
Donald H Beck
Jackson T Beger Jr
Richard C Behm
Richard Beller
Daniel Benedict
Lester R Benefiel
Robert D Benfit
Charles Bennett
Steven C Bennett
Ruth Benson
James E Bentley
James Berube
Jesse Bier
Brad R Birdsell
A E Bishop
John T Blankenship
Joseph Blotzke
Don Blue
Robert E Boeh
William W Boehler
Dick Bolling
Albert Borgmann
Walter Borley
Warren L Boughton Jr
Luther A Boyett
Jack L Brady
Noel C Branning
Doyle L Braton
Charles C Breechbill
Bryce D Breitenstein
Ronald E Briske
Norman P Brovold
James K Brown
Virginia Brunette
Bunker Hill Mining Co
Norman J Buresh
Charles T Burton
Richard B Caldwell
Joseph Calloway
Morris A Campbell
Edwin A Cannen
Eduardo Carames
Bruce R Carde
Ernest J Cardwell
George P Carey
James Carney
John A Carpenter
Ken Carson
Mort Castleton
Paul J Cavallo
Champion Int Corp
John Cheesman
Mary Jane Cheesman
Thomas Clifton
Larry Clinkerbeard
Robert B Clyde
William J Colee
Denzil Conley
Delores F Cook
John W Cooper
Donald E Cornwell
Evelyn Judith Murray Couture
Jesse W Couture

G Cox
Patricia I Crandall
Marguerite E Crawford
William C Culley
Naomi Ruth Cummings
Rita Cunningham
W P Cunningham
Glen Davis
Martin M Davis
Robin A Davis
Day Mines Inc
Mary Maclay Delaney
Verona Delong
Virginia J Demaster
Sherman Denton
Vibeke Detienne
Ralph Deutsch
Fred W Dewolf
Ray B Dey
Diamond International
Edwin L Diehl
Edwin C Dimmitt
Chris J Doering
Richard A Doering
Ted Doherr Jr
Gordon Doney
Shaun Donovan
William A Dorazi MD
James C Doty
Double Yolk
Stanley Drury
Dave Dubreuil
Dean Duncanson
James R Dunphy
Harold Durham
Martin D Dykstra
Carmen T Ebel
Eddy Creek Mfg Co
Bruce W Edwards
Paul Edwards
Paul B Edwards
Gerald Eugene Eggart
Lawrence D Eggart
Ronald S Eggertsen
Gerald E Elj
Kenneth J Elwood Jr
Larry H Emery
Energy Systems Pacific Ltd
Roy R Engle
Gary Englert
Edward Erickson
Aaron D Evans
William Everhart
Bill Everingham
Joseph E Fagalde
Arman Farmanian
James Glenn Farnes
Ruth E Farnes
Lisa Fenton
Herb R Ferguson
Fetscher Logging Co
H Field
Jean K Fields
George W Finley
First Christian Church of St Ignatius
Fred J Fitzpatrick
Flathead Indian Reservation
Joel Ford
Joe W Foster
Rodney Foster III
Edgar A French
Robert L French
Judith L Fristo
Wendell H Frojen
Donald W & Sharon T Frost
Adele Furby
Frank J Gabriel
O D Gannon
Dale L Gardner
Dennis A Gardner
Gene Garitone
Harold Gartz
John A Gauthier
Larry Bruce Gehrett
Joseph H George
Gerald B Frank
Clinton C Getschman
Myrtle E Ghigleri
John T Giesen
Glenn H Gilbet
Juan Gimilli
Roy D Gish
Forrest G Godde
David L Godfrey
Golconda Mining Corp
Robert J Goldman
Lenore F Gollwitzer
Allen L Gonder
Walter N Graf
Richard B Grant
William F Graveline
Karl W Grober
Wilbert B Gums

Garth Haddock
Calvin S Hafer
Ralph H Haigh
Bobby Hall
Robert L Ham
Laurence L Haman
Flore Hamel
Philip E. Hamel
Leonard A Hamilton
David C Haney
Jim Hansen
Colin C Hardy
Earnst D Harmon
William C Harrison
Myron N Haugen
Frances S Heard PhD
Lavern Heck
Hecla Mining Company
James B Hedberg
Vanner M Hegbloom
Czerzi Heinemann
David D Heishman
Jim E Hemstreet
B L Henderson
August Hermberg
Clayton Herron
Don Hess
Amos A Hill
A C Hindberg
Oliver G Hirschi
Wallace Hirt
William E Hitchcock
Joseph A Hoffman
William D Hohman
Holiday Ranch
Donald T Holland
John Joseph Holland
Argyll L Hollinshead
Deborah Holmquist
Robert L Honaker
Mickey D Hoobler
Charles D Hood
David Horne
Robert Horwath
David Hoskins
John E Hoskins
Kirk Hoskins
Vern Hoskins
Richard P House
George F Howse
David L Huit
Hunt Bros Construction
Steve Hurt
Idaho Forest Industries
Idaho Pine Timber Associates
Idaho State Grange
The Idaho Veneer Co
Inland Empire Paper Co
Lois D Irwin
Billie M Jackson
Eddie W Jackson
Paul Jackson
Scott M Jackson
H Sims James
Naomi L James
John A Jefferson
Doyle J Jensen
Alfred Jermyn
Robert E Jester
Donnie Johns
Arnold C Johnson
Betty Johnson
Brent Johnson
Ernest J Johnson
James L Johnson
Larry E Johnson
Louis J Johnson
Robert D Johnson
Arthur L Jones
Brian Jones
Hazel Jones
Preston Jones
Ronald E Jones
Jupiter Mining Company
James K Katayama
David M Kees
Harr F Kemmerer
Joe B Kenast
David O Kesler II
Karl F Ketterer
Charles W Keturakat
Warren J Kieffer
Gordon King
John B King
Orville Kirking
Robert T Kirkpatrick
Daniel A Kish
Virgil Klein
John G Klopatek
Frank L Knaack
George W Knickerbocker
Ellen J Knight
Marion Knotts
James A Knutson

E G Kollman
Helen Konda
Kootenai County Title Company
Robert L Kowalski
Thomas J Kramer
Krazy 3 Ranch Ltd
Peter J Krudde
Dennis Allen Kruse
Ronald O Kruse
Douglas P Kugler
Edward K Kyler
Elmer S Lachenmaier
Gary L Lacy
Edward R Laitinen
Robert Earl Lake
Ted Lanterman
Margaret Larive
Warren S Larson
Henry Lavoie
Fred Leclair Jr
Edward Ule Lee
Robert E Lee
David E Leigh
Sharon Rae Leighty
Effie Leonetti
William C Leroy
James D Leuze
Lillian Lewis
Yvonne L Lewis
Cecilia R Lieb
Lincolns Silver Dollar
Robert Loder
Robert D Long
Darol Lee Longacre
Louisiana Pacific Corp
Richard O Lutnes
Donald J Lynch
David L Lyon
Benton W Lytle
Linda Maas
David J Maclay
Frances E Maclay
Frances H Maclay
Clark Madrosen
Ralph J. Madsen
Madsen-Smith Partnership
John Magera
Harry F Magnuson
David J Maiani
Patricia Manor
David Manske
Warren L March Jr

Allen Marjerison
Richard Martell
C W Martin
Dean Martin
James A Martin
Randy Martin
Robert A Martin
Alden O Mathers
Marion L Maudlin
Michael S Maxwell
Peter S. May
Don J McAfee
Merelyn McCallum
Pat McCarthy
Donald McCaw
Carman E McChin
Adam C McClelland
Doris D McCollum
Willie J McCrite
McCuaig Brothers Prop
Michael McDermott
Mel McDowell
James P Mcginley
Jerome J McKay
Wade McKay
V Dennis McKnire
David L McLean
Russell E McMillan
Bette Jean Mead
Fred H Mello
Larue B Melton
Leon Melton
Don H Mercer
William F Mercer
Jean G Mercer/David E Carriere/Linda C Carriere
Oliver Mercier
Merger Mines Corp
James Millar
Richard C Miller
Robert L Milne
Nancy Lee Mines
Lewis M Minich
William D Mintzer
Willis H Mishler
Missoula County Commissioners
Daniel D. Missroom
Ervin E Mock
Clifton E More
Ala Morin
Leroy D Morin
Fred Morris

Alex C Morrison
Gary A Morrison
Ralph J Morrison
Carl Moss
George W Mourar
Jeanne Mueller
David W Murphy
Sidney Murray
Charles Myers
Roy L Nance
Frederick Nardecchia
Douglas A Nash
National Associated Prop
Vernon T Nelson
Fred W Nemoede
Les Neuert
Lloyd R Newell
Richard D Newlon
Nine Corporation
John W Nitschke
Stanley N Norgaard
Fred Norris
John Nyomo
Sherman Oakes
Alvin E Olin
Earl C Oliver
Leslie M Olson
Oliver L Olson
Michael G O'Shea
Lonnie D Osmonson
Marion H Ott
Henry L Overs
Pack River Co
Roger A Pagel
Laura L Palmer
Raymond D Parker
Kenneth F Parkinson
David Pasold
Glenn E Patovisti
Paul E Peak
James O Pelley
Vern Pelton
Roy P Peringer
Merle Perkins
Richard Peschel
Bruce M Peterson
Lucille Peterson
Robert A Peterson
Thomas A Peterson
Wayne Peterson
Angelo Petrette
Larry Pettijohn
Frank A Pettinato
William L Pettingill
Harold L Phelps
Walter R Pickering
Eugene L Pitts
Stanley G Pope
Port Blakely Mill Co
Morris A Porter
John P Potter
Sidney Powell
Mae Priddy
Richard W Priddy
Cryal Priddy Sr
Charles A. Prongua
Prongua Ranch Company
Earl M Pruyn
Lawrence H Radtke
Albert J Rambosak
Recreation Development Corp
Fred L Reed
Jake D Reed
Scott W Reed
Charles W Richert
George Ricks
Melvin G Risland
Everett A Robbins
Richard Robertson
Albert Rogers
Floyd E Rogers
Lois Rogers
Frank R Roque
Margaret Ann Rose
Vincent A Rossi
Royal Logging Company
Eugene J Rush
Connie Russell
Douglas Russell
Dave Ryan
Charles Sabins
Bob J Sallee
Sammons Trucking Co
Joanne L Sanchez
Ned A Satterlee
Charles C Sawyer
George C Sayler
James Leroy Sayler
Arthur Scarcello
Joseph Scarcello
James E Schadewitz
Edward T Schall
Ruth Scherr
Kenneth P Schleusner

Don Schmitz
W W Schneider
Rodney D Schobert
Robert H Schonfisch
Bernard J Schoonover
Merl L Schrader
Charles J Schreir
Louis A Schumacher
Joseph Sciglibaglio
John W Scott
Mrs F E Scott
Van J Scott
Lea L Seaboch
Gordon F Seerly
Mr & Mrs Seipert
Gail E Self
Thomas D Sensabaugh
Walter Serba Jr
Roy A Seymour
Ray Shafter
Roy H Shaffer Sr
John Shaw
Archie Sherar
Merl L Shrader
Ralph E Shrigley
John M Shugrue
William Sides
George F Siegel
William A Silva
Lawrence Singer
Singer Bros Ranch
Donald J Sirena
Dan W Siroshton
James A Siroshton
G N Siverson
Larry A Skeen
Eleanor Skero
Georgeanne Skinner
Patricia E Smalley
Frank C Smidt Jr
David Robert Smith
Dwight L Smith
Gerald E Smith
Kenneth M Smith
Lyle J Smith
Rex W Smith
Robert Smith
Robert E Smith
Warren R Smith
Judith L Snyder
William P Spearine
Robert A Spitzer

Donald C Springer
Robert Springer
Audrey Nelson Starkey
Xenofon C Stefanopoulos
Ted Stegman
Darren Stein
Robert Stephens
Wendell Stephens
Elma Stewart
John H Stiegler
Park H Stimson
Durward Duane Stolp
Noah F Stroup
Kenneth M Suhr
Delwyn N Sullivan
Neva F Svetich
Gordon D Sylte
John Sylte
Roberta W Tallant
Frank Lee Tavenner
Lenore L Taylor
B W Tester
James R Tholl
Dale V Thomas
Carl Thompson
Eugene B Thompson
Terry Thompson
Cecil D Thorpe
Lauretta M Tingley
Larry C Tipke
Walter Tipke
Raymond P Tipp Attorney
Mark Tomell
Helen Tomlinson
John Torma
George Torp
Trail Land & Livestock Co
Tree Farmers Inc
  Forest Resources Dept
Charles D Tremblay
Edwin Troester
James M Troglia
Jeffery J Tschilda
Thomas E Tucker
William Turnbull
Dorothy M Turner
Jerry Valenta
Wm A Vandagriff Jr
Alexander Vanderburg
Robert R Vanderhoff
Vanevan Co
John H Verbryke

Robert F Vert
Herbert R Viertel
Ray Voshall
Ron I Wadsworth
Alf W Wagner
Larry G Wall
Wall Street Mining Company
Louise Walsh
Washington Water Power Co
Larry C Watson
Kenneth L Way
James A Weldon
Clyde G Weller
K A Wellfonder
Western Highlands Inc
Maxine Whitney
Fred Martin Whitworth
Raymond F Wiedrich
Ashley Wilcox
Dennis K Williams
Gerald E Williams
Merlin L Williams
Thomas C Williams
Calvin W Wilson
Richard D Wilson
Patrick R Wimmer
Joseph W Wind II
Bruce Winegardner
Elmer Wirtz
Luther K Wise
Allen N Wiseley
Mervin Witt
Paul D Wollenburg
Gary L Woods
Lee T Wraith
Malcolm O Wright
Terry S Wright Et Al
Allan J Wruck
Gerald D Yarton
William K Yates
Robert E Young
Gary Younker
David F Zabel
Robert M Zachariasen
Robert E Zak
Larry Zaring
Marion E Ziegler
Donald K Zuraff

INDIVIDUALS

Joseph Abramavage
Marvin H Ackerman
Frank W Adams
Gordon Adams
Wally Adler
R A Ainsworth
Mrs Dale Akers
Ida M Alexander
John Alexander
Dick Allen
Gail Allen
Gladys Allen
Robert L Allen
Janet R Allison PHD
Susanne E Allshaw
Bruce Altman
Kenneth R Altman
Victor Ambo
C H Ammons
Ernest W Amundsen
C Leroy Anderson
Denny Anderson
Donna M Anderson
Gary M Anderson
Harlean Anderson
Maybelle Anderson
Nancy Anderson
Robert G Anderson
Roger Anderson
Shirley J Anderson
Sue Anderson
Randall P Aniballi
Deborah L Anson
Charles J Antos
Anna Aollowell
John W Appelt
Karen Armstrong
Mike Armstrong
Normand Arnenault
Bob Arnold
Gary Ashmore
Rhea Ashmore
June Atkins
James Auker
David J Ault
Douglas R Austin
Hazel Axelson
Art Aylesworth
Tonya Azure
Lloyd Babin
John Bacon
Richard A Baenen
Adolph J Baide
Art Baier
Daniel B Bailey
Pearl H Bailey
Thomas Bailey
H W Baitis
Dave Baker
Norman Balison
Val Balison
Eugene & Delores Ball
Claire G Balliet
Robert P Banaugh
Maridell E Bandy
Margaret A Banning
Stephen J Barclay
Doug Barker
Martin Barker
Wayne Barndt
Joe Barnett
Gail Barrett
Philip Barrett
Richard Barrett
Mike Barton
Sue Barton
Richard D Base
John Bauer
Phil Beagles
Wendall Beardsley
Gregory M Bearg
Terry Beauchamp
Thomas R Beaudette
Albert T Beaudry
Pauline Marie Beazley
Paul J Beccari
Andrew A Beck
Estate of Andrew J Beck
Bud Beck
Cliff Beck
Donald W Beck
Joe Beck
Laurence L Beck
Melvin R Beck
Tom Beck
Wayne W Beck
Patricia A Becker
Nancy Beech
Richard C Behus Jr
Gottlieb Beierle
William Belkowski
William Bell
Maggie Beller
Hilary J Benbenek

Marian Dalberg Benedick
John Benedict
Christina Bennett
David Bennett
Gregory A Bennett
L P Bennett
Roger W Bennett
T A Bennett
Vicki Bennett
C K Benson
Fred & Bruce Benson
Linda Benton
Ralph Bergsagel
Ed Berneking
Mary Ann Bertlin
Stanley J Bertlin
John D Bessette Jr
Esther S Best
Troyce E Best
William Bethel
Darlene Church Bibler
Sid Bibler
David Bilderback
Harry & Gretchen Billings
Larene Bingham
Brad Birdsall
Orville M Bjorge
Bert Blackman
A D Blakely
Ed Blaylock
Lois Bofsford
Robert A Boller
Randy Bolton
Keith E Bomstad
Richard M Bond
Larry Bonefeole
Albert Boomer
L Boone
Helen S Boostrom
Richard E Booth
Bob Borino
Fred Borngraeber
Michael Boshker
M S Boucher
Don R Bowen
Linda Bowers
Ron Boyce
Christopher L Boyd
Barbara Boye
Alta Boyes
T Dan Bracken
Philip H Brader
Alan Bradley
Blaine Bradshaw
Darrell Bradshaw
R Brandenberger
C O Bras
Gary Bratz
G E Breeding
Wayne O. Bricker
Jack S Bride
Donna Briggs
Leland R Briggs
Ed Brison
Dave E Broadfoot
Jean Brocklebank
Linzee Brockmeyer
Jane Brockway
Warren Brockway
Jean Brough
W L Brough
Paul Brouha
Brad Brown
Ken Brown
Robert C Brown
Sally Brown
Steve Brown Attorney
Bob Browne
James F Browne
John Browne
John T Browne
Buck Browning
Lloyd W Bruce
Richard A Brumbaugh
Jerry M Brunette
Kjell Brustad
John Bucher
Bruce Bugbee
Henry G Bugbee
Nancy Bugbee
Paul Burdett
David Burgan
Dr Joanne Burgan
C L Burke
Lawrence W Burnett
Elbe J Burnette
James Burr
Jim Burr Jr
William E Burroughs
Maxinne I Burruss
Roy Burton
Sue Burton
Tom Butler
Mick Buzzard

Erwin Byrnes
Stanley Cadwell
Kay Cain
Buddy E Cambell
D Cameron
Craig Campbell
David Campbell
Debora Campbell
Kate Campbell
Richard M Caputo
Patrick C Carey
T Carey
Gerald L Carr
Richard Carrell
Richard Carter
Ken Caruso
Helen V Cassidy
Mrs Carl Cassidy
Thomas R Castles
Mrs J L Chaffee
Gordon Chamberlain
C W Chambers
Alfred L Chase
Dan Chase
J J Cheesman
Floyd J Cheff
Cass Chinske
Steve Christensen
Vivian Christensen
Darla Clark
Don Clark
Janet M Clark
Mark E Clark
Ken Clawson
William H Clawson
William J Clawson
Robert M Clegg
Dale C Clute
L L Clute
Art Cochran
Louise T Cochran
Mike Cochran
Dale Cochrell
Doug Coffman
Ed Coffman
Fred Colby
Patrick L Cole
Kim Renee Collins
Mercedine Collins
Nick Commers
Louise Comstock
Leonard T Conley
Barbara F Conn
Darlene Conn
Jason Conn
John Allen Conn
Mary Faye Conn
Mike Conn
Renee Conn
Douglas Connick
Leonard J Connors Jr
Leonard J Connors Sr
Jocky Constenius
Lee Converse
Charles Conway
Margie Conway
Ed Cooper
Evelyn Cooper
Merle Copenhaver
Robert T Cordie
Cy C Corlett
J W Corn
Robert J Corn
Leigh Cornelius
A J Cotton
William Courser
Lillie Cowley
Eda M Cox
John R Cox
Dennis Coyle
Gene P Crabb
Michael Craig MD
Kenneth W Craighead
Patricia I Crandall
William L Craun
Daniel Crawford
Twila M Crawford
Gary D Crerar
Gardner Cromwell
Hazel M Cromwell
Larry Cron
Joan M Crowder
Mike Crowley
Susan Crystal
Charles Culver
Elsie E Culver
L K Cummins
Robert B Cummins
Frank Cunningham
Jim Cunningham
R J Cunningham
Bob Curtis
James F Curtis
Jim Curtiss

Tim D Curtiss
Amy Cyr
Dave Cyr
John W Cyr
Philip Cyr
Ken Dahinden
Howard W Daley
Roger Daniels
Jack Danielson
Warren I Darne
Milton Datsopoulos
James E Daub
Tom Daubert
G Kirk David
Pat Davies
Dan Davis
Darlene B Davis
Donna D Davis
Joann Davis
Martha Davis
Merrill Davis
Scott Davis
Tish Davis
George Day
Carl F Dayton
Kennedy W Degitz
William Deibert
Robert Demin
Mike Deneat
Michael Deneuf
Bill Dennis
Irene Dent
Mary E Depuy
Bob Derasig
J W Dersam
Adam Deschamps
Ed Deschamps
Rae & Malcolm Deschamps
Robert L Deschamps
Ron Deschamps
Mrs Dewey
Jarrel S Dickson
Linda G Dickson
Roy E Dilly
William Dingwall
Larry Dodge
Ray Doig
Richard Dolan
Randy K Dolven
Philip B Donally
Tom Doohan
Jim Doolittle
Frank Dory
John D Douglas
Desiree Douville
Jim Dowd
Luke Downing
Hazel M Drenth
John Joseph Driscoll III
Melita Drumheller
Ilamae Dunagan
Gerald R Dunn
Mrs James Dunn
D M Durland
Jim Durzho
Bill Dusenbury
Barry L Dutton
David Dutton
Ron Dutton
Reuben L Dwight
Forrest L Dyer
Lester Dyer
Paula Dyer
Forrest L Dyer Jr
Randy A Eastvold
Steve Eckert
Terryl Eckert
Kemra L Eckley
Jeannine Edelblut
Harold Edwards
Joe Egan
Richard Eggert
Earl C Eichenlaub
Jim A Ekstrom
Elvin Eldridge
Wilford F Elison
William W Elison
Harold W Elkins
Alan R Elmstrom
Lola M Elmstrom
David M Emmons
Donald W Engel
Karl Englund
David Ensner
Richard G Erb
Leonard Erickson
Mervin O Eriksson
Ronald R Erny
Al Evans
Alan D Evans
Bill Evans
Linda Evans
Rick Evans
Sam Evans

Wm W Evans
Bernard E Evelo
Beverly Ann Fancher
Phillip R Fandozzi
Meyl Fanning
Clay Fanslow
Owen F Farnes
Ted Faro
Kathy Farrington
Don Fausett
Douglas J Fausett
James F Feldt
Beth Ferris
Dennis Figgins
Steven Kent Finger
Jerry Fisher
Shirley Fisher
Frank Fitzgerald
Jim Flandsburg
Federico D Flechsing
Kenny Fleming
John L Fleury
Kurt Flock
Randy Floren
Frank Flynn
Eugene & Edna Fontenot
Robert L Foreman
Bert F Forest
Gladys Forest
Allan C Foss
Gordon Foster
James T Foster
Joe Foster
Rod Foster
Carol A Fowler
Michael A Fox
P Fox
Robert Fraley
Ruth Ann France
Michelle Fraser
Bonita I Frazer
Steve Frazier
Don Frederick
Keren Fredette
William Freeman
Naomi French
Edna E Frey
M Elizabeth Friesz
Bruce I Frye
James R Frye
Marie Fryer
Willard A Fuhrman
Peter Funk
Henry Gabel Jr
Robert W Gage
George Galbavy
Anthony Galegos
Kimberly A Gall
Gary J Gallagher
John D Gallaher
Ralph L Galloway
Justin Gamba
Dorothy M Gates
Douglas Gaut
R Douglas Gavin
Richard Gavin
M Gazaway
Ablert Gehurz
T E Geraghty
Pam Gibbons
Sharon Gibson
Brian Giddings
Arthur F Gidel
R H Giles
Dale C Gillespie
Dan & Mary Gillespie
John R Gilman
Bruce Gilmore
Henry Glantz
Beverly Glueckert
Linnea Gochanour et al
Richard L Godin
Carl Godtland
Hank Goetz
Jim Goff
Howard Goforth
Richard M Goldsby
George M Gonnder
Jerry D Gonsioroski
C W Gornall
William T Goslin
Janel Gowen
T J Graff
Randy Graham
Viola M. Gratter
Cliff Gravely
Keith Graybeal
H O Green
Jack L Green
Ralph Green
Clayton K Greene
Dan Greer
Dr Bob Gregg
William T Gregg

Sarah S Gregory
Willard D Grevson, Sr
L H Griffing
Darrell Grim
Steven Grimsrvel
Charles Groshong
Marjorie Groshong
Fred H Gross
Viola Grotbo
Gale Grote
V M Grothen
John Grove
Iona Grundmann
Maurice E Guay
David R Guelff
Don J Guiles
Dale A Gunderson
Elizabeth Gupton
Mike Guthneck
Les Guttu
Walter R Haag
Glen Haas
Pam Hackley
George Hacptatz
Mike Haffey
F F Hagel
Fred J Hager
Bill Haines
Ben Hall
Bruce Hall
Doug Hall
Lionel Hall
Lionell D Hall
Phillip Hall
Robert Hall
David Haman
Joe Hammond
Dan Hamptman
Everett L Hampton
George R Hangas
E L Hankenson
Dale L Hansen
Marijoyce Hansen
Ben Hanson
Susan Hardin
Merle Harding
Brett F Hardy
Doug Harkin
Russell L Harlan
William D Harlan
Larry R Harper
Marjorie Harper
Brad Harr
Charles V Harrington
Donald R Harrington
Helen M Harrington
Vera C Harrington
John A Harris MD
Doyle L Harvey
Anna L Haskins
Donald Hatcher
Caroyln Hathaway
Oscar C Hauge
David Hauptman
Stewart Hauptman
D Haverfield
Carl F Hayden
Richard J Hayden
Henry F Hayes
Dennis G Haynes
James A Heath
Linda Hedstrom
Sandra Heidecke
Hele Heimbigner
Arthur A Heine
Robert N Helding
Earl I Helms
Harold Helterline
Rod Helterline
Archie Henderson
Bill Henderson
Jim Henderson
Joe Henderson
J B Hendrix
Patricia Hennessy MD
Stephen S Henry
L Hensley
Kathleen Henson
Francis Hermes
Jin Hermes
Robert Hermes
Cesar Hernandez
Alen Herriman
Clayton R Herron
Barb Hesler
Elliott E Hewitt
Pansy K Hewitt
Edward Hickel
Earl B Hiett
Dennis Hildebrand
Dorothy S Hill
James W Hill
Lewis B Hill
Lewis Hill Family

Ronald L Hines
Rystey Hinzo
William G Hitchcock
Allin A Hodge
S L Hoell
Shirley E Hoff
Dean Hoffman
Tymen H Hofman
J J Hogan
Judy Hogan
Michael P Hogan
Tom Hogan
Robert Hogen
Jerry Hoggatt
John H Hogman
Melvin J Hoight
Allen Holbrook
Carol R Hollenback
Scott Hollenbeck
Nancy Holley
Inez Holloman
David H Holmquist
Deborah Holmquist
Craig Holstine
Jeffrey C Holwick
El Hombre
Ken Hook
Chester Hoover
Catherine Hopper
Gary L Hornseth
Robert Horton
Suzanne B Horton
Noel Hosier
Harvey Hotzel
Christopher Houppert
Rosemary Howard
G Howell
Duane A Howlett
Norma I Howlett
James Hoyne
Mike Hudlow
Donald Hughes
Ed C Hughes Et Al
Jerry M Hughes
Joe D Hughes
Dale E Huhtanen
David L Hult
Buff Hultman
R H Hultman
Sandy Hultman
Harriet H Humes
Roger Hungerford
Wilfred Huot
Wallace Hurt
Paul E Hyde
Stephen Immenschutt
Frances Ingalls
Kurt F Ingold
Lester Ippisch
Lois D Irwin
Barbara Isdahl
Dennis Iverson
Leonard Iverson
Judith M Jackman
Kathy Jackson
Wiley E Jackson
Bud Jacobsen
Ed James
Homer James
Marjorie M James
Michael A Janussi
Dick Jasper
Katherine E Jasper
John L Jeffries
Philip E Jemison
Charles H M Jensen
Mary W Jensen
Raymond O Jensen
Ron Jensen
Thomas C Jensen
Merle H Jerset
Kathleen Jesse
John E Jessick
Doug Jette
M Ronald Johns
Al E Johnson
Betty Johnson
Bill Johnson
Carl A Johnson
Carole Johnson
Elaine L Johnson
Ernest W Johnson
George V Johnson
Gregg Johnson
Jim Johnson
Kenneth G Johnson
Lavern E Johnson
Lillian Johnson
Loryl J Johnson
Lucille W Johnson
Paul D Johnson
Roy Johnson
Verdie M Johnson
Laurie Johnston

Lyle C Johnston
Max Johnston
Alfred Jones
B Irene Jones
Clarence L Jones
Margaret Jones
Norman Jones
Steve Jones
Lee A Jordan
Ralph C Jordan
Ron Jupka
Mike Kadas
Laurel Kain
Velsa Kane
DonaLd W Kangas
S Karkanen
Ronald P Kay
Doris Keffeler
Karla Kehrle
Lloyd Keily
Joe Keller
Ray Kelley
Toni Kelley
Robert J Kelly
Dave Keltz
Joe Kenast
Kyra Kennedy
Gregory A Kennett
Jeffrey L Keough
Norman Kern
David G Kester
Robert J Kester
Wayne Keyser
Betty Ann Kibbee
Olive Kielty
Nancy Kienholz
Harold Kilpatrick
Nick J Kimber
Jeff Kindemann
Tonja King
Trudy King
Leo T Kinney
Ellen E Kinonen
Joan Kirby
Leroy H Kirchner
W M Kirkpatrick
James A Kistle
A J Klapwyk
Elmer E Klapwyk
J C Klapwyk
Robert W Klaver
Mike Klutten
Harold G Knapp
Robert Knapp
Ray N Knight
Scott Knight
Mary Knudsen
Gordon Koenig
Jim Koke
Arthur Kolbeck
Otto N Nikoleyczik
Janet Koon
Donald R Kopetski
W R Korizek
John Korpi
Robert S Kortuem
Bob Kottkey
Ken Kovack
Julia Krantz
Daniel V Kreig
Robert D Kreis
Michael Kreisberg
Stanley J Kreshel
Roger Kruckenberg
Janice Krueger
Juanita Kruger
Rick Kruger
James Kubichek
Ken Kuhl
Andrew Kulla
Carol Kuluva
Clark Kyler
Carole La Pointe
L T La Rock
Craig Lacey
George Lacey
Eleanor Lachenmaier
Randall H Lachman
Elmer Lackermodal
Klaus Lackschewitz
Michael G Laforge
Bert Lafthus
Ted Laine
Marvin Lake
Terry W Lambert
J G Lamoreaux
Bob Lane
Charles E Lane
Jim Lane
Ray Lanfear
Duane R Lange
Mike Lapinski
Donald L Larson
James D Larson

Don Latham
J Fred Latour
Martha Lauterbach
Patrick Lawler
Patrick J Lawler
Vern L Lawrence
Jim Layman
C E Lear
S L Leclaire
Laura Ledbetter
Sandra L Lee
William G Lefler
Norman C Legato
Tony Leita
Merlin W Lemmer
Gene Lender
Natalie Lepou
Peter Lesica
D Lester
David Levesque
Stuart F Lewin
Michael D Lewis
E C Lile
Jack D Lincoln
Land M Lindberg
Wesley Gene Linder
Bill Lingenfelter
Jack T Lingenfelter
Mary D Lipski
Dighton Little
James T Litz
Charles F Lockwood
Paul Lodge
Bob Loewen
Dennis Loewen
Denley M Loge
Maynard Loge
Robert H Loge
Robert H Lohr
Jim Lommen
Terry Lommen
Vera L Lomrers
Joanne Long
Ray Lorensen
Earl C Lory
Mel Lory
John Loter
J Gary Louquet
Dan Lucier
Ray Lucier
Dr Jacob Lulack
Harold Lundgren
H W Lurgin
Doug Lutke
Leonard Lyman
Delores M Lyons
Nep A Lunch
Linda Maass
Margie A MacLay
Fred Madsen Jr
James E Maehl
Dan D Magcio
Rose Magnuson
Ruth Mahle
Dale D Mahlum
Minnie Mahnken
Berit W Malmend
Kay Managhan
Robert Managhan
Shirley Mancini
Valarie Mancini
Marilyn Mangion-Gray
John E Manley
Dan J Manning
Bernice Mannix
Bob Mansfield
Lee J Marceau
Warren L March Jr
C Les Marcum
Susan Mardin
Bud Mariska
Sewell Marks
Dalles R Marlon
Ian Marquand
De Lor Marquardt
Alice Martin
Forace Martin
Mike Martin
Chris L Martineau
Tom Marvin
Cindy Mason
Ron R Mason
Tom Mattfeldt
Russell Mayden
Marjorie Mayfield
Ryan McBride
Dan McCaffery
John McCann
Mike McCann
C G Pat McCarthy MD
Alvin McClure
Ernest E McCollum
Winona M McConnell
Steve McCool

F W McCormick
Geraldine McCormick
Charlene McCoy
Lorene McCoy
Thomas McCrea
Doug McCullough
Mike McCullough
James W McDonald
Mrs Lavon McDonald
Sharon McDonald
Jeff McDougall
John McDowell
Mike McElhatton
B Ralph McElwain
Jack B McFarland
James P McFarlane
Pat McGillis
Michael R McGinnis
Patrick E McGowan
Shannon McGowan
G M McGregor
Mike McInally
James R McMahan
Neil McMahon
R W McMahon
Robert McManus
Sandy McManus
Dale F McMeekin
Jerry McMullen
John R McMullen
Srruce McMullen
Pat McNally
Sandra McQuillan
G McRae
George McRae
Theresa P Meeks
Donna Meitner
Norm Meitner
Robert C Melcher
Fred Mello
Fred H Mello
Lester C Melton
Garry Mentzer
Gayla Mentzer
James C Mercer
Liz Merrill
Kelly Jo Merseal
Dale E Mesenbrink
Kenneth Mesenbrink
Lester Mesenbrink
Thomas Messina
Fred L Metcalf
Kennybelle Metcalf
Rita Metesh
Brian Mether
Stephen M Meuchel
Don Mevin
Daniel M Mibs
Adam D Michnevich
Dan Milam
Daniel M Miles
Pat Miles
A Eugene Miller
Carol P Miller
Everett Miller
Frieda Miller
GeraLd G Miller
Harry A Miller
Kenneth J Miller
Ramsey K Miller
Roy Miller
Sheelia Miller
Shirley J Miller
Wayne E Miller
Charles N Miller Jr
Harvey Millhouse
Mark Millhouse
John Milton
James Minckler
Bertha J Miner
Leslie Miner
Paula J Mintz
A Minzel
Jim Mitchell
John Mitchell
John A Mitchell
John C Moe
Nancy K Moe
Doug Moeller
Elaine P Mohland
Robert E Monaghan
Nancy Monk
Donald L Montelius
Gerald Montelius
Ray L Montelius
Robert E Montelius
Lou Monter
Martha Montgomery
Michael Moon
Lillian Moore
Michael Moran
Earl E Morgenroth
Marc M Morin
B T Morris

Gordon Morris
Melvin L Morris
Nellie Morris
Virginia Morris
Allen A Morrison
Dan K Morrison
Jean Morrison
Marie Morrison
Russell Morrison
William Morrison
E W Morrissett
Dalton Morse
Revel L Morse
Wanda Morse
Leo Muckerheide
Robert Mudri
L F Muller
Mavis Muller
Glen S Munds
George Mungas
David Munson Young
Karen Murfitt
Daniel R Murphy
Elaine M Murphy
Ellyn Murphy
Joe Murphy
Mabel Murphy
James P Murray
John Muster
Ben Myren
Donald G Naegeli
Donald C Nagy
Herb Nash
Richard Nash
Melanie Nedrud
Ernest E Nelson
Francis M Nelson
Jack D Nelson
Joanne Nelson
Leon Nelson
Merwin S Nelson
Mike Nelson
Raymond C Nelson
Kenneth Neo
W F Netherton
Myrtle Newell
Ed Newman
Vicky J Nicholas
Leo Nicholes
Terry Nichols
E J Nicholson
Harold M Niesen
Bernard Nieslank
Daniel W Noonan
William J Nooney
Susan Nordberg
Mel Nordbrock
Don Nordstrom
Virginia Norris
Samuel C Northey
Terri Norwood
Gerald A O'Brien
Philip O'Connell
Jake Odell
Sandra O'Dell
William R Ohrman
Jan Oien
Arlen E Ojala
Henry Oldenburg
Billy Joe Olsen
Gregory D Olsen
Kenneth E Olsen
Richard L Olson
Roger J Olson
William E Olson
Carol Olvera
Martin Onishuk
Duane Onstad
Thomas D Ordway
Barbara G Orgon
John Ottman
George M Otto
Lewellyn Overholt
D W Owen
Lynn Alison Packard
Rex W Paddock
Donna Paige
Ron Pales
Hildegarde Palin
Melvin Palin
Gary Palmer
Mike And Sandy Palmer
Dixie O Parham
Maxine Park
Dean L Parker
Fred Parker
Fred M Parker
Jami L Parker
Larry Parsons
Bernard Patterson
Jeanne M Patterson
Mrs J R Patterson
W B Patterson
Tim Patton

William A Patton
Robert J Pavlovich
Alice M Pearson
Sarah Audrey Peden
Michael L Pedersen
Ken Peres
Chet Periman
John Chester Periman
Leo Perkins
Michael E Perkins
Pat Perry
Tarsia A Persson
Shawn G Peterman
Joseph D Peters
Arthur J Petersen
Ronald G Petersen
E R Peterson
Lacy Peterson
Ray Peterson
Rusty Peterson
Susan Peterson
Wayne G Peterson
Angelo Petrettee
Robert W Philburn
Peter A Philips MD
Richard Pickens
Richard C Pickens
Paul V Pickering
Donald J Piekarski
G Edwin Pierce
Keith W Pilgeram
Zane Pilgeram
Suzan Pittn
Daniel J Plummer
Rex D Plummer
Edward J Plute
Les A Poat
Terry E Polegarz
Robert B Polegay Sr
Jim Poling
Eugene D Pollette
Joesph H Pollock
Verne Porter
Jean Post
Diane Powell
Roger K Powell
Stephen Powell
Donald E Prentice
Theodore Presler
Leslie J Pressey
E J Presthus
Jack S Price
Kenneth Price
Kevin L Price
Russell K Price
Sherem Price
Ronald Printz
Nancy Proctor
Earl M Pruyn
Minott Pruyn
Jon L Puz
Thomas G Pyne
Sandy Queen
Steve Quigley
Sandra Rachlis
Tim Racicot
E M Radtke
Edward Radtke
Marvin Radtke
Alice E Rafferty
Brian Rafferty
Frank Ramberg
Gladys Ramberg
Thresa L Ramberg
Rick Ramler
C Fred Rappe
Robert R Ream
Ethel Reardon
Veronica Rebel
Ralph Redenhour
Eric Redman
Bernie Reed
George Reed
Joyce Reeser
Ken Reesman
George Regan
Milton Reich
C W Reinhardt
George Reistad
Melvin D Reistad
Dorothy Relyea
John Rettenmayer
Reinhold Revner
Dave Reynolds
Karen Ann Reynur
R Rhoads
Gilbert S Rice
Harvey S Rice
George Richardson
Robert E Richardson
Richardson Family
Leonard Rieger
Barton T Rinehart
David W Rising

C G Ritchart
Tom Ritzheiner
Jackie Robb
Mark Robbins
Reed H Robinson
John Roblado
Tim Roche
George Rockwell Jr
Roy Rodenberger
Mary Rodgers
Fred A Rogers
Keith A Rogers
Linda S Rogers
Mrs Ray Rogers
Vincent Rogers
Kitte Rolins
Reece A Root
Monte Rosebeary
Bob Roseleip Jr
Shannon M Roshe
Steve Ross
William C Ross
Dick M Rossignol
Richard Rossignol
Lee Rost
Walt Roth
Nellie M Rourk
Ron Rude
Marcia Rundle
Donald E Rundquist
Robert C Runke
Jim Runyan
Earnest Rupp
John Russell
Albert Ruth
Bonnie Ruth
Debbie Ruth
Dennis Ruth
Tom Sagisson
William B Saint
Gordon Sanders
Wilbur F Sanders
Gordon Sanderson
Wilfred A Sanderson
Harry S Sansom
William G Sansom
Michele Sare
John Sauer
Nelson E Sayer
Bill Sayles
Creighton Sayles
Ross Sayn
Ed Schaffer
Gary Schaffer
Glenning Robert Scharf
Scott Scheffer
Dave Schilling
W Bruce Schlaebitz
Ivah G Schmitz
Joan L Schneider
James J Schreckendgust
Noble B Schrock
W C Schrock
Robert Schroder
Chuck Schroeder
Lois J Schulte
George E Schultz
Jim & Evelyn Schultz
Christine Schuly
Mae B Schumann
Dennis J Schwenk
Henry Sciuchetti
Bill Scott
Dana C Seavers
J Bernell Sebby
Mrs Walter Sedoff
Alma J Seng
Wayne A Senner
Blake Sevalstad
Susan Seymour
Roy Seymour Jr
Ina M Shafer
B Shaiman
Evelyn Shanklin
Duane A Sharp
Edward Sharp
B C Shaw
Frand Shaw
Ruth Shea
Paul K Shear
Sean Sheehan
Judy A Sheets
Mark Sheets
Robert J Shelton
Warren E Sherman
Jack Shields
Ray Shilund
Glen Shipp
Joan Shogan
Jim Shope
Jack Shuck
David L Sickels
George F Siegel
Chris Siegler

Jeannie Siegler
Bill Silver
Samuel C Silverthorn Sr
Jerry Simmons
Duane Simons
Jack W Simons
Lawrence Simonson
Bob Simpson
Gaile Singleton
Dan W Siroshton
Duard M Sisson
Leland Skaw
Harold H Skelton
Beverly J Skinner
Herb Skinner
Earl O Skogley
Stan Skonsen
Leota Slenes
Orville A Slenes Sr
Stanley R Slominski
Kathryn Lynn Small
Richard Smeriglio
Louis E Smida
Trudy Smida
Annich Smith
Bonnie Smith
Dale Smith
Franklin C Smith
H I Smith
H William Smith
Hugh W Smith
Jack Smith
James C Smith
Leonard W Smith
Lyle J "TuffY" Smith
Phil Smith
Walter Smith
Walter K Smith
Waren J Smith
James E. Snead
Redden C Snyder
Carlton G Sobczak
Laurie Solander
Robert A Solberg
Marlys R Sorenson
Robert L Sorenson
Robert W Sorenson
Billy Soul
Joan Estell Spackman
Lynn Spackman
Timothy Spangler
Kurt Spatzierath
John Specht
James R Speir
Guy Spence
Robert Spitzer
Fred C Spivey
Paul Sporich
Pat Sporleder
Pat Sprutz
Harriet Spurlock
Tom Squire
Daniel J Squires
Betty St John
Vic Staada
James R Stack
Jed Stanfill
Angeline M Stang
Barry Stang
Richard L Stang
Vic Starda
Jim Stauffer
Sigur C Stavran
Wesley Stearns
James Steele
Jim Steele
Richard Steffel
Barry Stein
Darrel Steinberg
Steinbrenner Family
Duane E Steinke
Hubert E Stelling
Marian Stenehjem
John E Stenger
Robert Z Stephens
Sharon Stephens
Calvin Stevens
James T Stevens
Willie Stevens
Dr K C Stewart
Ralph D Stewart
Lawrence G Stimatz
Carl Stine
Ronald N Stone
Stephen L Stonehocker
Max Storjohann
Jon Strack
Bob Strand
James Stravens
Annette M Stroud
Ann Struna
Jim Struna
Tony Suares
Dale R Suek

Marjorie Suek
Jane Sullivan
K C Sullivan
Pat Sullivan
Zane K Sullivan
Joe S Suminski
John Summers
Leonard R Sunderland
Earl E Sutton
Kevin Suzuki
John F Svetich
Tom Svoboda
Ray Swanger
R R Swartz
William E Taber
Rosalie B Talbot
Anthony Tallant
James S Tamietti
Rolf T Tandberg
David Tande
Lee Tangedahl
Gayle Tapp
Bob Taylor
Ray Teague
Donald G Teauge
William R Teauge
Robert L Teeter
Kay Teeters
Gladys Tester
D Margarethe Thayer
George E Thayer
Robert E Thayer
Timothy R Thayer
William R Thibodeau
Ralph Thisted
William A Thomas
Gene Thompson
J Kirk Thompson
Joe A Thompson
Larry Thompson
Melvin T Thompson
Orvil Thompson
Teresa Thompson
Verna Thompson
Lloyd Thorbergson
Tyrone L Throop
Charles Tilford
Christopher Tobias
Gary L Tobol
Knute J Tocci
Bert Todd
Carole Toppins
Lee A Torgrimson
John J Torma
D S Tornbom
Sara Toubman
Gary Tourtelotte
Frederick Treichel
Nancy Tremblay
Sally L Trenkle
Trudie Triplett
Horace Tromblee
Bill Trussell
Elaine J Tschida
Jean Tschida
Mark Tschida
Annah Tubbs
Ernest T Tubbs
Albert R Tucker
Shirley A Tucker
T E Tucker
Jack Tuholske
Gary Turbak
Butch Turk
Monte Turner
Evelyn Underhill
Rick Unruh
W L Vacura
John Valenski
Clifford Valenzano
Don Valiton
Mrs Richard W Valiton
Don Valliero
Warren Van
Romie Van Dame
Charles Vanisko
Daniel J Vap
Darlene Vietaly
Dave Vietor
Vern Walcker
Gilbert Virgil
James Voeller
Adi Von Gontart
David Vugrenes
James C Waddell
Paul W Wages
Herb Wagner
Peter Wagstaff
Linda Walcker
Joseph Waldbillig
FranK Waldbilling
Bernard J Walker
JacK Wallace
William Wallace

Jimmye L Wanner
Nicholas Wappock
Cheryl R Ward
Ralph S Ward
William Ward
Jeanette K Warne
Floyd L Warner
James Warnken
Pansy Warnken
Rick Wash
R M Watson
Bonnie J Watt
Robert A Wearne
Emmett Weaver
Fred Weaver
George M Weaver
Leland Weaver
Maurice G Weaver
Shirley L Weaver
H C Webb
Perry Webb
Richard L Webb
William Webb
Don Webster
Martin O Weeks
Charles I Weihe
Rich Welch
Dr Merle Wells
Tom Wells
R J Wende
Clarence Wendel
Sandi Wendland
Donald Werster
Darlene D West
Dave West
Bernard G Weston
Myron Wetter
Bob Whaley
Kermit L Wheeler
Bonnie M White
Marion A White
Phyllis White
H A Whitehead
Donna Whitney
Marie Wickberg
Margery H Wickham
Kerry Wickman
Raymond E Wicks
Erma Widgren
Bob Wiesner
Bill Wight
E J Wight
Jeannine Wilby
Earl D Wilcox
George Wilcox
Orville Wilcox
Bernice Wiley
James Willhite
Dennis Williams
Donald Williams
George D Williams
Vern S Williams
David Williamson
Charles D Williford
Beulah Wills
Robert R Wills
Sidney Wills
Claudianna R Wilson
Eileen Wilson
Jimme L Wilson
Kenneth Wilson
Roger Wingo
Kevin L Winter
Jenifer Wise
Terry Witkowski
Dennis Witt
Coleen Wodey
Joe Wohlers
John Wohlers
William Wohlers
James Wolf
Terry L Wolfe
Eileen Wolff
Joe R Wolff
John J Womack
Mike Wood
Michele Woodson
John E Wordal
Bill Worley
John L Wozniak
David Wright
John B Wright
Chester Wylie
Betty J Yoemans
Norman Yogerst
Roger M Yost
Lillian M Young
Clayton W Zander
Bud Zimmerman
Lester D Zimmerman
Dale Zulauf

Index

INDEX

This index provides references for major discussions of topics in Volume I. Any resource potentially affected by the line will also be found under each section discussion in Chapter IV, ENVIRONMENTAL CONSEQUENCES. Individual sections are found on the following pages:

References

REFERENCES 1/

Amstutz, H. E., and D. B. Miller.
1980. A study of farm animals near 765-kV transmission lines. For the Indiana and Michigan Electric Company and American Electric Power Service Corporation. 31 pp. AEP UHV Project, North Liberty, Indiana.

Anderson, L. E.
1981. Biological effects of power-frequency electric fields. IEEE/PES short course on corona and field effects. July 1981, Portland, Oregon. 8 pp.

Atoian, G. E.
1978. Are there biological and psychological effects due to extra-high voltage installations? IEEE Transmission Power Apparatus and Systems, Vol. PAS-97-1 pp.8-18.

Banks, Robert S., Charlene M. Kauniainen, and Richard D. Clark.
1977. Public health and safety effects of high-voltage overhead transmission lines: an analysis for the Minnesota Environmental Quality Board. 151 pp. Minnesota Department of Health, Minneapolis, Minnesota.

Bennett, Edward.
1982. Personal communications with Judith Montgomery, Editor. January 28, 1982.

Bourgsdorf, M. F.
1980. Round table on UHV feasibility: How the advancement of knowledge has modified the technical-economical feasibility forecasts. Electra 73:27-42.

Blair, William G. E., Brian A. Gray, John A. Hebert, Grant R. Jones.
1976. Visual impact of high-voltage transmission facilities in northern Idaho and northwestern Montana. For the Bonneville Power Administration. 157 pp. Jones and Jones, Inc., Seattle, Washington.

Brammer, Marshall, The Washington Water Power Company
1983. Personal communications with Dan Bisenius, Project Team Leader. January 26, 1983

Bridges, J. E.
1975. Biological effects of high voltage electric fields. Final report for R.P. 381-1. 190 pp. Electric Power Research Institute, Palo Alto, California.

Bridges, J. E., and M. J. Frazier.
1979. The effects of 60-Hertz electric and magnetic fields on implanted cardiac pacemakers. Final report of research project 679-1 by ITT Research Institute for Electric Power Research Institute, Palo Alto, California.

1/ References to specific Federal bureaus are listed under their Federal Department. For instance, Bonneville Power Administration appears under U.S. Department of Energy.

Burden, Liz.
1980. Missoula County subdivision inventory report and large scale maps. 75 pp. Montana. Environmental Information Center, Missoula, Montana.

Cabanes, J.
1976. Effects of electric and magnetic fields on living organisms and in particular on man. General review of the literature. In: Recherches sur les effets biologiques des champs electrique et magnetique. Revue Generale de L'Electricite Numero Special. (July) pp. 1-26.

Campbell, A. B.
1960. Geology and mineral deposits of the St. Regis-Superior area, Mineral County, Montana. USGS Bull. 1082-I.

Cavanagh, Ralph C.
1980. Comments of the Natural Resources Defense Council, Inc., on the Bonneville Power Administration's Revised Draft Environmental Impact Statement. 256 pp. Natural Resources Defense Council, Inc. San Francisco, California.

Cerretelli, P., A. Veicsteinas, V. Margonato, A. Cantone, D. Vida, C. Malaguti, and A. Previ.
1979. 1000-kV project: research on the biological effects of 50-Hz electric fields in Italy. pp. 241-257. In: Biological Effects of Extremely Low-Frequency Electromagnetic Fields. R. D. Phillips et al. (editors). Technical Information Center, USDOE. Available as CONF-78 10 16 from NTIS, Springfield, Virginia.

Champion International Corporation.
1979. Unpublished data and forest productivity maps. 1:125,000 scale.

Choquette, W. T. and C. E. Holstine.
1982. An archaeological and historical overview of the BPA's proposed Garrison-Spokane transmission line corridor. Eastern Washington University Reports in Archaeology and History 100-20, Cheney, Washington 1982.

Climatological Handbook, 1968.
Columbia Basin States hourly data. Volume 3, Part B, Meteorology Committee, Pacific Northwest River Basins Commission, December 1968.

Committee on Biosphere Effects of Extremely Low-Frequency Radiation (CBEELFR).
1977. Biologic effects of electric and magnetic fields associated with proposed project Seafarer. 440 pp. National Academy of Sciences. Washington, D.C.

Comptroller General of the United States.
1979. Coal Creek: A power project with continuing controversies over costs, siting, and potential health hazards. 75 pp. U.S. General Accounting Office, Washington, D.C.

County of Missoula, et al. v. Peter Johnson, et al. Mont. D.C., CV-81-35-BU, January, 1982.

Craighead, John J., and Lance Craighead.
1978. An assessment of the ecological impacts of the (LAURD) project and Libby Dam on the American bald eagle. 140 pp. U.S. Army Corps of Engineers, Seattle, Washington.

Dames and Moore.
1980. (Draft) Study documentation report: Ashe-Slatt Environmental Impact Statement Supplement. Report prepared for Bonneville Power Administration. 188 pp.

Daubenmire, R.,and Jean B. Daubenmire.
1968. Forest vegetation of eastern Washington and northern Idaho. 104 pp. Washington Agricultural Experiment Station, College of Agriculture, Washington State University.

Dietrich, Fred. 1982.
Audible noise impact and electric field levels of the proposed BPA Garrison-Spokane 500-kV Transmission Project. Electric Research and Management Inc. for Montana DNRC, Helena.

Dow Associates
1980. Biological effects and physical characteristics of fields, ions, and shock. Dow Associates, Inc. Berkeley, California.

Driscoll, Edward C. Jr., Brian A. Gray, William G. E. Blair, John F. Ady.
1976. Measuring the visibility of high voltage transmission facilities in the Pacific Northwest. For the Bonneville Power Administration. 55 pp. Jones and Jones, Inc., Seattle, Washington.

Dumansky, Y. D., G. I. Ertushenko, T. V. Kalyada, and V. Y. Akimenko.
1979. Study of static and low-frequency EMF biologic effects report on the results of scientific investigations for 1978 (USSR). Paper included with memorandum of the results of the second US-USSR workshop conference on the biological effects of physical factors in the environment. Seattle, Washington.

Edaw, Inc.
1975a. Report prepared for Electric Power Research Institute and U.S. Energy Research and Development Administration. 191 pp. San Francisco, California.

Edaw, Inc.
1975b. Visual impact analysis methodology for transmission line planning corridors. 48 pp. San Francisco, California.

Edward C. Jordan Co., Inc.
1977. Dickey-Lincoln school lakes transmission project. Socioeconomic assessment of alternative routes: Appendix H. pp.15-27, 131-151. For the U.S. Department of Energy, Portland, Maine.

Edward C. Jordan Co., Inc.
1980. Dickey-Lincoln school lakes transmission project. Socioeconomic assessment of alternative routes: supplemental report, segment F. pp.16, 22, 24. For the U.S. Department of Energy, Portland, Maine.

Eighth Circuit in Citizens and Landowners Against the Miles City/New Underwood Powerline, et al., v. Secretary, U.S. Department of Energy, et al. Nos. 81-1544 and 81-1718, July, 1982

Electric Power Research Institute (EPRI).
1979. Initial study of the effects of transformer and transmission line noise on people (three volumes). Prepared for EPRI by Bolt, Beranek, & Newman, Inc., EPRI Report Number RP 852, December 1979, Palo Alto, California.

Evans, W. A.
1977. Fish migration and fish passage--a practical guide to solving fish passage problems. USDA Forest Service, Region 5.

Federal Emergency Management Agency.
1980. Flood insurance study for city of Deer Lodge and Powell Counties, Montana. 28p. Deer Lodge, Montana.

Fortin, Jean-Marie.
1980. Time lost with electric towers. CSAE Paper No. 80-107.

Freidline, R. A., R. B. Smith, and D. D. Blackwell.
1976. Seismicity and contemporary tectonics of the Helena, Montana area. Bull. Seism. Soc. Am. 66(1):81-95

Fulton, J. P., S. Cobb, L. Preble, L. Leone, and E. Forman.
1980. Electrical wiring configurations and childhood leukemia in Rhode Island. American Journal of Epidemiology 111:292-296.

Gallant, William A., Charles S. Robinson and Associates, Inc.
1979. General geologic report, Blackfoot Planning Unit. 18 pp. Prepared for the Bureau of Land Management, Missoula, Montana.

Gazunis, Katherine - Teressa.
1976. Archaeological inventory in the Blackfoot Planning Unit western central Montana. 30 pp. Western Interstate Commission for Higher Education, Boulder, Colorado.

Genereux, John P., and M. Michele Genereux.
1980. Perceptions of landowners about the effects of the UPA/CPA powerline on human and animal health in west central Minnesota. For the Minnesota Environmental Quality Board. 22 pp. Consulting and Research in the Social Sciences, St. Paul, Minnesota.

Gerlach, Lutner P.
1978. The great energy standoff. Natural History 89:22-32.

Getson, D. E. et al.
1974. Tower design reduces visual impact. Electrical World 182:66-69.

Goodwin, Jr., John G.
1975. Big game movement near a 500-kV transmission line in northern Idaho. For the Bonneville Power Administration. 56 pp. Western Interstate Commission for Higher Education, Boulder, Colorado.

Greene, R. W.
1979. Study of biological effects of UHV transmission line electric fields. A report to American Electric Power Service Corporation by the Department of Biology, University of Notre Dame, South Bend, Indiana.

Greenberg, B., J. C. Kunich, and V. P. Bindokas.
1978. The effects of high-voltage transmission lines on honey bees. 35 pp. For Electric Power Research Institute. Palo Alto, California.

Gustafson, R.J., P.D. Grumstrup, E.R. Hendrickson, and M.P. Meyer.
1979. Land lost from production under and around electrical transmission line structures. ASAE Paper No. 79-3048.

Gustafson, R.J., V.R. Morey, V.R. Eidman, and M.P. Meyer.
1978. An investigation of electric power transmission and agriculture compatability in the MAPP region. University of Minnesota, Agricultural Experimental Station, Misc. Pub. 1713-1978.

Gustafson, R.J., V.R. Morey, V.R. Eidman, and E.R. Hendrickson.
1979. Interaction of center pivot irrigation and electrical transmission line structures. ASAE Paper No. 79-3007.

Hagmann, Carol.
1977. Recreational use and use areas within the Blackfoot Planning Unit. 47 p. Western Interstate Commission for Higher Education, Boulder, Colorado.

Hagmann, Carol.
1979. Recreational use of the Upper Clark Fork River and its tributaries. 92 pp. In cooperation with Montana Department of Fish and Game, Helena, Montana. Wilderness Institute, University of Montana, Missoula, Montana.

Haynam, Karen C., and Jay S. Summer.
1977. Peregrine and prairie falcon survey and habitat analysis. 16 pp. U.S. Forest Service, Lolo National Forest, Missoula, Montana.

Heidel, Bonnie.
1979. Endangered and threatened plants in the north Idaho BLM district. 100 pp. Bureau of Land Management, Coeur d'Alene, Idaho.

Hennichs, K.
1982. Cows exposed to 400-kV lines. Inventory and Fertility Study. Swedish University of Agricultural Sciences, Dept. of Animal Hygiene. Report No. 7. Skara.

Heritage Conservation and Recreation Service.
1979. National Register of Historic Places: annual listing of historic properties. pp. 7416-7649. Federal Register. Tuesday, February 6, and subsequent addenda through January 1980.

Heritage Conservation and Recreation Service.
1980. Nationwide rivers inventory. A report on natural and free-flowing rivers in the northwestern United States. 47 pp. Seattle, Washington.

Herrold, J. E.
1979. Health and safety effects of EHV electric transmission lines. A review of the literature. Michigan Public Service Commission. Lansing, Michigan. 101 pp.

Hodges, T. K., and C. Mitchell.
1979. Growth and yield of field crops in the proximity of an ultra-high voltage electric test line. 38 pp. American Electric Power System, North Liberty, Indiana.

Holzworth, George C.
1972. Mixing heights, wind speeds, and potential for urban air pollution throughout the contiguous United States. 118 pp. Environmental Protection Agency, Research Triangle Park, North Carolina.

IIT Research Institute
1979. Biological effects of high-voltage electric fields: An update. Vol. 2: Bibliography. Electric Power Research Institute, Palo Alto, California.

Idaho State Historic Society.
1980. Idaho historic inventory.

Janes, D. E.
1976. Background information on extra-high-voltage overhead electric transmission lines. U.S. Environmental Protection Agency, Washington, D.C.

Janes, D. E.
1980. Evaluation of health and environmental effects of extra high voltage (EHV) transmission. 233 pp. U.S. Environmental Protection Agency, Office of Radiation Programs, Washington, D.C.

Kaufman, G. E., and S. M. Michaelson
1974. Critical review of the biological effects of electric and magnetic fields. 345 pp. Charles C. Thomas, Springfieldf, Illinois.

Kavet, R.
1979. High-voltage health effects studies. EPRI Journal 4:57-59.

King, E. N., J. E. Harrison, and A. B. Griggs.
1970. Geologic implications of aeromagnetic data in the Pend Oreille area, Idaho-Montana. USGS Prof. Paper 646-D.

Kitchings, J.T., H.H. Shugart, J.D. Story.
1974. Environmental impacts associated with electric transmission lines. Oak Ridge National Lab., Tennessee.

Knave, B., F. Gamberale, S. Bergstrom, E. Birke, A. Iregren, B. Kolmodin-Hedman, and A. Wennberg.
1979. Long-term exposure to electric fields: A cross-sectional epidemiologic investigation on occupationally exposed high-voltage substation workers. Scandinavian Journal of Work Environment and Health 5:115-125.

Kootenai County, Idaho.
1979. Plat maps. 1:6,000 scale.

Kootenai County Planning Board.
1979. County comprehensive plan and land use maps. 1:24,000 scale. Coeur d'Alene, Idaho.

Kornberg, H.A.
1976. Ecological influence of electric fields. Interim Report, Westinghouse Electric Corporation, East Pittsburg, Pennsylvania.

Kornberg, H. A.
1977. Concern overhead. Electric Power Research Institute Journal 2(5):6-13.

Kornelis, T.
1977. Farming around and under transmission lines. Prepared for Bonneville Power Administration, U.S. Department of Energy, Portland, Oregon.

Lake County Planning Board.
1979. Draft comprehensive plan and maps. 1:125,000 scale. 103 pp. Polson, Montana.

Lathrop, Earl W. and Edwin F. Archbold.
1980. Plant response to utility right-of-way construction in the Mojave Desert. Env. Management 4(3):215-226.

Lee, Jack M. Jr., J. H. Brunke, G. E. Lee, G. L. Reiner, and F. L. Shon.
1982. Electrical and Biological Effects of Transmission Lines: A Review. Bonneville Power Administration. Portland, Oregon.

Lingel-Pate, T.
1981. Status of wintering bald eagles on the Lolo National Forest. 39 pp. Unpublished report. Lolo National Forest, Missoula, Montana.

Loftness, M. O.
1977. A practical handbook for the prevention and correction of television interference from overhead power lines. 101 pp. For the Bonneville Power Administration, Portland, Oregon.

Loftness, M. O.
1980. A practical handbook for the correction of radio interference from overhead power lines and facilities. 130 pp. For the Bonneville Power Administration, Portland, Oregon.

Lyons, W. W. (Deputy Under Secretary of U.S. Department of Interior).
1976. Memorandum to Administrator (Bonneville Power Administration) on Colstrip Project, Montana Power Company et al. November 15, 1976.

MacLaren Ltd.
1979. A report on the state-of-the-art of environmental effects of transmission lines. Canadian Electrical Association, Montreal, P.Q. Canada.

Mahmoud, A. A. and D. Zimmerman.
1982. Pigs fare well under a 345-kV line. Transmission and Distribution. December, pages 28-30.

Malaguti, C., A. Previ, A. Cantone, and P. Cerretelli.
1980. Biological effects of exposure to electric fields at 50 Hz. Rendiconti Associazione Elettrotecnici ed Elettronici Italiano, 41 pp. Trieste. (English translation).

Malboysson, E.
1977. Medical testing of people working under the effects of an electromagnetic field. Elekrik Muhendisligi 250:496-499. (English translation from the original Turkish.)

Male, J. C. and W. T. Norris
1981. Are the electric fields near power-transmission plant harmful to health? A brief review of present knoweledge and proposed action. 22 pp. Central Electricity Research Laboratories. Great Britain.

Marino, A. A. and R. O. Becker.
1978. High-voltage lines hazard at a distance. Environment 20:6-15.

Marino, A. A., J. M. Cullen, M. Reichmanis, and R. O. Becker.
1979. Power frequency electric fields and biological stress: A cause-and-effect relationship. pp. 258-276. In: Biological Effects of Extremely Low Frequency Electromagnetic Fields. R. D. Philips, et al. (ed.). Technical Information Center, U.S. Department of Energy. Available as CONF-781016 from NTIS, Springfield, Virginia.

Matias, T. R. and H. L. Colbeth.
1978. Cases 26529 and 26559 recommended decision of the administrative law judges on the health and safety effects of 765-kV transmission lines. 75 pp. State of New York, Public Service Commission, Albany.

Mehn, W. H.
1979. The human considerations in biological effects of electric fields. pp. 21-37. In: Biological Effects of Extremely Low-Frequency Electromagnetic Fields. R. D. Phillips, et al. (ed.). Technical Information Center, U.S. Department of Energy. Available as CONF-781016 from NTIS, Springfield, Virginia.

Meyer, James R.
1978. Effects of transmission lines on bird flight behavior and collision mortality. For the Bonneville Power Administration. 200 pp. Western Interstate Commission for Higher Education, Boulder, Colorado.

Meyer, James R.
1979. Northwest Montana/north Idaho transmission corridor bald eagle study. 90 pp. Bonneville Power Administration. Portland, Oregon.

Michaelson, S. M.
1979. Human responses to power frequency exposures. pp. 1-20. In: Biological Effects of Extremely Low-Frequency Electromagnetic Fields. R. D. Phillips, et al. (ed.). Technical Information Center, U.S. Department of Energy. Available as CONF-781016 from NTIS, Springfield, Virginia.

Miller, M. W., and G. E. Kaufman.
1978. High-voltage overhead. Environment 20:6-36.

Missoula County, Montana.
1981a. Certificates of survey and subdivision records. Planning Office. Missoula, Montana.

Missoula County, Montana.
1981b. Plat maps. 1:6,000 scale. Assessor's office. Missoula, Montana.

Molino, J. A., G. A. Zerdy, N. D. Lerner, D. L. Harwood, and Susan G. Tremaine.
1978. Initial psychoacoustic experiments on the human response to transmission line audible noise. For U.S. Department of Energy. (DOE/ET/6010-1). National Bureau of Standards, Washington, D.C.

Montana Department of Agriculture and Statistical Reporting Service-USDA.
1976. Montana Agriculture Statistics. Vol. XVI.

Montana State Historic Society.
1980. Montana State historic inventory.

Montana Water Resources Board.
No date. An atlas of water resources in Montana by hydrologic basins. Inventory Series Report No. 11.

Moore, Gerald, et. al.
1976. Some management implications of habitat type classification. 80 pp. Olson-Elliott and Associates, Helena, Montana.

Mountain West Research, Inc.
1982. Transmission line construction worker profile and community/corridor resident impact study. 94 pp. Final report for the Bonneville Power Administration, U.S. Department of Energy, Portland, Oregon.

National Oceanic and Atmospheric Administration.
1979. Sectional aeronautical chart. Great Falls, Montana.

Ninth Circuit in Columbia Basin Land Protection Association v. Schlesinger
643 F.2d 585, 602, (9th Cir. 1981).

Ninth Circuit in Daly v. Volpe
514 F.2d 1106 (9th Cir. 1975).

Nordell, Larry.
1979. Northern Tier Report No. 6: Social and economic impacts of the proposed Northern Tier Pipeline in Montana. 20 pp. Montana Department of Natural Resources and Conservation, Energy Division, Helena, Montana.

Nordstrom, S.
1981. Reproductive hazards and chromosomal aberrations among workers at high voltage substations. Paper presented at an International Seminar on Biological Effects of Electromagnetic Fields in Relation to the Evaluation of Health Hazards from Power Transmission Lines. NTNT Conf. Center, Oslo, Norway. March 12, 13.

Northern Idaho Regional Archeological Center.
1980. Unpublished maps and records.

Northwest Power Planning Council
1983. Regional conservation and eletric power plan (draft). Portland, Oregon.

Olson, D. L.,Senior Vice President, Resources, The Washington Water Power Company.
1983. Letter to Marvin Klinger, Assistant Administrator for Engineering and Construction, The Bonneville Power Administration. January 19, 1983

Osborne, Phil.
1982. National Park Service. January Personal Communication with Marvin Jeffers, BPA, Portland, Oregon.

Pachard, Patricia L.
1979. Status report: Tofieldia glutinosa absona. 7 pp. U.S. Fish and Wildlife Service, Portland, Oregon.

Pachot, James.
1981. Bonneville Power Administration. February Personal Communications with Judith Montgomery, Team Member, Portland, Oregon.

Pacific Northwest Regional Conference.
1977. Unpublished land use maps for Oregon, Washington, and Idaho. 1:250,000 scale.

Pacific Northwest Utilities Conference Committee.
1982a. Long-range projection of power loads and resources for resource planning. PNUCC, Portland, Oregon

Payne, Richard D.
1976. An inventory of recreation house developments in Idaho. Center for Research, Grants, and Contracts, Boise State University, Boise, Idaho.

Pearsons, K. S., R. L. Bennett, and S. A. Fidell.
1979. Initial study on the effects of transformers and transmisson line noise on people, Vol. 1: Annoyance. 38 pp. Prepared by Bolt, Beranek, and Newman, Inc., for Electric Power Research Institute, Palo Alto, California.

Perry, Dean E.
1972. An Analysis of transmission line audible noise levels based upon field and three-phase test line measurements. IEEE Transactions on Power Apparatus and Systems Volume 91, Number 3, May/June 1972, New York, New York.

Petterson, George R.
1980. Statement regarding operation of the CU-TR-1 transmission line-health considerations. 5 pp. Memorandum to the Chairman Minnesota Environmental Quality Board, from Commissioner of Health, Minneapolis, Minnesota.

Phillips, R. D. and W. T. Kaune
1977. Biological effects of static and low-frequency electromagnetic fields: An overview of United States literature. 29 pp. Battelle Northwest Laboratories, Richland, Washington.

Phillips, R. D., M. F. Gillis, J. L. Beamer, C. H. Allen, W. T. Kaune, J. R. Decker, T. W. Jeffs, and H. A. Ragan.
1979a. Biological effects of electric fields on large animals. Pacific Northwest Laboratory Annual Report to the Electric Power Research Institute, PNL 2850. NTIS, Springfield, Virginia.

Phillips, R. D., L. B. Anderson, and W. T. Kaune.
1979b. Biological effects of high strength electric fields on small laboratory animals. 338 pp. Prepared by Battelle Pacific Northwest Laboratory for U.S. Department of Energy (DOE/TIC-10084). Division of Electrical Energy Systems, Washington, D.C.

Phister, Robert D. et al.
1977. Forest habitat types of Montana. 174 pp. General Technical Report Int-34. Intermountain Forest and Range Experiment Station, U.S. Forest Service, Ogden, Utah.

Ponte, L.
1980. The menace of electric smog. Readers Digest 116(693):65-69.

Powell County Assessor's Office
1981. Certificate of survey and subdivision records. Deer Lodge, Montana.

Powell County Planning Commission.
1978. Powell County land use plan. 51 pp. Deer Lodge, Montana.

Poznaniak, D.T., J.W. Bankoske, and H.G. Mathews.
1977. Simulations of transmission line ground-level gradient for biological studies of small plants and animals. From IEEE Power Engineering Society, Summer Meeting, Mexico City, Mexico, July 17-22, 1977. Published by IEEE, New York, NY, 1977. Paper A77 718-0.

Pramstatter, M. E.
1981. Final results of the second annual midwinter bald eagle survey. Raptor Information Center, National Wildlife Federation, Washington. D.C.

Randall, William E.
1973. Multiple use potential along power transmission rights of way. pp. 89-113. In: American Institute of Biological Sciences Annual Meeting Proceedings of the Colloquia: "Biotic Management Along Power Transmission Rights of Way." June 21, 1973. Amherst, Massachusetts.

Raptor Information Center.
1979. Bald eagle distribution during the NWF's first annual midwinter bald eagle survey, 13-27. January, 1979. National Wildlife Federation. Washington, D.C.

Rabe, F. W. and N. L. Savage.
1977. Aquatic natural areas in Idaho. Technical Completion Report A-046-IDA. U.S. Department of Interior, Office of Water Research and Technology Research.

Rogers, L. E., J. L. Warren, K. A. Gano, R. L. Hinds, R. E. Fitzner, and G. F. Piepel.
1982. Environmental studies of a 1100-kV prototype transmission line. An annual report for the 1981 study period. Prepared for Bonneville Power Administration by Battelle Pacific Northwest Laboratories, Richland, Washington.

Ross, C. P.
1955. Geologic map of Montana. 1:500,000 scale. Montana Bureau of Mines and Geology.

Ross, C. P. and D. J. Forrester.
1959. Geologic map of the State of Idaho. 1:500,000 scale. Idaho Bureau of Mines and Geology.

Savin, B. M. et al.
1978. Methods for studying and criteria for evaluating the biological effects of electric fields of industrial frequency. In: American-Soviet Symposium on superhigh supply lines, Tashkent.

Scott-Walton, B. et al.
1979. Potential environmental effects of 765-kV transmission lines: Views before the New York State Public Service Commission, cases 26529 and 26559, 1976-1978. U.S. Dept. of Energy, Washington, D.C.

Shandala, M. G., Y. D. Dumansky, G. V. Prohvatilo, I. S. Bezdolnaya, and Y. I. Vasilenko.
1979. Biological effects of the low-frequency electromagnetic field (50 Hz). Paper presented at Bioelectromagnetics Symposium, June 21, 1979. Seattle, Washington. (In Press.)

Sheppard, A. R. and M. Eisenbud
1977. Biological effects of electric and magnetic fields of extremely low frequency. New York University Press, N.Y.

Sheppard, A. R.
1983. Biological effects of high voltage a.c. transmission lines. Report submitted to Montana DNRC, Energy Division, Helena.

Slough, Dennis.
1977. Wales Creek recreation inventory. 38 pp. For the Bureau of Land Management. Western Interstate Commission for Higher Education, Boulder, Colorado.

State of Idaho.
1970. Map of irrigated and potentially irrigable lands. 1:250,000 scale. Water Resources Board.

State of Idaho.
1972. Idaho general soils map, Kootenai County. 1:253,440 scale.

State of Idaho
1977. Outdoor Recreation Plan. County maps. 1:125,000 scale.

State of Idaho
1978. Map of waterways of the lower Coeur d'Alene River. 1:750,000 scale. Department of Fish and Game, Coeur d'Alene, Idaho.

State of Idaho
1979a. Official Highway Map. 1:1,128,800 scale.

State of Idaho.
1979b. Unpublished resource maps. 1:125,000 scale. Department of Fish and Game, Coeur d'Alene, Idaho.

State of Idaho.
1981. Cultural resources inventory. University of Idaho Anthropology Lab, Moscow, Idaho.

State of Montana, et al. v. Peter Johnson, et al.
Mont. D.C., CV-81-26-BU, March, 1982.

State of Montana, et al. v. Peter Johnson, et al.
Mont. D.C., CV-81-26-BU, August, 1982.

State of Montana.
No date. Montana recreation guide. 1:1,056,000 scale.
Department of Fish and Game.

State of Montana.
1972. Montana bridges. Highway Department.

State of Montana.
1976, 1981. General highway maps. 1:125,000, 1:1,390,000 scales.
Highway Department.

State of Montana.
1977-81. Existing land use: Granite, Missoula, Sanders, Lake, Ravalli and Powell. 1:125,000 scale. Montana Statewide Cooperative Land Use Mapping Program. Department of Community Affairs. Missoula, Montana.

State of Montana.
1978a. Montana statewide comprehensive outdoor recreation plan: Volume 2--outdoor recreation inventory. 167 pp. Department of Fish, Wildlife and Parks, Helena, Montana.

State of Montana.
1978b. Unpublished wildlife habitat maps--Region 2. 1:250,000 scale. Department of Fish, Wildlife and Parks, Missoula, Montana.

State of Montana.
1979a. Unpublished forest data and productivity maps. 1:250,000 scale. Department of Natural Resources and Conservation, Helena, Montana.

State of Montana.
1979b. Montana stream ratings. Unpublished stream evaluation data. Department of Fish, Wildlife and Parks, Bozeman, Montana.

State of Montana.
1979c. Unpublished resource maps. 1:125,000 scale. Department of Fish, Wildlife and Parks, Missoula, Montana.

State of Montana.
1981a. Cultural resource inventory. University of Montana, Missoula, Montana.

State of Montana.
1981b. Parks perspective. 42 pp. Department of Fish, Wildlife and Parks, Helena, Montana.

State of New York Public Service Commission (SNYPSC).
1978. Opinion No. 78-13. Opinion and order determining health and safety issues, imposing operating conditions, and authorizing, in case 26529, operating pursuant to those conditions. SNYPSC, Albany, N.Y.

State of New York.
1982. "Decision claim No. 61030." Court of Claims, Utica, New York.

Stetson, L.E.
1979. Goals and concerns of ASAE task force in overhead clearance of power lines. Agric. Engineering 69(4):56.

Stopps, G. J., and W. Janischewskyj.
1979. An epidemiological study of personnel working on a.c. transmission lines. Paper presented before the Canadian Electrical Association, Vancouver, British Columbia, March 1979.

Tomenius, L., L. Hellstrom, and B. Enander.
1982. Electrical constructions and 50-Hz magnetic field at the dwellings of tumour cases (0-18 years of age) in the Country of Stockholm. International Symposium on Occupational Health and Safety in Mining and Tunnelling. Prague. June 21-25.

Travis, Michael R., Gary H. Elsner, Wayne D. Iverson, Christine G. Johnson.
1975. VIEWIT: Computation of seen areas, slope, and aspect for land-use planning. Technical report PSW-11. 70 pp. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California.

Umpleby, J. B.
1924. The Osburn fault, Idaho. J. Geol. 32(7):601-614.

U.S. Department of Agriculture, Forest Service.
1972-1979. Published and unpublished planning unit reports. Lolo, Kootenai, Deerlodge, Bitterroot, and Panhandle National Forests. U.S. Department of Agriculture.

U.S. Department of Agriculture, Forest Service.
1974. National forest landscape management: visual management system. Volume 2, Chapter 1. 47 pp. U.S. Department of Agriculture Handbook No. 462.

U.S. Department of Agriculture, Forest Service.
1975. National forest landscape management: utilities Volume 2, Chapter 2. 147 pp. U.S. Department of Agriculture Handbook No 478.

U.S. Department of Agriculture, Forest Service.
1976a. Forest travel plan map. Lolo National Forest, Montana. 1:168,917 scale. Missoula, Montana.

U.S. Department of Agriculture, Forest Service.
1976b. Land suitability pattern for electrical transmission lines. 75 pp. U.S. Department of Agriculture, Missoula, Montana.

U.S. Department of Agriculture, Forest Service.
1977. National forest landscape management: roads. Volume 2, Chapter 2. 62 pp. U.S. Department of Agriculture Handbook No. 483.

U.S. Department of Agriculture, Forest Service.
1979. RARE II Final Environmental Statement Map, Northern Region National Forests. 1:1,000,000 scale. U.S. Department of Agriculture.

U.S. Department of Agriculture, Forest Service.
1979 - 1981. Published and unpublished resource maps. 1:24,000; 1:30,000; 1:125,000; 1:250,000 and 1:500,000 scales. U.S. Department of Agriculture. Lolo, Kootenai, Deerlodge, Bitterroot, and Panhandle National Forests.

U.S. Department of Agriculture, Forest Service.
1980. Lolo National Forest plan. Draft environmental impact statement. 172 pp. Lolo National Forest, Missoula, Montana.

U.S. Department of Interior, Geological Survey.
1973, 1974. LANDSAT Imagery. 1:250,000 scale. U.S. Department of Interior, EROS Data Center, Sioux Falls, South Dakota.

U.S. Department of Agriculture, Geological Survey.
1978. Color infrared aerial photography. 1:125,000 scale. U.S. Department of Interior, EROS Data Center, Sioux Falls, South Dakota.

U.S. Department of Agriculture, Soil Conservation Service.
1973. Soil survey lower Blackfoot area, Missoula County, Montana. 205 pp. In cooperation with Anaconda Forest Products and Bureau of Land Management. Missoula, Montana.

U.S. Department of Agriculture, Soil Conservation Service.
1975. Potential irrigation development map. Sanders County. 1:250,000 scale. U.S. Department of Agriculture.

U.S. Department of Agriculture, Soil Conservation Service.
1977a. Clark Fork of the Columbia River Basin. In cooperation with Montana Department of Natural Resources and Conservation. With resource maps: 1:500,000 scale. Portland, Oregon.

U.S. Department of Agriculture, Soil Conservation Service.
1977b. Rattlesnake Creek watershed investigation report. 9 pp. Missoula County,Montana.

U.S. Department of Agriculture, Soil Conservation Service.
1978a. Granite conservation district, long range plan. 14 pp. Portland, Oregon.

U.S. Department of Agriculture, Soil Conservation Service.
1978b. General Soil Map of Montana. Montana State University, Bozeman, Ext. Misc. Pub. No. 16.

U.S. Department of Agriculture, Soil Conservation Service.
1979. Prime farmland. Inventory and Monitoring Bulletin No. 42-9-2. U.S. Department of Agriculture.

U.S. Department of Agriculture, Soil Conservation Service.
1981. Soil survey of Kootenai County area, Idaho.

U.S. Department of Agriculture (Forest Service), U.S. Department of Interior (Bureau of Land Management), and U.S. Department of Energy (Bonneville Power Administration).
1979. Federal corridor option summary: Colstrip transmission system. 37 pp. U.S. Department of Agriculture, Missoula, Montana.

U.S. Department of Energy
1980. Project Resumes submitted during a contractor's review, November 18-19. USDOE, Division of Electrical Energy Systems.

U.S. Department of Energy, Bonneville Power Administration.
1975. Draft facility evaluation for Hot Springs-Bell 500-kV line. Supplement to the environmental statement. FY 1977 Proposed Program. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1976, 1978. Unpublished resource maps. BPA Libby Integration Study and Colstrip Transmission Environmental Report. 1:125,000, 1:500,000 scale. U.S. Department of Energy.

U.S. Department of Energy, Bonneville Power Administration.
1977a. BPA's Pacific Northwest long range east-west energy corridor study, Phase I. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1977b. The role of the Bonneville Power Administration in the Pacific Northwest power supply system, Appendix B: BPA power transmission. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1979a. Population, employment, and households projected to the year 2000 for Washington. 30 pp. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1979b. Tips on how to behave near high-voltage power lines. 9 pp. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1980a. Idaho population, employment, and households projected to the year 2000. 30 pp. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1980b. Montana population, employment, and households projected to the year 2000. 30 pp. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1980c. Northwest Montana/north Idaho support and Libby integration final environmental impact statement. 79 pp. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1980d. Reliability criteria and standards. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1981. Living and working around high-voltage power lines. 9 pp. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy, Bonneville Power Administration.
1982. Bonneville Power Administration forecasts of electricity consumption in the Pacific Northwest. 167 pp. Final Report. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy.
1982b. Transmission facilities vegetation management program. Draft Environmental Impact Statement. U.S. Department of Energy, Portland, Oregon.

U.S. Department of Energy.
To be published (1983). Transmission facilities vegetation management program. Environmental Impact Statement. I.S. Department of Energy, Portland, Oregon.

U. S. Department of Energy (Bonneville Power Administration), U.S. Department of Interior (Bureau of Land Management), U.S. Department of Agriculture (Forest Service).
1978. Colstrip Transmission Environment Report: Federal Interagency Colstrip Transmission Corridor Analysis.

U.S. Department of Interior, Bureau of Indian Affairs.
1979. Unpublished resource maps. 1:250,000 scale. U.S. Department of Interior, Ronan, Montana.

U.S. Department of Interior, Bureau of Indian Affairs.
1980. Cultural inventory. 1:125,000 scale. U.S. Department of Interior. Ronan, Montana.

U.S. Department of Interior, Bureau of Land Management.
1972-1981. Unpublished wildlife resource maps--Hoodoo and Blackfoot Planning Units. 1:126,720 scale. Missoula, Montana.

U.S. Department of Interior, Bureau of Land Management.
1975. Visual resource inventory and evaluation. 64 pp. BLM manual 6310. U.S. Department of Interior.

U.S. Department of Interior, Bureau of Land Management.
1979. Northern Tier Draft EIS crude oil transportation system: map addendum. 187 pp. U.S. Department of Interior.

U.S. Department of Interior, Bureau of Land Management.
1980a. Idaho intensive wilderness inventory, final decision. 76 pp. Boise, Idaho.

U.S. Department of Interior, Bureau of Land Management.
1980b. Montana overthrust belt wilderness inventory, Butte District. 145 pp. Billings, Montana.

U.S. Department of Interior, Fish and Wildlife Service.
1978. Stream evaluation map, State of Idaho. 1:500,000 scale. Denver, Colorado.

U.S. Department of Interior, Fish and Wildlife Service and Montana Department of Fish, Wildlife, and Parks.
1979. Stream evaluation map - State of Montana. 1:500,000 scale.

U.S. Department of Interior, Fish and Wildlife Service and Montana Department of Fish, Wildlife and Parks.
1980. Stream evaluation map - State of Montana. 1:500,000 scale. Helena, Montana.

U.S. Departments of the Interior and Agriculture.
1970. Environmental criteria for electric transmission systems. 52 pp. U.S. Government General Printing Office, Washington, D.C.

U.S. Environmental Protection Agency.
1979a. Environmental quality profile for Idaho. 26 pp. Seattle, Washington.

U.S. Environmental Protection Agency.
1979b. Environmental quality profile for Washington. 26 pp. Seattle, Washington.

University of Idaho.
1980. Unpublished resource maps. 1:158,400 scale. Moscow, Idaho.

Veseth, Roger and Clifford Montagne.
1980. Geologic Parent Materials of Montana Soils. USDA-Soil Conservation Service, Bozeman, Montana. Bull. No. 721.

Watson, Tom J. Jr.
1976. An evaluation of putatively threatened or endangered species from the Montana flora. 31 pp. Unpublished Forestry Facility Intern Program Report. U.S. Forest Service, Missoula, Montana.

Wellner, C. A. and F. O. Jackson.
1974. Research natural area needs in Idaho: A first estimate.

Wertheimer, N. and E. Leeper.
1979. Electrical wiring configurations and childhood cancer. American Journal of Epidemiology 109:273-284.

Willdan Associates.
1982. Impact of the Ashe-Slatt 500-kV transmission line on birds at Crow Butte Islands: Postconstruction study final report. 110 pp. Prepared for Bonneville Power Administration, I.S. Department of Energy, Portland Oregon.

Williams, J. H., and E. J. Beiler.
1979. An investigation of dairy farm operations in association with 765-kV transmission in Ohio. Ohio Power Siting Commission and Cleveland Electric Illuminating Company, Cleveland, Ohio.

Young, L. B.
1978. Danger: High voltage. Environment 20(4):16-38.

Errata

E R R A T A

This chapter contains revisions and/or updated information for the EIS Appendices, which are not being reprinted.

APPENDIX A - METHODOLOGY

3. DATA BASE DEVELOPMENT

Page 6, line 6: Add "Deerlodge, Bitterroot" inside the parenthesis.

4. CORRIDOR IDENTIFICATION

Figure 4.1: Filled-in box for "Farmland Of Statewide Importance" should be under Agriculture, not Forestry.

Figure 4.1: "Cultural Resources" should be numbered "21.1", not "19.1."

5. IMPACT ASSESSMENT

Table 5-1, Environmental Ranking Summary: This table has been revised to reflect changes in the preferred route for the Plains plan and the addition of environmentally sensitive areas (Maxville and St.Regis-Tamarack Creek). See revised version attached.

Attachment 1: Public Involvement Summary

The attached sheets reflect corrections and updates since the draft EIS was released.

Attachment 2: Location Factors

Page 1, line 5: insert "to" between "susceptibility" and "impact".

Page 11-12: Forest productivity measurements in terms of cubic feet per acre per year should be added to the three productivity classes, as follows:

High Productivity - 85 cf/ac/yr
Moderate Productivity - 50-84 cf/ac/yr
Low Productivity - up to 50 cf/ac/yr.

Attachment 3: Route Comparison Workshop Summaries

Additional route comparison workshops held on local routing alternatives in the Maxville, Potomac, Blue Mountain, and St. Regis areas, August 30-September 2, 1982, are summarized, with maps and data summaries, in Volume II, Part IV.

ATTACHMENT 1 - PUBLIC AND AGENCY INVOLVEMENT SUMMARY

MONTH/DAY	YEAR	LOCATION	ACTIVITY
SEPT 19	1979	Missoula	Hot Springs-Bell Project scoping meeting held.
SEPT 20	1979	Coeur d'Alene	Hot Springs-Bell Project scoping meeting held.
NOV 6	1979	Coeur d'Alene	EIS team meets with involved local agencies for data collection.
NOV 7-8	1979	Missoula	EIS team meets with involved local agencies for data collection.
DEC 4	1979	Superior	BPA meets with Mineral County land use planning department on Hot Springs-Bell project.
DEC 5	1979	Thompson Falls	BPA meets with Sanders County Commissioners and land use planning department on Hot Springs-Bell project.
DEC 7	1979	Missoula	BPA meets with Missoula County Planning Board on Hot Springs-Bell project.
DEC 13	1979	Portland	Hot Springs-Bell steering committee meeting.
DEC	1979	Thompson Falls	BPA meets with land use planning departments and other local government groups regarding the Hot Springs-Bell project.
JAN 30	1980	Missoula	Hot Springs-Bell steering committee meeting.
FEB 20	1980	Spokane	Hot Springs-Bell steering committee meeting.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
MAR	1980		Public workshops designed to describe the project and obtain data and review of corridors were conducted in eight cities: 3-17-80 Coeur d'Alene 3-18-80 Spokane 3-19-80 Wallace 3-20-80 Noxon 3-24-80 Thompson Falls 3-25-80 Missoula 3-26-80 Superior 3-27-80 St. Ignatius
APR 15	1980	Missoula	Hot Springs-Bell steering committee meeting.
MAY 1	1980	Missoula	BPA meets with Lincolnwood Homeowners Association on centerline location.
JUN 4	1980	Clinton	BPA meets with Hellgate Homeowners Group on centerline location.
JUL 22	1980	Missoula	Hot Springs-Bell steering committee meeting.
AUG 26	1980	Clinton	BPA meets with Hellgate Homeowners Group on centerline location.
SEPT 11	1980	Portland	Hot Springs-Bell steering committee meeting.
OCT 6	1980	Missoula	BPA meets with Lincolnwood Homeowners Association on centerline location.
NOV	1980		Results of workshops and EIS updates sent to meeting participants.
DEC 27	1980	Drummond	BPA meets with Senator Baucus and the Upper Clark Fork Valley Protective Association on corridor and centerline location.
JAN 7	1981	Drummond	BPA meets with Upper Clark Fork Valley Protective Association on corridor and centerline location.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
JAN 21	1981	Missoula	BPA meets with Missoula County Commissioners.
FEB 12	1981	Missoula	Progress Report #1 released on Colstrip Project overall.
MAR 27	1981	Missoula	Progress report #2 released on Colstrip Project overall.
APR 20	1981	Missoula	BPA opens branch office in Missoula to facilitate public involvement on the Townsend-Garrison and Hot Springs-Bell projects.
Late APR	1981	Missoula	BPA meets with Patrick Duffey, State Executive Officer for Congressman Pat Williams, to notify him of Missoula Office opening.
Late APR	1981	Missoula	BPA meets with Earl Hiatt of Senator Melcher's office and Carlene Nimlos of Senator Baucus' Office to notify them of Missoula Office opening.
APR 21-23	1981		BPA meets with parties interested in Townsend-Garrison and Hot Springs-Bell Projects: 4-21-81 Drummond: Rick Lacey, Upper Clark Fork Valley Protective Association, Drummond Area Landowners Group, and individuals in the Drummond and Gold Creek area. 4-22-81 Missoula: Upper Clark Fork Valley Protective Association and Senator Baucus. 4-23-81 Missoula: Upper Clark Fork Valley Protective Association, Lincolnwood Homeowners Association and Touchette homeowners. 4-23-81 Missoula: Senator Baucus in Missoula Town Hall meeting.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
MAY 6	1981	Missoula	BPA meets with Missoula County Commissioners and Marjorie Harper of the Clark Fork Basin Protective Association to outline the EIS plan for the Garrison-Spokane Project.
MAY 7	1981	Missoula	Garrison-Spokane steering committee meeting.
MAY 11	1981	Missoula	BPA meets with Pat Duffey, Earl Hiatt, and Evan Barrett (Senator Melcher's aide in Butte) to discuss the transmission project.
MAY 12	1981		Flyer announcing scoping meetings for Garrison-Spokane EIS sent to interested parties.
MAY 18	1981	Missoula	BPA meets with publishers of newspapers in Missoula, Philipsburg, Anaconda, and Deerlodge to discuss the purpose of the Missoula office.
MAY 18	1981	Drummond	Scoping meeting held.
MAY 19	1981	Clinton	Scoping meeting held.
MAY 20	1981	Potomac	Scoping meeting held.
MAY 21	1981	Lolo	Scoping meeting held.
MAY 27	1981	Frenchtown	Scoping meeting held.
MAY 28	1981	Missoula	Scoping meeting held.
JUN 2	1981	Gold Creek	BPA meets with residents to discuss the Garrison Substation location.
JUN 4	1981	Superior	BPA meets with Mineral County Commissioners to outline the Garrison-Spokane EIS plan and to notify of upcoming information meetings.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
JUN 5	1981	Polson	BPA meets with Lake County Commissioners to outline the Garrison-Spokane EIS plan and to notify of upcoming information meetings.
JUN 8	1981		Letter announcing open houses to explain Garrison-Spokane project sent to interested parties.
JUN 9	1981	Thompson Falls	BPA meets with Sanders County Commissioners to outline the Garrison-Spokane EIS plan and to notify of upcoming information meetings.
JUN 10	1981	Missoula	BPA meets with representatives of the Rattlesnake area regarding their opposition to a line through this residential area.
JUN 15-25	1981		BPA holds eight open houses to explain the Garrison-Spokane project: 6-15-81 Kellogg 6-16-81 Hayden Lake 6-17-81 Spokane 6-18-81 Noxon 6-22-81 St. Ignatius 6-23-81 Superior 6-24-81 Thompson Falls 6-25-81 Plains
JUN 22	1981		BPA distributes first Power Line News to people on project mailing list.
JUN 26	1981	Maxville	BPA meets with Cass Chinske (Friends of the Rattlesnake) to discuss concerns related to routing a transmission corridor through the Rattlesnake National Recreation Area.
JUL 7	1981	Maxville	BPA meets with residents of the Maxville area to discuss a transmission line routing through this area.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
JUL 9	1981	Maxville	BPA meets with Ledbetter ranch owners (Laura Ledbetter, Lloyd Keiley, Gordon Foster) to discuss transmission line routing over part of the ranch.
JUL 13	1981	Missoula	Toll-free number for use by Montana residents put into service at Missoula office.
JUL 15	1981	Maxville	BPA meets with Ledbetter ranch owners (Lloyd Keiley).
JUL 17	1981	Missoula	BPA meets with Lloyd Keiley to discuss his concerns about the transmission project.
JUL 23	1981	Missoula	Garrison-Spokane steering committee meeting.
JUL 28	1981	Missoula	Power Line News issued on current status of Townsend-Garrison and Garrison-Spokane projects.
AUG 25	1981		Review of May 1981 scoping meetings for the Garrison-Spokane EIS sent to interested parties.
AUG 26-30	1981	Missoula	BPA opens display at Missoula County Fair to answer questions and provide information on the Garrison-Spokane Project.
AUG 31	1981	Missoula	BPA meets with Missoula County Commissioners.
SEPT 10	1981	Missoula	Power Line News issued on current status of Townsend-Garrison and Garrison-Spokane projects.
SEPT 16	1981	Missoula	Second Power Line News issued on current status of Townsend-Garrison and Garrison-Spokane Projects.
SEPT 30	1981	Missoula	BPA makes a presentation to Missoula Rotary Club on the transmission project.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
OCT	1981	Missoula	BPA makes a presentation to a law class at University of Montana Law School on the transmission project.
OCT 7	1981	St. Regis	BPA meets with area residents to provide information on the Garrison-Spokane Project.
OCT 8	1981	Deer Lodge	BPA meets with Powell County Commissioners to discuss impact aid payments.
OCT 14	1981	Missoula	BPA meets with Missoula County attorney and City-County Air Quality officials regarding measurement of ozone levels under existing 230-kV and proposed 500-kV (Garrison-Spokane) lines.
OCT 19	1981	Superior	BPA meets with Mineral County Commissioners on the issue of impact aid payments.
OCT 28	1981	Missoula	BPA meets with Miller Creek area residents to discuss the Garrison-Spokane project and a routing in this area.
NOV 18	1981	Missoula	Garrison-Spokane Steering Committee meeting.
DEC 29	1981	Missoula, St. Regis	BPA meets with residents of Rattlesnake area, Miller Creek area, and St. Regis area to discuss the Garrison-Spokane Project. Three separate meetings were conducted by Kayle Jackson of U.S. Senator Max Baucus' staff.
JAN 13	1982	Missoula	Power Line News issued on current status of Townsend-Garrison and Garrison-Spokane projects.
JAN 16	1982	Ninemile	BPA meets with residents of the area to discuss the Garrison-Spokane Project and other issues.
JAN-present	1982/3		BPA works with individual landowners concerning line location, impacts, and other questions.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
MAR 16	1982		Garrison-Spokane 500-kV transmission project draft EIS filed with the Environmental Protection Agency.
MAR 16-MAY 28	1982		Public comment period on draft EIS.
MAR 17	1982	Missoula	Power Line News issued on current status of Townsend-Garrison and Garrison-Spokane projects.
MAR 24	1982	Miller Creek	BPA meets with Miller Creek area residents to discuss route location in that area.
MAR 25	1982	Hall	BPA meets with Granite County Alliance on route options in the Maxville area.
APR 6	1982	Polson	BPA updates Lake County commissioners on the project, including the upcoming open houses and public meetings.
APR 6	1982	Thompson Falls	BPA updates Sanders County commissioners on the project, including the upcoming open houses and public meetings.
APR 7	1982	Philipsburg	BPA updates Granite County commissioners on the project, including the upcoming open houses and public meetings.
APR 7	1982	Miller Creek	BPA meets with residents of the Rodeo Ranchettes subdivision to discuss the location of the route in the Miller Creek area.
APR 8	1982	Missoula	BPA updates Missoula County commissioners on the project, including the upcoming open houses and public meetings.
APR 8	1982	Superior	BPA updates Mineral County commissioners on the project, including the upcoming open houses and public meetings.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
APR 12-MAY 3	1982		Open house and public meetings designed to obtain comment on the project held throughout study area (see Volume II, Part V):
APR 12	1982	Spokane	Public meeting held.
APR 13	1982	Coeur d'Alene	Public meeting held.
APR 14	1982	Wallace	Public meeting held.
APR 15	1982	St. Regis	Public meeting held.
APR 19	1982	Missoula	Public meeting held.
APR 20	1982	Drummond	Public meeting held.
APR 21	1982	Lolo	Public meeting held.
APR 22	1982	Philipsburg	Public meeting held.
APR 26	1982	Frenchtown	Public meeting held.
APR 27	1982	Superior	Public meeting held.
APR 28	1982	St. Ignatius	Public meeting held.
APR 29	1982	Plains	Public meeting held.
APR 30	1982	Potomac	Public meeting held.
MAY 3	1982	Thompson Falls	Public meeting held.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
MAY 11	1982	Ninemile area	BPA meets with residents of the Ponderosa Acres area northwest of Missoula to discuss line location options.
MAY 24	1982	Missoula	Power Line News issued on current status of Townsend-Garrison and Garrison-Spokane projects.
JUN-SEP	1982		EIS team identifies and analyzes comments.
JUN-SEP	1982		EIS team reviews alternative route suggestions.
JUN 16	1982	Hall	BPA meets with Granite County Alliance on route options in the Maxville area.
JUN 30	1982	Missoula area	BPA meets with residents of Ponderosa Acres northwest of Missoula to discuss line location options.
JUL 27	1982	Missoula	Powerline News issued on current status of Townsend-Garrison and Garrison-Spokane project.
SEP	1982	Portland	EIS team conducts route ranking analysis of four local route alternatives. (See Volume II, Part IV.)
OCT 28	1982	Missoula	Power Line News issued on current status of Townsend-Garrison and Garrison-Spokane project.
NOV 15-19	1982	Helena	BPA and Montana Department of Natural Resources and Conservation teams meet to conduct a joint route analysis and arrive at consensus on proposed plan and route.
NOV-FEB	1982/3	Portland	EIS team responds to comments received during review and revises EIS.

MONTH/DAY	YEAR	LOCATION	ACTIVITY
DEC 20-22	1982		BPA briefs Congressional staffs from Washington, Idaho, and Montana on project status and proposed plan.
JAN 12	1983	Missoula	Power Line News issued on current status of Townsend-Garrison and Garrison-Spokane project.
FEB 16	1983	Philipsburg	BPA, State of Montana and Maxville area residents conduct working session on mitigation and centerline adjustment options.

TABLE 5.1 ENVIRONMENTAL RANKING SUMMARY[1]

EVALUATION CRITERIA	HOT SPRINGS PLAN	PLAINS PLAN	PROPOSED ACTION TAFT PLAN
1. Minimizes Disruption of Existing and Planned Land Uses:			
a. Avoids Residential and Inhabited Areas	3	2	1
b. Avoids Agricultural Land, especially Irrigated Land	3	2	1
c. Avoids Intensively Managed Forest Land	1	2	3
2. Minimizes Disruption of People's Lives and Lifestyles	3	2	1
3. Minimizes Adverse Effects on Scenic Areas and Esthetic Values.	2	3	1
4. Avoids Adverse Effects on Important Historical and Cultural Resources.	3	2	1
5. Minimizes Disturbance of Natural Resources (Geo/Soils, Water Features, Vegetation, Wildlife).	1	3	2
6. Avoids Environmentally Sensitive Areas.	2	3	1
7. Uses Existing Utility Corridors Wherever Feasible.	1	2	3
8. Future Transmission Facilities: Allows for (Does not preclude possibility of) Building Future Parallel Lines.	3	2	1
Degree to which criterion is met: 1 = Best; 3 = Least			

[1] Evaluation criteria are standards which provide a consistent basis for evaluating alternatives. In general, the alternative which best meets the most criteria is considered to have the lowest overall environmental impact potential. This table is a rank order summary of interdisciplinary team conclusions for each of the criteria listed. Also see Appendix A - Methodology.

Attachment 4: Evaluation Criteria

Page 8, first two paragraphs, should read as follows:

> The bar graph on page 9 presents two representative criteria (problem soils and high access requirements) evaluated in determining the potential impact to geology/soils. The graph reflects the increased high access required for the Hot Springs Plan (A) compared with the other two plans. It also shows that a significant amount of problem soils occurs along the Hot Springs Plan. Although steeper, the land crossed by the Taft and Plains Plans is made of predominantly stable materials. These plans largely avoid problem soil areas.
>
> The potential severity of impact posed by the problem soils on the Hot Springs Plan is significant enough to override other concerns. This makes the Plains Plan the option of least overall impact. The Taft Plan is the intermediate and the Hot Springs Plan the least desirable alternative.

The graph on page 9 has been revised to reflect changes in the preferred routing for the Plains Plan which have resulted in changes in the relative rank order of the three plans for "problem soils" and "high access requirements." The revised version of this chart is attached.

Page 10, line 6: First word should read "discrete".

Page 10: Last paragraph should indicate that all three plans now cross eight environmentally sensitive areas. This reflects the addition of St. Regis and Maxville. The footnote on the table has been removed to indicate that options on Plans A and B using segment 114 across the Rattlesnake NRA have been dropped from the preferred route. The revised table is attached. Also see Volume II, Part IV.K.

The chart on page 12 has been revised to reflect the changes in the preferred routing for the Plains Plan, and is attached.

The table on page 14 has been revised to reflect the changes in the preferred routing for the Plains Plan, and is attached.

APPENDIX B - INDEX TO ENVIRONMENTAL FACTORS CONSIDERED UNDER STATE MAJOR FACILITY SITING ACTS

Page 1, after paragraph four, add: The States of Montana and Washington have Acts governing the siting of major facilities.

The States have sought to require that BPA transmission line projects be subject to these Acts. BPA, however, under the current court interpretations, is Constitutionally prohibited from being bound by these provisions without Congressional authorization. The lack of Congressional authorization was reaffirmed by two Federal court decisions entered subsequent to the issuance of the draft EIS.

The first decision was entered July 16, 1982, by the United States Court of Appeals for the Eighth Circuit in the case entitled Citizens and Landowners Against the Miles City/New Underwood Powerline, et. al. v. Secretary, United States Department of Energy, in his official capacity, et. al. The court held that under the supremacy clause of the United States Consitution, The Western Power Administration (WPA) as a Federal agency was not subject to the regulations of the South Dakota siting law. Subsequently, a decision was entered on August 12, 1982, in the United States District Court for the District of Montana in the case of The State of Montana, et. al. v. Peter Johnson, Adm. of BPA, et. al. The District Court affirmed that Congress had not consented to waive Federal supremacy in respect to the findings entered pursuant to the State of Montana Major Facility Siting Act Certification Process respecting the siting of the Townsend to Garrison Transmission Line Project. The State of Montana and others have appealed the District court decision to the Circuit Court of Appeals for the Ninth Circuit.

APPENDIX C - MAP VOLUME

DATA MAPS

GARRISON-MISSOULA STUDY AREA

Hydrology: Special Features: This map has been reprinted to include additional high value fishery streams and is enclosed at the back of this volume.

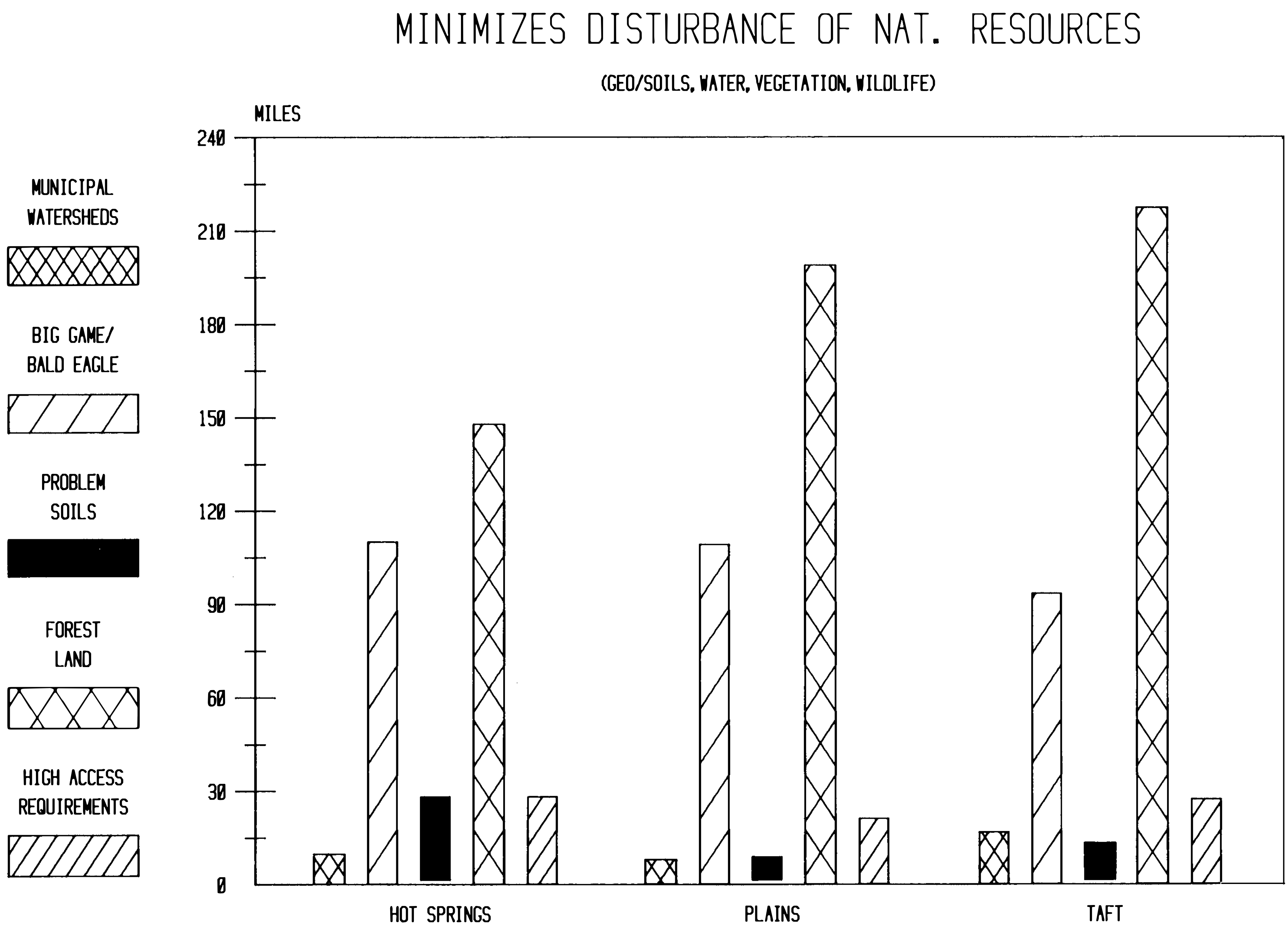
Land Use: Agriculture: This map has been reprinted to show the correct distribution of irrigated and non-irrigated farmland and is enclosed at the back of this volume.

Transportation: Aerodromes: "Elliott" airport should read "Rock Creek" airport.

HOT SPRINGS-BELL STUDY AREA

"BIA, Wildlife Branch" should be added to the source information for the following maps:

Wildlife: Big Game Sensitive Habitat
Wildlife: Bald Eagle
Wildlife: Osprey
Wildlife: Grizzly Bear
Wildlife: Waterfowl Concentrations


MINIMIZES DISTURBANCE OF NAT. RESOURCES
(GEO/SOILS, WATER, VEGETATION, WILDLIFE)
MILES
240
210
180
150
120
90
60
30
0
MUNICIPAL WATERSHEDS
BIG GAME/ BALD EAGLE
PROBLEM SOILS
FOREST LAND
HIGH ACCESS REQUIREMENTS
HOT SPRINGS
PLAINS
TAFT

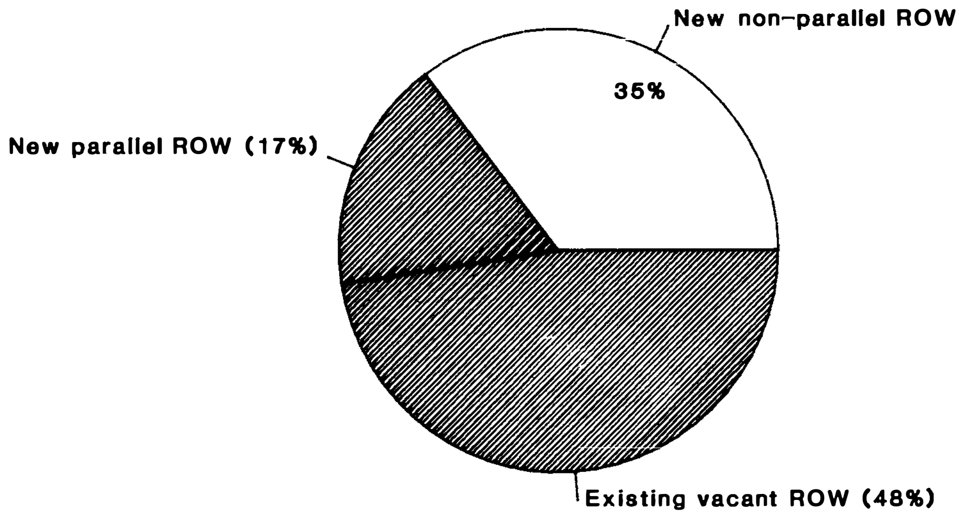
AVOIDS SENSITIVE ENVIRONMENTAL AREAS*

PLANS	MAJOR SENSITIVE AREAS														
	GOLD CREEK	MAXVILLE	ROCK CREEK	RATTLESNAKE CREEK	NORTH MISSOULA	MILLER CREEK-BLUE MOUNTAIN	NINEMILE CREEK	ST. REGIS-TAMARACK CREEK	SIEGEL MOUNTAIN-FLATHEAD RIVER	DIXON-FLATHEAD RIVER	RAINBOW LAKE	CLARK FORK CANYON	LOOKOUT PASS-MULLAN	HAYDEN LAKE-RATHDRUM PRAIRIE	PLEASANT PRAIRIE
A	X			X	X					X	X	X		X	X
B		X	X			X	X		X			X		X	X
C		X	X			X	X	X					X	X	X

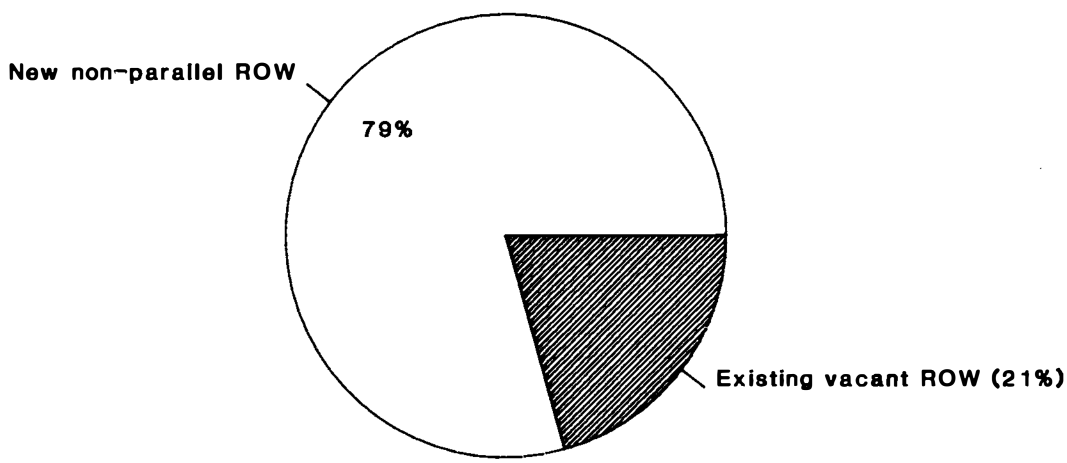
*BASED ON PREFERRED ROUTE FOR EACH PLAN

USES EXISTING CORRIDORS

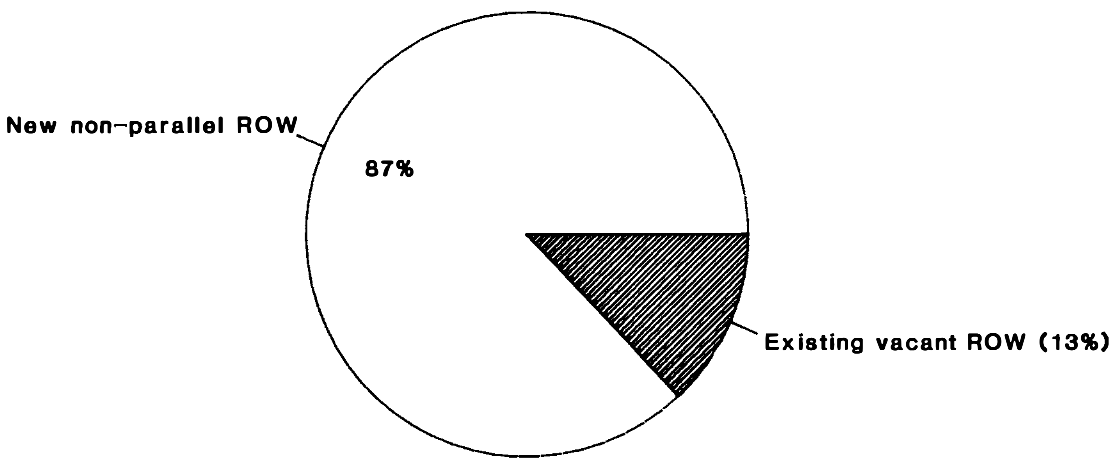
PLAN A – % OF TOTAL ROUTE LENGTH



PLAN B – % OF TOTAL ROUTE LENGTH



PLAN C – % OF TOTAL ROUTE LENGTH



FUTURE TRANSMISSION FACILITIES:

ALLOWS FOR (DOES NOT PRECLUDE POSSIBILITY OF)
BUILDING PARALLEL LINES IN THE FUTURE

	CONSTRAINT AREAS						
PLANS	CAMAS PRAIRIE-LOWER RATTLESNAKE	NORTH MISSOULA	EVARO-DIXON	RAINBOW LAKE	SIEGEL PASS	CLARK FORK CANYON	EAGLE CREEK
A	X	X	X	X		X	X
B					X	X	X
C							

ANALYSIS MAPS

GARRISON-MISSOULA AND HOT SPRINGS-BELL STUDY AREAS

Hydrology Corridor Impact Map: This map has been reprinted to reflect impact on lakes and rivers and is enclosed at the back of this volume.

The "None" entry should be deleted from the legend on the following maps:

Vegetation Corridor Impact Map
Wildlife Corridor Impact Map
Agriculture Corridor Impact Map
Recreation Corridor Impact Map
Land Use Constraints Corridor Impact Map
Acquisition Cost Corridor Impact Map

Updated transparent route overlays for the Garrison-Missoula and Hot Springs-Bell study area are also enclosed at the back of this volume. These have veen revised to show the route options for the four Local Routing Alternatives analyzed since release of the draft EIS.

APPENDIX D - SOCIAL AND ECONOMIC CONSIDERATIONS

Section 3.3.2.3 was inadvertently omitted from the appendix. It is as follows:

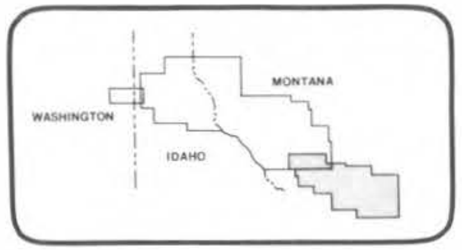
3.3.2.3 The Confederated Salish and Kootenai Tribes

One of the proposed alternatives for the Garrison-Spokane transmission line crosses the southwest corner of the Flathead Indian Reservation. Use of the existing seventeen-mile right-of-way has been challenged by the Tribal Council on the grounds that: (1) the original right-of-way was for the 230-kV line; (2) the rights to the original right-of-way will expire long before the useful life of the power line and thus must be renegotiated; and (3) there are questions about BPA's rights to acquire or condemn land within the Reservation's boundaries.

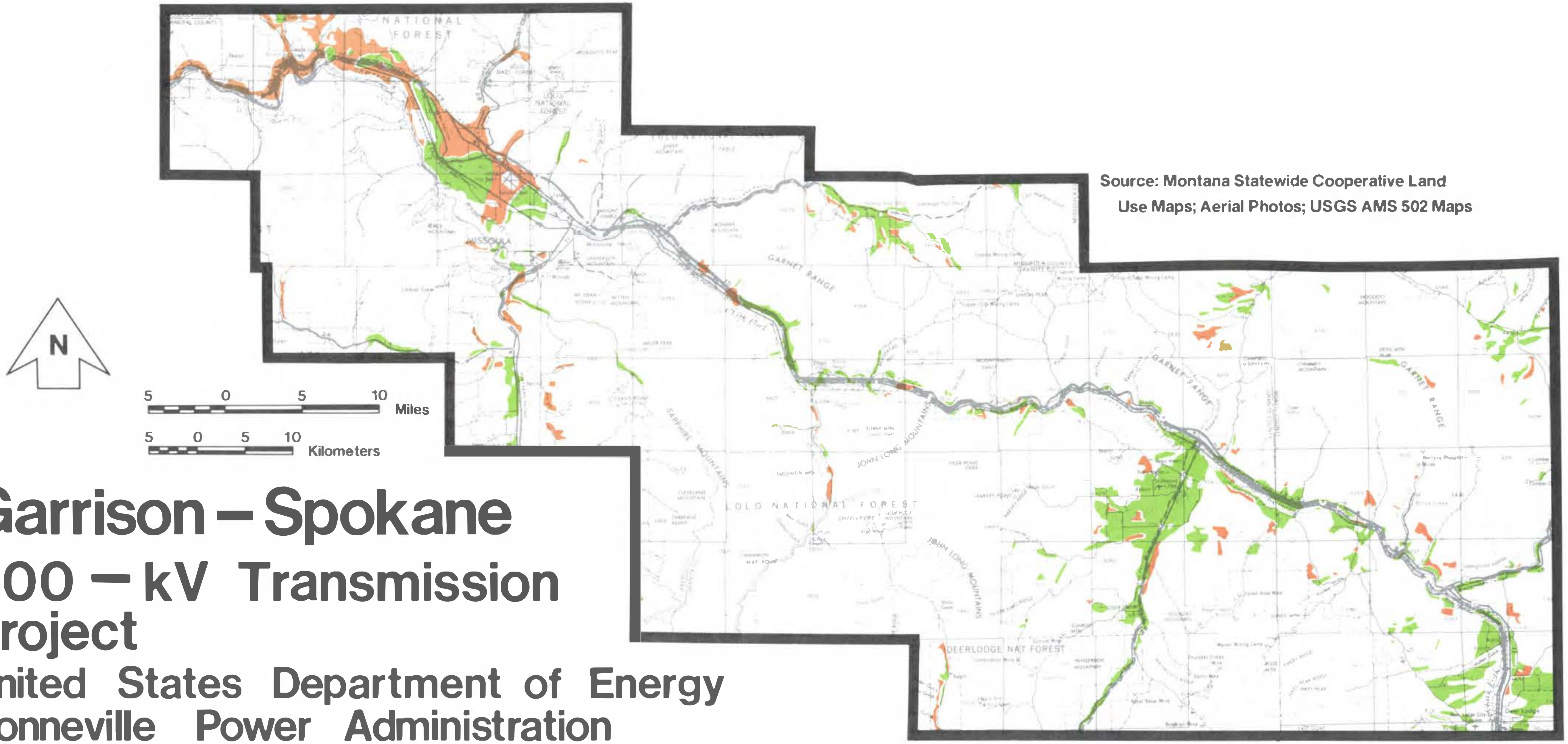
The proposed lines must cross not only Reservation property, but also private deeded property and allotted land held in trust by the Federal government and farmed by members of the Tribes. There are some sixty parcels of allotted land; acquiring a right-of-way on any of them would require individual agreements with landowners separate from any agreement with the Tribal Council.

To members of the Council, the primary issues concern their rights and autonomy in the right-of-way easement negotiation process. The Council expects that condemnation would seriously erode the relationship between BPA and the Confederated Tribes. In addition, Tribal members and land allotees are concerned about the visual and aesthetic effects of the proposed line, potential land value impacts, and safety issues such as potential fire hazard should the line attract lightning.

Land Use: Agriculture



Irrigated
Non-Irrigated



Source: Montana Statewide Cooperative Land Use Maps; Aerial Photos; USGS AMS 502 Maps

Garrison – Spokane

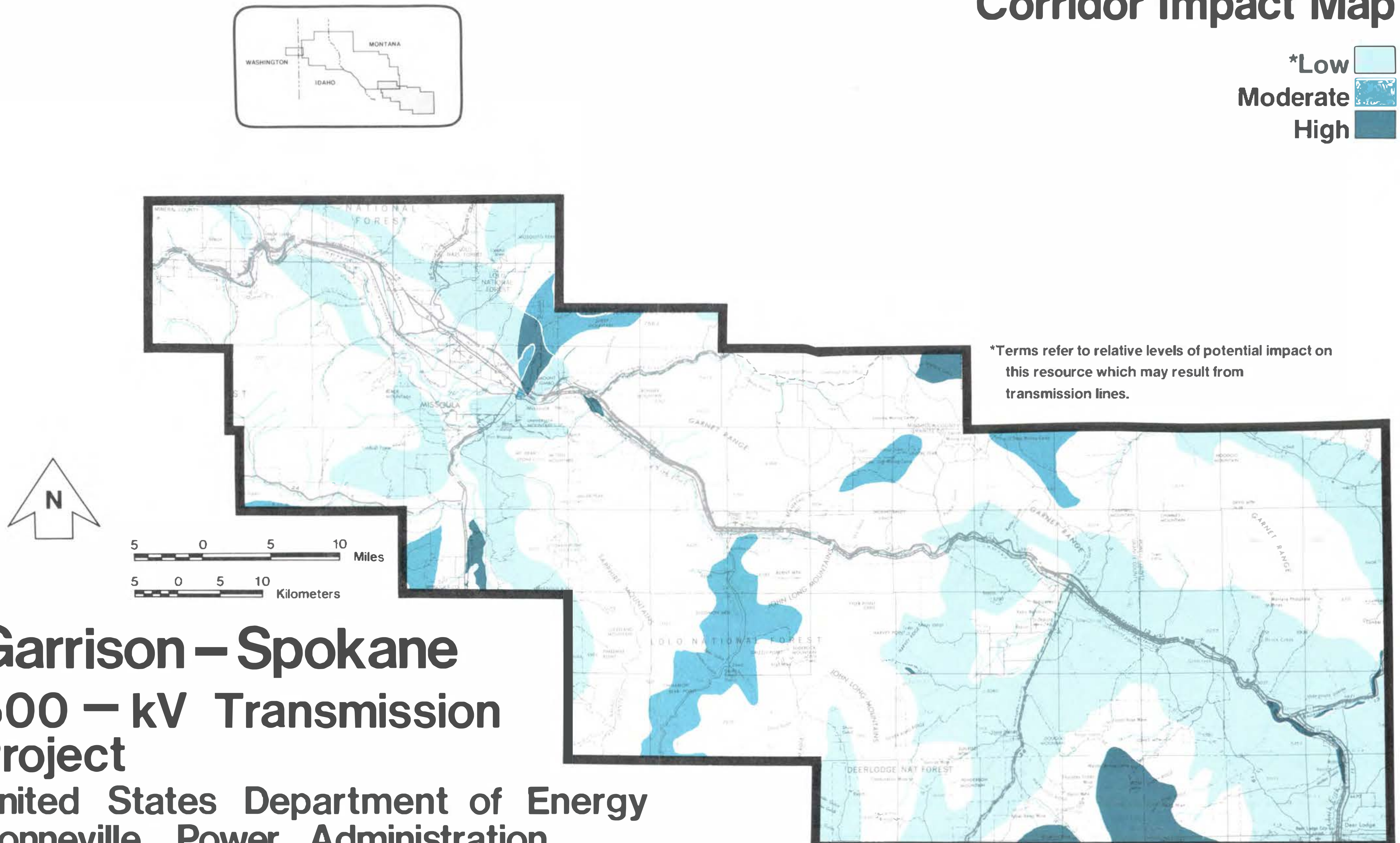
500 – kV Transmission Project

United States Department of Energy
Bonneville Power Administration

Hydrology
Corridor Impact Map

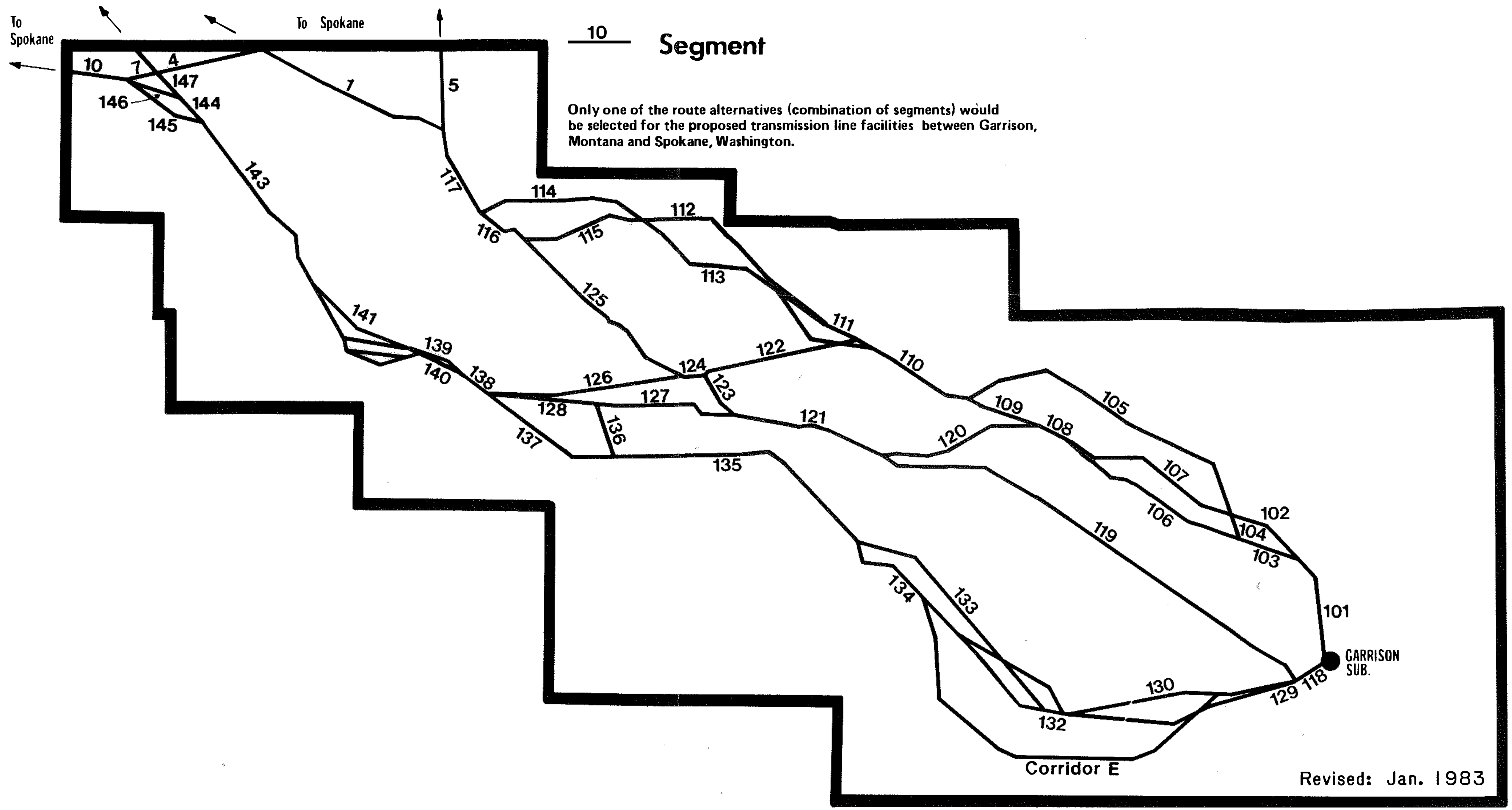
*Low
Moderate
High

*Terms refer to relative levels of potential impact on this resource which may result from transmission lines.

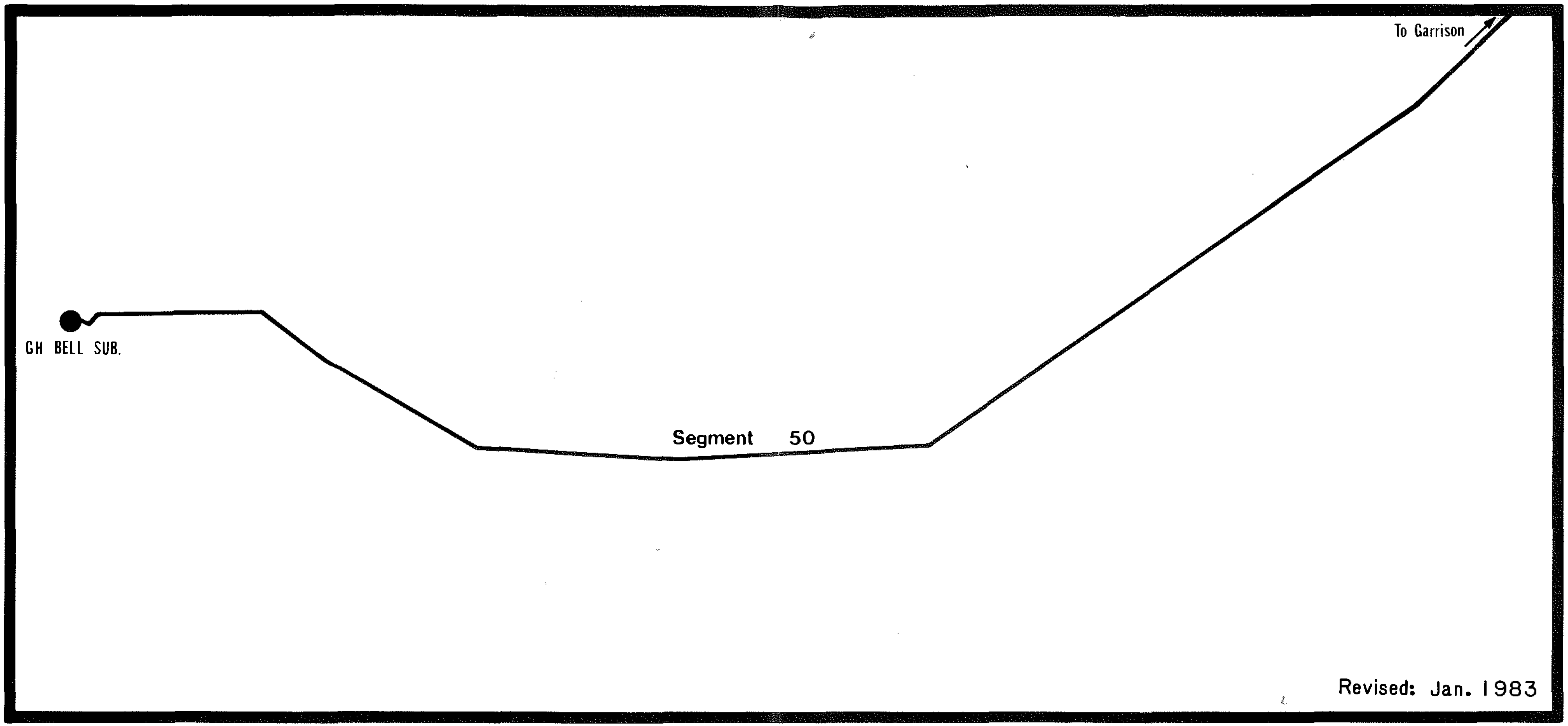


Garrison – Spokane
500 – kV Transmission Project
United States Department of Energy
Bonneville Power Administration


Hydrology: Special Features
High Value Fishery Streams
Municipal Watersheds
Source: Stream Evaluation Maps, Idaho (1978), Montana (1979); USFS Planning Unit Data
N
5 0 5 10 Miles
5 0 5 10 Kilometers
LOLO NATIONAL FOREST
Garrison – Spokane
500 – kV Transmission Project
United States Department of Energy
Bonneville Power Administration


To Spokane
To Spokane
10 Segment
Only one of the route alternatives (combination of segments) would be selected for the proposed transmission line facilities between Garrison, Montana and Spokane, Washington.
10
7
4
147
146
144
145
1
5
143
117
114
112
116
115
113
125
111
141
139
140
138
126
124
122
110
123
128
127
121
109
105
108
136
137
135
120
107
106
119
102
104
103
134
133
101
GARRISON SUB.
130
129
118
132
Corridor E
Revised: Jan. 1983


To Spokane
Only one of the route alternatives (combination of segments) would be selected for the proposed transmission line facilities between Garrison, Montana and Spokane, Washington.
47
43
45
41
35
40
34
29
37
33
31
32
22
18
16
28
26
25
92
15
14
5
13
6
148
10
4
7
147
145
144
146
143
1
117
114
To Garrison
Revised: Jan. 1983
22 Segment
BPA Alternative Routes
WWP Alternative Routes


To Garrison
GH BELL SUB.
Segment 50
Revised: Jan. 1983