

draft wild and scenic river study  
draft environmental statement

june 1979

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GREEN AND YAMPA RIVERS

COLORADO / UTAH





United States Department of the Interior

DRAFT WILD AND SCENIC RIVER STUDY

and

DRAFT ENVIRONMENTAL STATEMENT

GREEN AND YAMPA

WILD AND SCENIC RIVERS

Prepared by

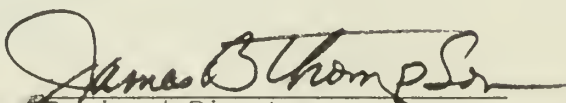
National Park Service  
Denver Service Center

in cooperation with

The Colorado Department of Natural Resources

and

The Utah Department of Natural Resources

  
Regional Director  
Rocky Mountain Region

APR 30 1979





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## SUMMARY OF FINDINGS AND RECOMMENDATIONS

### FINDINGS

1. The entire study area, consisting of 91 miles (146.5 km) of the Green River from Flaming Gorge Dam to the southern boundary of Dinosaur National Monument (Utah and Colorado), and the 47 miles (75.7 km) of the Yampa River from the eastern boundary of Dinosaur National Monument to the confluence with the Green River (Colorado), is eligible for inclusion in the National Wild and Scenic Rivers System.
2. Six alternative plans were studied, including four that involve wild and scenic river designation. Two alternatives would designate the Green River segments or the Yampa River segment only. The recommended alternatives (see chapter VI and recommendation 2 in this summary) were found to offer the greatest degree of resource protection, consistent with classifying all four river segments at the most restrictive level for which they now qualify.
3. Management of the Green and Yampa Rivers within the study area is the responsibility of several federal and state agencies. A need for greater coordination in future management and planning will be met largely by preparation and implementation of a cooperative management plan following designation.
4. Several major water resource developments and a number of smaller projects have been proposed for the Yampa River Basin upstream from Dinosaur National Monument. It was determined that if the Juniper-Cross Mountain, Sheephorn, or Oak Creek projects (or less likely, the Savery-Pothook Project or a combination of several smaller projects) were built, the present essentially natural flows through the Yampa River study segment would be modified

and the unique wilderness qualities of the area reduced. The Endangered Species Act, through efforts to protect two endangered fish in the Yampa River, may limit Yampa Basin water project development. However, if the Yampa is designated, findings will need to be made by the Secretary of the Interior for each federally assisted or licensed project to determine if the magnitude of impact will constitute a "direct and adverse effect on the values for which the river might be designated," or "unreasonably diminish the scenic, recreational, and fish and wildlife values present. . . ." <sup>1</sup> Detailed project data, which to date has not been made available, will be needed to make these findings.

5. Low level flows on the Green River below Flaming Gorge Dam can cause problems for rafters and other recreationists and may also adversely affect fish and esthetics. Additional water project development in the Yampa River Basin could adversely impact esthetics, wilderness qualities, and rafting. Thus, there is a need to establish minimum and maximum flow guidelines, preferably as a part of management planning, for rafting and other recreation uses, fisheries, and maintenance of present ecotypes.

## RECOMMENDATIONS

1. The 91 miles (146.5 km) of the Green River between the Forest Service Spillway boat ramp below Flaming Gorge Dam and the southern boundary of Dinosaur National Monument and the 47 miles (75.7 km) of the Yampa River between the eastern boundary of Dinosaur National Monument and the confluence with the Green River should be designated as components of the National Wild and Scenic Rivers System.

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1. Section 7, Wild and Scenic Rivers Act.





NORTH

0 4 8 12 MILES  
0 4 8 12 KILOMETERS

## LEGEND

- IMPROVED ROAD
- - UNIMPROVED ROAD
- STUDY AREA AS DESIGNATED BY P.L. 93-621
- ADDITION TO STUDY AREA

# THE STUDY AREA AND SURROUNDINGS

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

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2A . Based on physiographic and man-made characteristics, the Green and Yampa Rivers were divided into four segments. The federal study team agencies recommend these segments be classified as follows:

Segment A, Green River: From the Forest Service Spillway boat ramp below Flaming Gorge Dam to the Bureau of Land Management boat ramp at Indian Crossing:  
15 miles (24.2 km)- - - - -SCENIC

Segment B, Green River: From the Bureau of Land Management boat ramp at Indian Crossing to the Gates of Lodore in Dinosaur National Monument:  
32 miles (51.5 km)- - - - -RECREATIONAL

Segment C, Green River: From the Gates of Lodore to the southern boundary of Dinosaur National Monument, 0.7 miles (1.1 km) south of the Split Mountain boat landing:  
44 miles (70.8 km)- - - - -WILD

Segment D, Yampa River: From the eastern boundary of Dinosaur National Monument to the river's confluence with the Green:  
47 miles (75.7 km)--- - - - -WILD

2IB. CDNR Recommendation. The Colorado Department of Natural Resources concurs with the recommendations for Segments A, C, and D, but finds Segment B (Browns Park) qualifies as a SCENIC river area, and recommends it be classified at that level.

3. As required in the Wild and Scenic Rivers Act, a detailed (cooperative) management plan must be developed for the area within one year following river designation. The cooperative plan should emphasize aspects of river management that will both ensure



## LEGEND

- 1 SPILLWAY BOAT RAMP
  - 2 LITTLE HOLE CAMPGROUND, BOAT RAMP, AND TRAIL
  - 3 RED CREEK FLOAT STOP
  - 4 PROPOSED BRIDGE HOLLOW CAMPGROUND AND PICKNIC AREA
  - 5 BROWNS PARK NATIONAL WILDLIFE REFUGE
- BUREAU OF LAND MANAGEMENT RECREATION SITES
- ▲ U.S. FOREST SERVICE RECREATION SITES

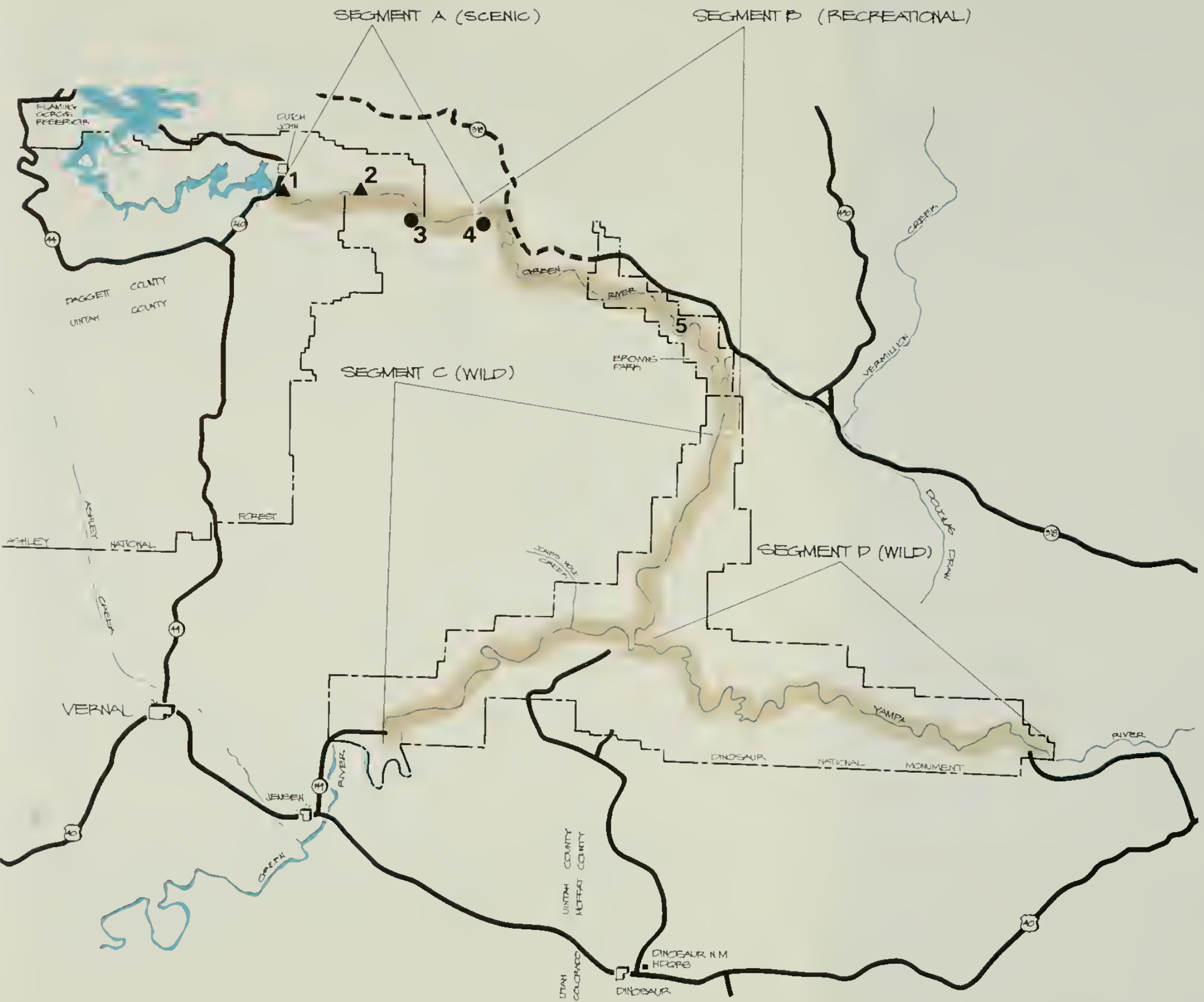


## PROPOSED DESIGNATION, CLASSIFICATION, AND RECREATION DEVELOPMENTS

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

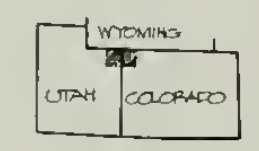
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# LEGEND

- 1 SPILLWAY BOAT RAMP
- 2 LITTLE HOLE CAMPGROUND, BOAT RAMP, AND TRAIL
- 3 PED CREEK FLOAT STOP
- 4 PROPOSED BRIDGE HOLLOW CAMPGROUND AND PICNIC AREA
- 5 BROWNS PARK NATIONAL WILDLIFE REFUGE
- BUREAU OF LAND MANAGEMENT RECREATION SITES
- ▲ US FOREST SERVICE RECREATION SITES



## PROPOSED DESIGNATION, CLASSIFICATION, AND RECREATION DEVELOPMENTS GREEN/YAMPA WILD AND SCENIC RIVER STUDY

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protection and enhancement of the area's outstanding natural values and provide for safe, high quality visitor experiences. The plan should dovetail with individual agency management plans and be prepared jointly by the Forest Service, Bureau of Land Management, Fish and Wildlife Service, National Park Service, Bureau of Reclamation, Utah Division of Wildlife Resources, and the Colorado Department of Natural Resources.

4. Federal Energy Regulatory Commission (FERC) licenses to construct the Juniper-Cross Mountain, Sheephorn, and Oak Creek Projects should not be granted unless findings to be made by the Secretary of the Interior show that these projects will not have "a direct and adverse effect on the values for which the river (study segment) might be designated," or "unreasonably diminish the scenic, recreational, or fish and wildlife values present. . . ." These findings, which should be made after preliminary permits or licenses to construct are sought from FERC, will be based on detailed data to be furnished by project sponsors, including projected changes in the flow in the Yampa study segment. These findings should also be made for all lesser Yampa Basin projects that are to be federally assisted or licensed so as to avoid significant cumulative impacts on the study segment of the Yampa.

Should the Savery-Pothook Project be proposed for construction funding, a Secretarial finding should be made on the question of its "direct and adverse effects" on the Yampa study segment.

Because of differences in the Wild and Scenic Rivers Act and the Endangered Species Act of 1973, including resource values these acts protect (see chapters I and VI), Secretarial findings under the former should be made independently of any studies, consultation, or preparation of biological opinions that may be in progress under the Endangered Species Act.

5. Based on rafting, other recreation, and fisheries needs only, the following minimum and maximum river flows are suggested as management planning guidelines for the Green and Yampa River study segments:

GREEN RIVER			YAMPA RIVER	
MINIMUM OR MAXIMUM	PERIOD	FLOW	PERIOD	FLOW
MINIMUM	May 15-Sept 15	1,600 cfs <sup>a</sup> (45.3 m <sup>3</sup> /s)	May 1-July 1	2,500 cfs (70.8 m <sup>3</sup> /s)
	Rest of Year	800 cfs (22.7 m <sup>3</sup> /s)	July 2-Sept 10	1,200 cfs (34.0 m <sup>3</sup> /s)
			Rest of Year	250 cfs (7.1 m <sup>3</sup> /s)
MAXIMUM	Year-Round	4,600 cfs (130.3 m <sup>3</sup> /s)	Year-Round	Historic Maximum Seasonal Flow <sup>b</sup>

NOTE: cfs = cubic feet per second; m<sup>3</sup>/s = cubic meters per second

<sup>a</sup> Minimum flow recommended by Forest Service and Bureau of Land Management (see below).

<sup>b</sup> Instantaneous record flow - 24,000 to 25,000 cfs (680-710 m<sup>3</sup>/s).

The flow guidelines suggested for the Yampa River are flows that should be sought for rafting and other recreation uses should major water resource development and modification of main stem flows be permitted in the Yampa Basin. The guidelines should not be construed as recommendations for such development. These flows may involve significant decreases in wilderness values, the diversity of recreation environments, and numbers of remaining endangered fish in the Yampa study segment, and would require the allocation of up to 181,000 acre-feet (223 million m<sup>3</sup>) of storage to maintain them in both high and low runoff years.

For the Green River, the suggested flows are for releases from Flaming Gorge Reservoir. While the Forest Service and the Bureau of Land Management have recommended minimum flows of 1,600 cfs (45 m<sup>3</sup>/s) for good rafting, the Bureau of Reclamation has stated that such releases would conflict with Flaming Gorge Dam power generation requirements.<sup>2</sup> However, it is recommended this issue be pursued further in management planning should the river be designated.

An estimated 108 acres (43.7 ha) of private land with about 0.8 mile (1.3 km) of riverfront involving two tracts in the Utah portion of

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2. According to the Bureau of Reclamation, by law Flaming Gorge Dam must be operated so as to maximize power production; at present BR attempts to maintain, 1,200 cfs (34.0 m<sup>3</sup>/s) as the normal minimum daytime flow. However, at night and on infrequent occasions during the day, summer low flows drop to 800 cfs (22.7 m<sup>3</sup>/s) or even lower. It is believed some upward adjustment might be made if the release pattern is analyzed on a year-long or multi-year basis.

segment B (Browns Park) should be acquired as scenic easements. The cost of these easements will be approximately \$162,000.<sup>3</sup>

7. Several recreation site improvements and developments are proposed in segments A and B (see chapters V and VI). Total recreation improvement costs associated with this proposal would be \$913,000. The cost of additional annual administration, operation, and maintenance for recreation would be approximately \$12,000.<sup>4</sup>

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3,4. Cost estimates for scenic easement acquisitions, recreation improvements and developments, and additional annual administration, operation, and maintenance for recreation are based on information that was provided by federal land-managing agencies in the river corridor.



# C H A P T E R   I

## I N T R O D U C T I O N

### BACKGROUND

On October 2, 1968, the President signed into law the Wild and Scenic Rivers Act, Public Law 90-542, creating a national policy to preserve certain outstanding rivers or river segments for the enjoyment of present and future generations. To implement this policy, Congress and the President established the National Wild and Scenic Rivers System and designated all or portions of eight rivers as initial components of that system.

A total of 28 rivers or river segments are part of the National System, as of the most recent amendment, P.L. 95-625. Numerous other rivers mentioned in the original act and ensuing amendments are now undergoing study. In the amendment of January 3, 1975 (P.L. 93-621), 29 additional rivers were designated for study, 12 of which are located in Colorado. Among these rivers are the 47-mile (75.7 km) segment of the Yampa and the 91-mile (146.4 km) segment of the Green River covered by this report. For efficiency, a decision was made to study the Yampa and Green Rivers concurrently.

### STUDY REQUIREMENTS

Procedures and criteria for determining eligibility for and classification under the National System are outlined in the Act and in joint guidelines issued in February, 1970, by the Departments of the Interior and Agriculture. Determinations, as they apply to the Yampa and Green Rivers study, appear in chapter IV and are based on information presented in chapters II and III of this report.



The Gates of Lodore. HCRS



Weber Sandstone walls along the Yampa. HCRS





Since wild and scenic river studies involve decisions concerning future use of water and related land resources, each study must include a socioeconomic analysis of the effects that may result from possible designation of a river under the National System. Procedures for making such an analysis were developed by the Water Resources Council and published in the Federal Register of September 10, 1973 (Volume 38, Number 174). The process undertaken for this study is presented in chapter XI and is commonly known as the "Principles and Standards Analysis."

As required by the National Environmental Policy Act (NEPA) of January 1, 1970 (P.L. 91-190), an evaluation was made of the environmental impacts associated with the "Proposed Action" and is displayed in the environmental impact statement. The intent of this statement is to display the impacts so that environmental effects may be fully considered in the decisionmaking process.

## EXTENSION OF THE GREEN RIVER STUDY AREA

The study area boundaries as listed in section 5(a) of P.L. 93-621 were as follows: "(38) Green, Colorado: The entire segment within the boundaries of the Dinosaur National Monument." The segment of the Green River ran from the upper end of Browns Park to a point just above Jones Hole Creek in Whirlpool Canyon. The upper and lower study limits did not coincide with any change in physiographic or man-made features.

Recognizing that the boundaries specified in the Act would restrict the effectiveness of the study, Governor Calvin L. Rampton of Utah requested that the Secretary of the Interior extend the Green River study area into Utah, upstream to Flaming Gorge Dam and downstream to the southern boundary of Dinosaur National Monument, i.e., 0.7 mile (1.1 km) below the boat landing at Split

Mountain Campground. Colorado Governor Richard D. Lamm supported Governor Rampton's request. In August 1976, Assistant Secretary of the Interior Nathaniel P. Reed approved the Utah Governor's request to extent the Green River study area.

## CONDUCT OF STUDY

A joint federal-state study team was organized in January, 1976. Leadership responsibilities were shared by the Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) and the Colorado Department of Natural Resources (represented by the Colorado Water Conservation Board) and, with the extension of the study boundaries, by the Utah Department of Natural Resources. Other member agencies included the Forest Service, Bureau of Land Management, National Park Service, Fish and Wildlife Service, Bureau of Mines, and the Bureau of Reclamation.

Assisting the study team was a work group composed of representatives of federal and state agencies, water districts, and conservation and other organizations. Public views were solicited through the formal review process and at public meetings held in Craig and Denver, Colorado, and in Vernal and Salt Lake City, Utah. In addition, news releases and information on the public meetings were widely distributed.

Basic information used in developing the report and environmental statement was obtained from a variety of sources, including the Colorado and Utah Statewide Comprehensive Outdoor Recreation plans. In some instances information was supplied by team or work group members with special expertise in the subjects covered. Prior to making the determination of river eligibility and classification presented in chapter IV, a field reconnaissance was



Drag-folding bends the layers of the Weber Sandstone and Morgan Formation along the Mitten Park Fault, near the confluence of the Green and Yampa Rivers. HCRS



conducted by the team, accompanied by representatives of interested agencies and organizations and concerned private citizens. In addition, experts in several resource fields advised the team and work group on which natural values (by segment) could be considered "outstandingly remarkable."

## MAJOR ISSUES AND CONCERNS

Through public contacts and data collection, the team identified about thirty possible water resource development sites in the Yampa River basin, several of which could affect the river study segment downstream. These reservoirs and associated facilities would provide power, irrigation, municipal and industrial water, domestic water, and limited flood control benefits, and although it is unlikely that all will be built, the potential for basin development is considerable. The projects are described in the "water resources" section of chapter II; additional references are made in chapter XI.

In western Colorado, public concern was expressed over the possibility that wild or scenic river designation of the Yampa could eliminate, modify, or otherwise interfere with the development of upstream water resource projects. Conversely there was concern that water resource development might regulate and diminish the present natural flows of the Yampa through Dinosaur National Monument.

Section 7 of the Wild and Scenic Rivers Act addresses the question of water resource development restrictions and project impacts on stream segments being studied for potential inclusion, or which are already included in the National Wild and Scenic Rivers System. It states that no federally-assisted, licensed, or aided projects on rivers in the National System will be permitted if they "invade the area" or "unreasonably diminish the scenic, recreational and fish

and wildlife values present. . . ."<sup>1</sup> The application of these provisions to the Yampa required clarification; therefore, an option was obtained from the Regional Solicitor of the Department of the Interior (see appendix B). The Solicitor was asked to define the nature and amount of control the Secretary of the Interior would have on the development of water resource projects in the Yampa River basin should the Yampa study segment be included in the National Wild and Scenic Rivers system.

In response, the Regional Solicitor stated that the Secretary of the Interior has the authority to make findings as to whether the Juniper-Cross Mountain and Savery-Pothook projects "directly affect" the study segment of the Yampa and whether they would have a "direct and adverse effect on (or "diminish") the values for which such river may be designated." Presumably, a similar Secretarial finding would be required for other Yampa Basin projects if the projects are to be federally assisted "by loan, grant, license, or otherwise." However, in the case of other federally assisted projects for which plans may not be advanced until after the Yampa is designated a component of the National Wild and Scenic Rivers System, the degree the project would affect the wild or scenic river segment determines whether the Secretary of the Interior would make a positive or negative finding. This is based on the fact that the Act states that projects may not be federally-assisted if they would "diminish" the value of rivers under

---

1. In the case of projects that require licenses issued by the Federal Energy Regulatory Commission (formerly F.P.C.), the Act states that development will not be permitted if the projects would result in "directly affecting" rivers in or being studied for potential inclusion in the Wild and Scenic Rivers System. In the case of federal projects, the Secretary of the Interior and the Congress must be notified in advance in writing of intent to request authorization or construction funds. It is then up to Congress to deny or grant authorization or funding.

study, while the term "unreasonably diminish" is used for rivers in the system. The Regional Solicitor further interpreted the term "diminish" as permitting "no degradation."

To determine probable water resource project effects on the study segment of the Yampa River, project data were requested from the Bureau of Reclamation, the Colorado River Water Conservation District, and other entities sponsoring water resource developments in the Yampa Basin. The information received was used in chapters II, III, and XI; it was not sufficiently complete, however, to make a detailed evaluation of effects of the projects on the outstanding natural values of the Yampa River in Dinosaur National Monument. The determination of the cumulative impacts of multi-project development on the study segment was also not possible since it is not known which of the reservoirs proposed will be built. If all the reservoirs proposed were actually constructed, they would store about 50 percent more water than the basin's average annual runoff.

An additional concern is the presence of endangered and potentially endangered and threatened species of fish in the Yampa River and the Green River below the Yampa confluence. According to the results of research done by K.G. Seethaler and others, populations of these fish have been decimated or eliminated in the Green River above the Yampa confluence by colder water temperatures and altered flow patterns caused by Flaming Gorge Dam and Reservoir.<sup>2</sup> Based on Seethaler's research, it is believed that major water

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2. Endangered and Threatened Fish in the Yampa and Green Rivers of Dinosaur Monument, K.G. Seethaler, C.W. McAda, and R.S. Wydowski, Utah Cooperative Fishery Research Unit, Utah State University, December 1976. The endangered fish are the Colorado squawfish (Ptychocheilus lucius) and the humpback chub (Gila cypha). The bonytail chub (Gila elegans) has been recommended by the Fish and Wildlife Service for endangered status, while the humpback sucker (Xyrauchen texanus) has been recommended for threatened status.

resource developments on the Yampa River or its tributaries upstream from the study segment could further jeopardize the existence of these four species of fish, at least in the Yampa River. The Fish and Wildlife Service has stated that the Endangered Species Act of 1973, P.L. 94-205 (as amended in 1978), offers full protection to these endangered species and that the Act's protection provisions can and should function independently of (or in conjunction with) protection that may be provided under the Wild and Scenic Act.<sup>3</sup> The presence of the two endangered fish enhances the outstanding natural values which have made the Yampa River segment eligible for designation under the Wild and Scenic Rivers Act.

Other public concerns expressed were possible additional federal regulations and involvement in local affairs, government takeover or interference with private water rights and lands, and questions as to why the two rivers should be in the Wild and Scenic Rivers System when much of the length of the study segments is already protected within Dinosaur National Monument. Conversely, others felt the two rivers might not be given adequate protection under the Wild and Scenic Rivers System or that one or more of the segments would be inappropriately classified.

Team response to these concerns pointed out that, should the Yampa and Green be added to the National Wild and Scenic Rivers System, (1) administration will continue under existing agencies with no expected major changes in regulations or permitted river uses; (2) no condemnation of private lands in fee title will be permitted, although a limited number of riverfront scenic easements

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3. See letter from Fish and Wildlife Service in appendix B.



will be purchased through negotiation, or less likely, condemnation; (3) no need or funding for the purchase of privately owned water rights in the study area is foreseen; and (4) designation under the Wild and Scenic Rivers Act would provide for the preservation of free-flowing river and other natural values at a greater level than that possible through present management or ownership.

## ACKNOWLEDGMENTS

The National Park Service, and prior to March of 1978, the Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) shared leadership of this study with the Colorado Department of Natural Resources (Water Conservation Board) and the Utah Department of Natural Resources (Outdoor Recreation Agency). The National Park Service is indebted to these agencies and to member agencies of the study team, work group agencies and organizations, and to members of the study team, work group agencies and organizations, and to members of the concerned public. Without the leadership and participation of these agencies, groups, and individuals, it would not have been possible to adequately treat the major issues or assemble the multi-resource data in the report and environmental statement.

The divergent viewpoints and opposing opinions expressed by the public throughout the study process at meetings and through correspondence aided in the development of a range of alternative plans that were considered.



## CHAPTER II

### REGIONAL DESCRIPTION

#### LOCATION, SIZE

The study region covers portions of the Green and Yampa River Basins in northeastern Utah and northwestern Colorado. For practical description, it is a three-county area--Daggett and Uintah Counties in Utah, and Moffat County in Colorado.<sup>1</sup> Total area is 9,930 square miles (25,719 km<sup>2</sup>), almost evenly divided between the two states. Maximum length (east-west) is 140 miles (225 km); maximum width (north-south) is 75 miles (120 km).

#### CLIMATE

The climate ranges from hot and arid in the lower desert portions to cool and moderately wet in the higher mountain areas. The average low precipitation is less than 6 inches (15 cm); the high exceeds 40 inches (100 cm). From October to April, a slightly

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1. Both the Green and Yampa Rivers extend beyond the study area boundaries. The Green flows 730 miles (1,175 km) from its headwaters in Wyoming's Wind River Range to its confluence with the Colorado River in Canyonlands National Park in southeastern Utah. It is the largest tributary to the Colorado, and the Yampa is the largest tributary to the Green. From its headwaters in the Park and Gore Ranges and the Flattops Mountains in central and northern Colorado, the Yampa flows about 200 miles (322 km) to its meeting with the Green River in Dinosaur National Monument in western Colorado. Where relevant, this regional description will also include information from beyond this three-county area.



0 10 20 30 MILES  
0 0 20 30 40 KILOMETERS

## REGIONAL STUDY AREA

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

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greater amount of precipitation occurs, most often as snow; summer rainfall comes mostly with thunderstorms. Frost-free season ranges from 20 days to more than 120. The eastern Uinta Mountains, situated in the northern portion of the region, are more arid than the western Uintas.

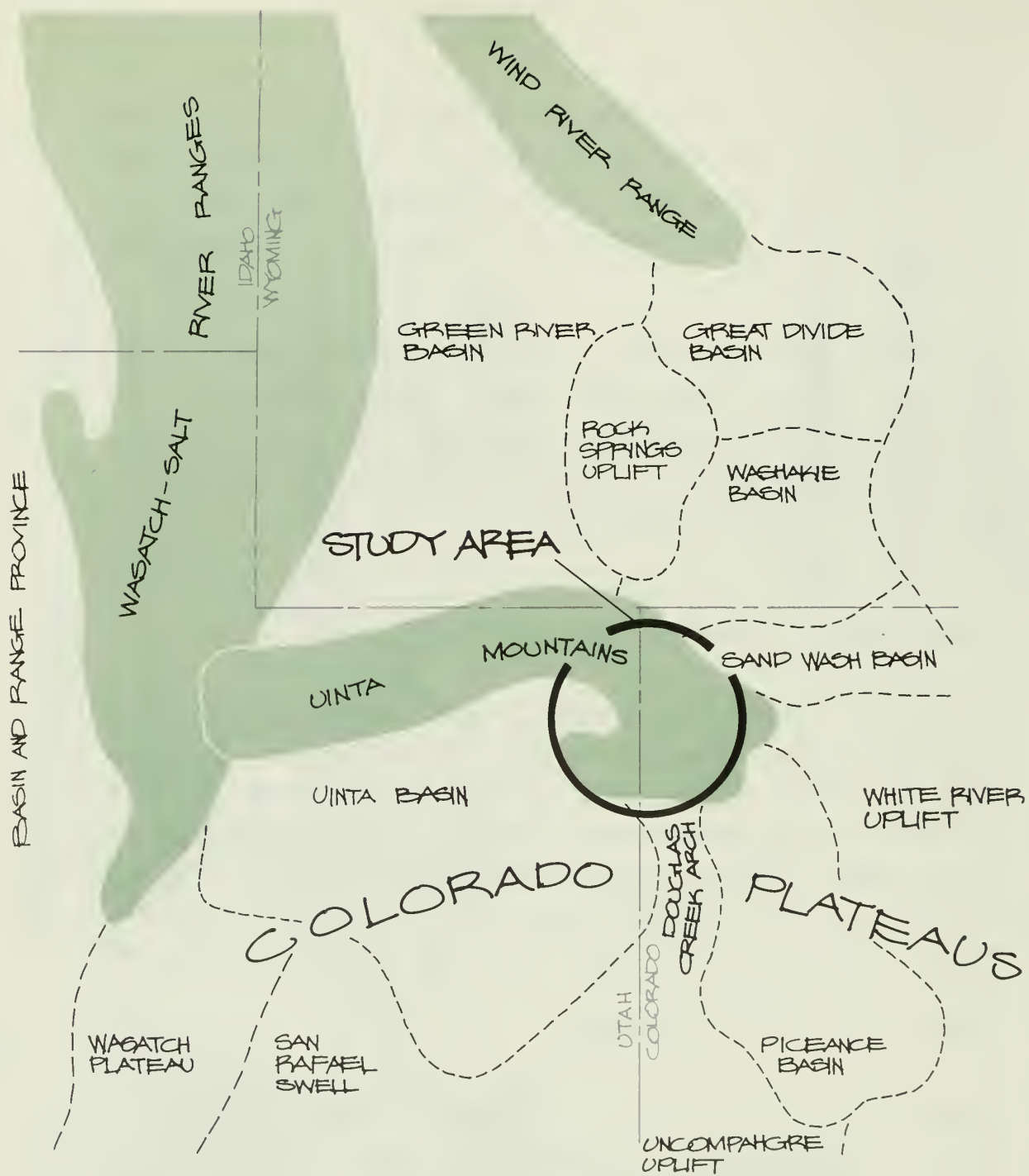
The climate along the Yampa and Green Rivers is slightly milder than that of the surrounding areas. Winter temperatures are normally mild and summers are warm but not overly hot with daytime highs ranging in the 80s and the 90s and evening lows dipping into the 50s and even 40s.

#### PHYSIOGRAPHY, GEOLOGY, AND MINERALS

The dominant feature of the region is the Uinta Range, the largest east-west trending block of mountains in the western hemisphere south of Alaska. This range extends from north-central Utah eastward, well across the study region to Blue Mountain at the eastern edge of Dinosaur National Monument in Colorado. From the south the Colorado Plateau edges into the region; the eastern portion contains isolated uplifts and high plains related to the central Rocky Mountains. In all, the region displays extremely diverse physiography and geology.

Topographic features include high mountains, deep canyons, broken foothills, bluffs, buttes, rolling plains, alluvial valleys, and an assortment of typically "western" features--washes, gulches, steep breaks, and rugged hills. Exposed rocks are equally varied.

The topography received its basic, present shape during the Laramide Orogeny, the mountain-building period which gave rise to the entire Rocky Mountain chain. This era of geologic unrest commenced about 70 million years ago and continued into the



## REGIONAL GEOGRAPHIC SETTING

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Tertiary Period, particularly the late Eocene Epoch (approximately 40 million years ago) when maximum elevation of the Uinta Range was probably reached. Total uplift may have exceeded 45,000 feet (13,716 m), though at no time was actual elevation much greater than present heights because of concurrent erosion. A unique feature of the study area is the presence of dramatic folds and faults that are exposed along and near the Green and Yampa rivers in Dinosaur National Monument.

Mineral development is the major industry in the Green River subregion. Coal, oil, gas, uranium, phosphate rock, trona (soda ash), and gilsonite are the significant minerals. In 1973, composite mineral production in Moffat County exceeded \$11 million in value; in Uintah County the figure was \$23.5 million. Daggett County production was valued at \$1.1 million. The southern part of the region has vast deposits of oil shale. These reserves may be the basis for future large-scale industrial development.

### Coal

In the Northwest Colorado Coal EIS (FES 77/1) covering Moffat, northern Rio Blanco, and western Routt Counties, the Bureau of Land Management has projected the following cumulative developments by 1990: 226 million tons (205 million metric tons) of coal produced, 14 coal mines, 3 power plants, 85 miles (127 km) of new railroads, 90 miles (145 km) of new roads, 350 miles (560 km) of new powerlines, and a population increase of 11,870. About 250,000 acres (100,000 ha) of land are involved in lease applications and industry nominations for additional coal leasing. Most of the coal development are southwest, southeast, and east of Craig, Colorado. Closest to the study area are two proposed developments near the White River in northern Rio Blanco County. BLM is also studying the potential for leases in the Williams Fork drainage, a tributary of the Yampa, southeast of Craig.



## LEGEND

QUATERNARY AND UPPER  
TERTIARY SEDIMENTARY DEPOSITS

TERTIARY VOLCANIC ROCKS

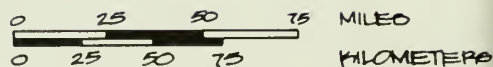
LOWER TERTIARY FORMATIONS

CRETACEOUS FORMATIONS

JURASSIC AND TRIASSIC  
FORMATIONS

PALEOZOIC FORMATIONS

PRECAMBRIAN ROCKS



## REGIONAL GEOLOGY

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Several major coal development areas are being studied in southern Wyoming. One, the Savery Project, is in the upper Yampa River Basin. This 46,000-acre (18,620-ha) area has a potential of about 60 million tons (54 million metric tons) of coal production (mostly from underground mining) over a period of 30 years. Five other coal projects in southern Wyoming, all outside the regional study area, involve a potential of more than 380 million tons (345 million metric tons) of coal, with mine lives ranging from 16 to 40 years. None of these five projects would directly impact the wild and scenic river study area. Uintah County also has significant coal resources; Daggett County's coal reserves are negligible.

### Oil and Gas

Most of Moffat County's oil fields are in its southeastern quarter; most of the gas fields are in the northern part of the county. Production has been increasing since the discovery of oil and gas in 1924. At the end of 1975, the county had 200 active wells in 23 fields. Production for that year was approximately 800,000 barrels of oil and 21,972,957 Mcf (621,000 m<sup>3</sup>) of gas.<sup>3</sup>

The Ashley Valley field near Jensen in Uintah County produced gas from 1925 to 1941. From 1948 to the present, the field has produced oil from the deeper Weber sandstone. The Altamont-Bluebell field in the western portion of the county is the largest oil-producing area in Utah. The Clay Basin gas field in Daggett County has 23 wells, with 5 in production. Daggett County production of gas and oil in 1975 was approximately 2,946,427 Mcf (83,384 m<sup>3</sup>) and 5831 barrels, respectively; Uintah

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3. Colorado Oil and Gas Commission, Dept. Natural Resources, 1975 Oil and Gas Statistics (1976).

County produced 5,236,360 barrels of oil and 11,279,248 Mcf (399,000 m<sup>3</sup>) of gas in 1975.<sup>4</sup> Many wildcat oil and gas drilling operations are active in southern Uintah County. The Overthrust Belt, the largest oil discovery in the United States since Prudhoe Bay in Alaska, is being developed in parts of northeastern Utah and western Wyoming. Major oil fields have been discovered on the west side of the Upper Green River basin, indicating that a substantial potential for future development exists. The Overthrust Belt is about 60 to 70 (95-110 km) miles west of the region described in this report.

### Uranium

Uranium has been mined in Moffat County, near the town of Maybell, since 1953. Ores are of low grade and are found largely in lenticular bodies within the Browns Park formation. Potential (relatively low-grade) uranium mining areas are located near the Colorado-Utah border north of Rangely and in the area from the Wyoming border south to the vicinity of Craig and Maybell. The Energy Research and Development Administration (now the Department of Energy) has estimated "probable potential" resources at 55 million tons (50 million metric tons) of ore, containing 44 million pounds (20 million kg) of U<sub>3</sub>O<sub>8</sub>. Recent price escalation has changed some of the potential resources to the economically mineable category. A heap leaching mill using old tailings has recently opened at Maybell, Colorado.

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4. Yearly summary in Monthly Oil and Gas Production Report, Utah Oil, Gas, and Mining Division, December 1975.

## Oil Shale

Although oil shale in the Green River Formation of Colorado, Utah, and Wyoming contains the world's greatest potential reserve of oil, there has been no significant development to date. A nationally significant oil shale development area is situated in the Piceance Creek basin of Rio Blanco County, south of the regional study area. Certain production methods would require large amounts of water, part of which might be taken from the Yampa River basin by trans-basin diversion. However, the Paraho process, which seems promising, would require very little water and Yampa River flows are not likely to be affected. The Piceance Creek basin of Colorado and Utah has a total estimated potential of 600 billion barrels of shale oil [in beds 10 feet (3m) or more in thickness, containing 25 or more gallons per ton], of which about 480 billion barrels are estimated to lie in Colorado.<sup>5</sup>

Large oil shale deposits have also been reserved by the U.S. Navy in southwestern Uinta County, Utah. A large area is withdrawn northwest of Maybell, Colorado in the Sand Wash Basin. In Utah's Uinta Basin and at Rifle, Colorado, a limited amount of shale oil is being produced on a test basis.

## Other Minerals

Extensive bituminous tar sand deposits have been identified in Asphalt Ridge southwest of Vernal, Utah (Uintah County); deposits

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5. Information provided by Stephen Utter, oil shale specialist with the Bureau of Mines, by memo of Feb. 8, 1979.



south of the White River might contain 3.7-4 billion recoverable barrels. Phosphate is produced near Brush Creek north of Vernal and gilsonite is mined at several sites in Uintah County. Zinc, copper, iron, gold and other metallic minerals have been found in the Dinosaur National Monument area; all are uneconomical to produce. The Browns Park Formation contains great quantities of tuff (volcanic ash). Promising deposits are also found along the Green River in Daggett County, Utah.

## SOILS






Four (of a total of 10) soil orders are found in Moffat County, Colorado--Alfisols, Aridisols, Entisols, and Mollisols. Most common are the Entisols, mineral soils with weak or undeveloped pedogenic horizons. Aridisols, the second largest soil group, are mineral soils of relatively low organic matter content that have inadequate moisture to mature a crop without irrigation in most years. Mollisols, the next most common, are mineral soils relatively rich in organic matter, with a thick, dark surface horizon; they have a high base saturation throughout. The smallest group is Alfisols, soils of low organic matter and relatively high base saturation; alluvial horizons of silicate clays are present, and sufficient moisture is usually available to mature a crop.

In Utah, intensive soil mapping is currently underway in the region and the study corridor. Soils include Mollisols, Entisols, Aridisols, and Inceptisols.

Because of a general lack of comparability between soils maps covering Moffat County in Colorado and Daggett and Uintah Counties in Utah, it was not possible to prepare a meaningful regional soils map. However, a study corridor soils map follows.

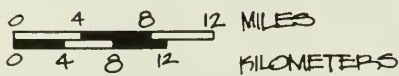




-  LITHIC ARGIBOROLLS - ROCK OUTCROP -  
TYPIC ARGIBOROLLS
-  TYPIC CALCORTHIDS - USTOLIC  
HAPLARGIDS - TYPIC TORRIORTHENTS
-  LITHIC USTIC TORRIORTHENTS -  
USTIC TORRIORTHENTS
-  LITHIC HAPLOBOROLLS - ROCK LAND -  
ARIDIC ARGIBOROLLS
-  USTOLIC HAPLARGIDS



NORTH



## SOILS

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## VEGETATION

The region's vegetation is the complex result of such environmental factors as climate, slope, altitude, and soils, as well as livestock grazing and other land uses. In general, nine primary and two secondary vegetative types are present. The following review begins high in the subalpine life zone and proceeds to the lower zones which are drier and have longer growing seasons.

Coniferous trees are generally marginal except at elevations above 8,500 feet (2,600 m) in the Uinta Range where soils are cooler and precipitation is relatively high. Conifers tend to be more common on north-facing slopes. Dominant species are the Douglas-fir, subalpine fir, and Engelmann spruce, in addition to substantial stands of ponderosa pine. Stands of aspen are often intermingled with conifers at high elevations where fires have caused secondary succession.

At lower elevations, the mountain shrub type develops where moisture is sufficient. Common plant species are the Utah serviceberry, western serviceberry, and Gambel oak. Also common are the mountain mahogany, bitterbrush, and chokecherry. In one area of north-central Moffat County, the sagebrush association occupies about 1,500 square miles (4000 km<sup>2</sup>). Basin big sagebrush, Wyoming big sagebrush, low sagebrush, and black sagebrush are common to this diversely distributed type--the only association found adjacent to all other types in the study region.

The pinon-juniper type is present where precipitation is similar to that required by sagebrush, but where the soils are shallow. Utah juniper, Rocky Mountain juniper, and pinon pine form an open overstory. Northern Colorado and Utah mark the northernmost extension of pinon.

DAGGETT COUNTY  
FLAMING GORGE  
RESERVOIR



LEGEND

ALPINE

CROPLAND

IRRIGATED LAND

DRY CROPLAND

RANGE

NORTHERN DESERT SHRUB

FOREST

SUBALPINE FOREST

MOUNTAIN BRUSH

PINYON - JUNIPER WOODLAND



0 10 20 30 MILES  
0 10 20 30 40 KILOMETERS

# VEGETATION COVER TYPES

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Grassland sites vary from deep soil areas to wet mountain meadows to dry, rocky hillsides. Meadows are small, as are grassland patches on windswept ridges and uppermost south-facing slopes. Western wheatgrass, needle-and-thread grass, Indian ricegrass, June grass, bluegrass, and the exotic cheatgrass are the dominant species.

Barren areas tend to be small and restricted to rocky areas of low precipitation where little soil has developed. Saltbush and greasewood also grow where the precipitation and elevation are low. Saltbush is most frequent in large, rolling, semi-arid basins and on lower foothill slopes; greasewood appears in low elevation drainage bottoms, alluvial fans, and basin floodplains.

The river bottom type is extremely diverse and includes groves of cottonwoods and box elder with willow thickets, marshlands, and open grasslands. In many river bottoms, there has also been a widespread invasion of tamarisk.

Finally, the cropland type grows in natural meadows, irrigated valley bottoms, and adjacent mesas and slopes along the river basins. Principal crops are hay, small grains, and winter wheat.

## WATER RESOURCES

### Flow

The region is drained exclusively by the Green and Yampa Rivers and small tributaries: Little Snake River and Fortification Red, Strawberry, Vermillion, Jones Hole, Brush, and Ashley Creeks. Flow in the Green River is controlled by releases from Flaming Gorge Dam; the main stem of the Yampa, however, is the largest undammed tributary in the Colorado River Basin. Flow data for the





The north-facing slope of Red Canyon on the Green supports both the pinyon-juniper community and stands of Douglas-fir. Burn scar on the rim is being colonized by the mountain-shrub community. NPS



Flaming Gorge Dam, a part of the Colorado River Storage Project just above segment A, stores almost 4,000,000 acre-feet (4,890 million m<sup>3</sup>) of water. NPS

Green River below Flaming Gorge Dam, the Yampa River at Maybell [33 river miles (53 km) upstream from the east boundary of Dinosaur National Monument], and the Little Snake River near Lily, Colorado [10 miles (16.1 km) upstream from its mouth] are displayed on tables II-1, II-2, and II-3. The Yampa in the monument has an average annual flow of about 1,567,000 acre-feet (1.4 billion  $m^3$ ), or about 2,160 cfs (61  $m^3/s$ ). The Green above the Yampa has an average annual flow of about 1,650,000 acre-feet (2 billion  $m^3$ ), or about 2,280 cfs (65  $m^3/s$ ).

### Depletions, Water Use<sup>6</sup>

The average annual depletion in the entire Yampa River basin and in the Green River as it flows throughout the three-county region is approximately 175,000 acre-feet (216 million  $m^3$ ).<sup>7</sup>

The major consumptive use is for irrigation, which accounts for about 75 percent of the total depletion. There are over 2,100 active irrigation water rights in the Yampa-Green River Basin in Colorado and Wyoming and several hundred more within the Green River drainage in Daggett and Uintah counties.

Other consumptive use includes that for non-crop areas incidental to irrigation, i.e., grazing, timber, and recreation; domestic and

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6. Because activities and conditions on the Yampa River east of the three-county region and upstream to the headwaters may impact the immediate study area, this and the following two sections on water treat the entire Yampa River Basin. See footnote 1.

7. Estimates are for water, consumptively used. Water diverted from streams and rivers and thereafter returned is not included; neither are natural depletions such as those by forests, riparian vegetation, native pasture, range vegetation, natural lake evaporation, wildlife, or seepage.

Table II-1

Average Monthly and Annual Flow, Green River at Greendale, Utah  
Water Years 1971-1976

Water Year	October		November		December		January		February		March	
	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s
1971	960	26.2	1,111	31.5	1,304	36.9	903	25.6	773	21.9	781	22.1
1972	1,911	54.1	2,878	81.5	3,257	92.2	2,762	78.2	2,925	82.8	1,662	47.1
1973	3,168	89.7	3,621	102.6	3,626	102.7	3,578	101.3	3,651	103.4	1,834	51.9
1974	2,402	68.0	2,591	73.4	2,533	71.7	2,068	58.6	808	22.9	826	23.4
1975	2,928	82.9	2,476	70.1	2,412	68.3	2,509	71.1	2,941	83.3	1,598	45.3
1976	1,403	39.7	2,115	59.9	3,449	97.7	2,906	82.3	1,930	54.7	1,760	49.8
Average	2,129	60.3	2,466	78.3	2,764	78.3	2,454	69.5	2,171	61.5	1,410	39.9
Percent	7%		9%		10%		9%		8%		5%	

Water Year	April		May		June		July		August		September		Yearly Avg.	
	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s
1971	1,355	38.4	1,457	41.3	1,673	47.4	1,899	53.8	2,453	69.5	2,283	64.7	1,416	40.1
1972	2,348	66.5	3,973	112.5	3,188	90.3	2,944	83.4	2,620	74.2	1,566	44.4	2,670	75.6
1973	1,038	29.4	2,612	74.0	3,170	89.8	2,710	76.8	3,426	97.0	2,517	71.3	2,910	82.4
1974	1,010	28.6	2,966	84.0	2,215	62.7	1,415	40.1	2,225	63.0	2,369	67.1	1,961	55.51
1975	1,046	29.6	1,440	40.8	3,454	97.8	4,324	122.5	3,218	91.1	1,581	44.8	2,494	70.6
1976	2,321	65.7	4,212	119.3	3,568	101.1	2,793	79.1	2,627	74.4	2,695	76.3	2,652	75.1
Average	1,520	43.1	2,777	78.6	2,878	81.5	2,681	75.9	2,762	78.2	2,169	61.4	2,351	66.5
Percent	5%		10%		10%		9%		10%		8%		6%	



Table II-2

Average Monthly and Annual Flow, Yampa River at Maybell, Colorado  
Water Years 1971-1976

Water Year	October		November		December		January		February		March	
	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s
1971	470	13.3	437	12.4	345	9.8	374	10.6	384	10.9	1,081	30.6
1972	306	8.7	355	10.1	310	8.8	347	9.8	436	12.4	1,175	33.3
1973	400	11.3	382	10.8	351	9.9	305	8.6	284	8.0	428	12.1
1974	250	7.1	338	9.6	357	10.1	308	8.7	271	7.7	577	16.3
1975	207	5.9	280	7.9	138	3.9	220	6.2	298	8.4	458	13.0
1976	247	6.0	298	8.4	272	7.7	246	7.0	343	9.7	531	15.0
Average	313	8.9	348	9.9	296	8.4	300	8.5	337	9.5	703	19.9
Percent	1%		2%		1%		1%		2%		4%	

Water Year	April		May		June		July		August		September		Yearly Av.	
	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s
1971	4,649	131.7	6,401	181.3	7,756	219.7	1,901	53.8	320	9.1	254	7.2	2,031	57.0
1972	2,116	59.9	4,248	120.3	4,872	138.0	538	15.2	151	4.3	197	5.6	1,252	35.5
1973	1,626	46.1	7,689	217.8	6,022	170.5	2,128	60.3	517	14.6	205	5.8	1,702	48.2
1974	3,775	106.9	9,695	274.6	6,208	175.8	1,236	35.0	314	8.9	89	2.5	1,958	55.5
1975	1,566	44.4	5,439	154.0	7,270	205.9	3,388	96.0	509	14.4	180	5.1	1,667	47.2
1976	1,463	41.4	5,011	141.9	3,712	105.1	997	28.2	357	10.1	165	4.7	1,138	32.2
Average	2,533	71.7	6,414	181.6	5,973	169.2	1,698	48.1	361	10.2	182	5.2	1,624	46.0
Percent	13%		33%		31%		9%		2%		1%		8%	

Table II-3

Average Monthly and Annual Flow, Little Snake River  
Near Lily, Colorado Water Years 1970-1975

Water Year	October		November		December		January		February		March	
	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s
1970	148	4.2	135	3.8	86	2.4	94	2.7	190	5.4	241	6.8
1971	183	5.2	167	4.7	133	3.8	141	4.0	159	4.5	612	17.3
1972	123	3.5	147	4.2	154	4.4	140	4.0	424	12.0	752	21.3
1973	73	2.1	153	4.3	106	3.0	100	2.8	91	2.6	127	3.6
1974	98	2.8	166	4.7	132	3.7	106	3.0	113	3.2	189	5.4
1975	57	1.6	104	2.9	78	2.2	71	2.0	96	2.7	246	7.0
Average	114	3.2	145	4.1	115	3.3	109	3.1	179	5.1	361	10.2
Percent	1%		2%		1%		1%		2%		4%	

Water Year	April		May		June		July		August		September		Yearly Avg.	
	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s	ft <sup>3</sup> /s	m <sup>3</sup> /s
1970	651	18.4	3503	99.2	2979	84.4	464	13.1	43	1.2	63	1.8	716	20.3
1971	1607	45.5	3370	95.5	3606	102.2	584	16.5	25	0.7	55	1.6	887	25.1
1972	808	22.9	1697	48.1	1625	46.0	102	2.9	7	0.2	3	0.1	499	14.1
1973	1061	30.1	3572	101.2	2517	71.3	586	16.6	109	3.1	84	2.4	715	20.3
1974	1073	30.4	4140	117.3	2540	72.0	281	8.0	48	1.4	7	0.2	741	21.0
1975	409	11.6	2605	73.8	2526	71.6	758	21.5	119	3.4	76	2.2	595	16.9
Average	935	26.5	3148	89.2	2632	74.6	463	13.1	59	1.7	48	1.4	692	19.6
Percent	11%		38%		32%		6%		1%		1%		8%	

municipal use, mostly in the Vernal area, which takes about 2,000 acre-feet (2.5 million  $m^3$ ) per year from the Green River; export through three transbasin diversions from the Yampa Basin, which accounts for an annual depletion of about 10,800 acre-feet (13.3 million  $m^3$ ); evaporation losses from reservoirs [about 80,000 acre-feet (98.7 million  $m^3$ ), mostly from Flaming Gorge Reservoir]; livestock watering; and industrial use. This last use accounts for recent significant increases in depletion from the Yampa River Basin and from the Green River below its confluence with the Yampa. A coal-fired, steam electric generating plant, with a consumptive use of 3,300 acre-feet (4 million  $m^3$ ) per year, began operating at Hayden, Colorado 17 miles (27.4 km) east of Craig in mid-1975. Unit 2 of the Hayden plant started operations in 1976 and uses 5,000 acre-feet (6.2 million  $m^3$ ) annually. Units 1 and 2 of the Colorado-Ute Electric Association plant near Craig will soon be on line, producing about 700 MW; Unit 3 is being planned. Units 1 and 2 will use about 5,000 acre-feet per year.

### Water Quality

See "Water Quality" in chapter III.

### Existing and Proposed Water Developments

The largest water development in the region is Flaming Gorge Dam on the Green River. This 502-foot-high (153-m) structure, located in Red Canyon, backs up the Green River for 91 miles (145 km) when full. Total area at capacity is 42,020 acres (17,010 ha); reservoir storage capacity ranges from 2,804,000 acre-feet (3,460 million  $m^3$ ) at elevation 6,015 feet (1,833.4 m) to 3,749,000 acre-feet (4,624 million  $m^3$ ) at elevation 6,040 feet (1,841 m). About 92 percent is usable storage. The dam, completed in 1964 by the



Bureau of Reclamation for the purposes of irrigation, power generation, flood control, and recreation, is a major feature of the Colorado River Storage Project. The penstocks of the dam have been modified to permit warmer releases and thus improve the downstream fishery.

The Bureau of Reclamation's authorized Central Utah Project is the largest water resource development program ever undertaken in Utah. Three units of the project involve portions of Uintah County, although they will have no direct effect on any part of the wild and scenic river study reach. The Vernal Unit, which supplies irrigation water and involves a 38,000 acre-feet (46.9 million m<sup>3</sup>) reservoir near Vernal, Utah, was completed in 1962. Development of the Jensen and Uintah Units, which will provide irrigation, municipal and industrial water to areas near Jensen, Ouray, Roosevelt, and Whiterock, was initiated in 1977 and 1978.

The Colorado River Basin Peaking Power Investigations study has considered three possibilities that would increase the hydroelectric peaking power output at Flaming Gorge Dam. The Peaking Power Study will not include the first two preliminary possibilities in its list of recommendations, and any that are included would require Congressional approval and funding of feasibility studies. Following are the three peaking power possibilities that have been considered.

1. Flaming Gorge Pump-Storage Project: With this 1,000 megawatt proposal, Flaming Gorge Reservoir would serve as a forebay, while an after-bay reservoir would be required in the vicinity of or just above Indian Crossing, at the lower end of the Red Canyon segment. This would involve construction of a 105-foot (32 m) high dam which would serve as a regulating structure with constant releases of approximately 1,800 cfs (51 m<sup>3</sup>/s). Peak releases of about 5 hours duration from Flaming Gorge Reservoir would be extremely high--as much as 42,500 cfs (1,200 m<sup>3</sup>/s). This would

result in the virtual loss of the Red Canyon segment of the Green River. This proposal has been dropped because of adverse impacts and high costs, but it might be reconsidered at a later date.

2. Modification of Flaming Gorge Dam Penstocks: The dam penstocks would be modified to accommodate a greater flow, and thus 129 megawatts of additional peaking power would be produced. A 65-foot (19.8 m) high reregulating dam and reservoir would be built below Flaming Gorge Reservoir near Little Hole Campground. This reservoir would release steady flows of approximately 1,800 cfs ( $51 \text{ m}^3/\text{s}$ ). This project would decrease the time period of high flows, while increasing the volume of those flows from about 4,000 cfs ( $113.3 \text{ m}^3/\text{s}$ ) to approximately 5,000 cfs ( $140 \text{ m}^3/\text{s}$ ). The volume of low flows would be reduced, while the time duration would be increased. This project would adversely affect recreation use and fisheries between Flaming Gorge Dam and the reregulation reservoir. This proposal has been dropped due to adverse impacts and high costs, but it also could be reconsidered later.

3. Installing Power Generation Capacity on Flaming Gorge Dam Outlet Works: Water is released only periodically through the dam outlet works, but if turbines were installed, hydroelectric power could be produced when such releases are made. An estimated 40 megawatts of power could be so produced. This proposal would not involve an afterbay or reregulating reservoir. However, as above, the volume of high flows would be increased to about 5,000 cfs ( $140 \text{ m}^3/\text{s}$ ), while the duration of high flows would be reduced. The volume of low flows would be reduced, while the duration would be increased. This project would adversely impact recreation use and fisheries below Flaming Gorge Dam, principally in the Red Canyon and Browns Park segments, but also to some extent below this. The Bureau of Reclamation has recommended this modification be included in a more detailed feasibility study of potential peaking power projects in the Colorado River Basin.

In the Yampa River Basin, there are about 45 relatively small impoundments on tributaries with a total capacity of about 150,000 acre-feet (185 million  $m^3$ ). About 30 reservoirs of varying size have been proposed in the Yampa River Basin. Capacities range from Wren Reservoir on Fish Creek (2,200 acre-feet or 2.7 million  $m^3$ ) to the Juniper-Cross Mountain Project on the Yampa main stem (1,222,000 acre-feet or 1,507 million  $m^3$ ). Table II-4 lists significant proposed reservoirs for which limited information is available; the map, following, shows approximate reservoir locations.

These projects are in various stages of planning, assessment, and evaluation. Not all of them can be built, for some overlap at near-identical sites and the aggregate would develop more water than is available. Also, under the Endangered Species Act of 1973, as amended, licensing, funding, or construction of projects that would jeopardize the continued existence of endangered and threatened species or result in destruction or adverse modification of their critical habitat are prohibited, unless exempted under section 7 of the Act.

Following are brief descriptions of several proposed or potential projects. These are the largest of those on which information is available.

1. Juniper-Cross Mountain Project: Sponsored by the Colorado River Water Conservation District (CRWCD), the Juniper-Cross Mountain Project proposes two large dams on the Yampa River. The primary purpose of both would be hydropower generation; additional stated benefits are irrigation, domestic, fish, industrial, and municipal. The Juniper Reservoir, with 1,080,000 acre-feet (1,332 million  $m^3$ ) of storage, would be located 25 miles (40.3 km) southwest of Craig, Colorado and produce peaking power which, according to the CRWCD, would be "the optimum hydropower



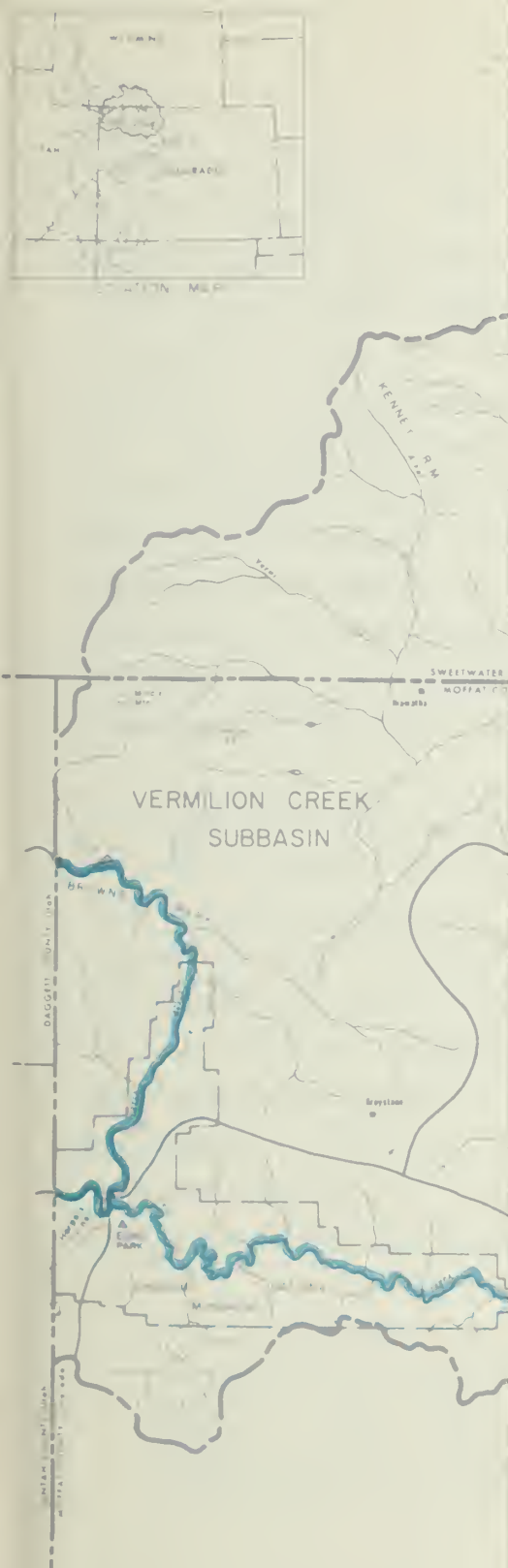
## POTENTIAL WATER DEVELOPMENT RESERVOIRS IN YAMPA RIVER BASIN

Map Key	Project Name	Capacity Acre-feet	Principal Use	Decree Held By	Date of Decree	Map Key	Project Name	Capacity Acre-feet	Principal Use	Decree Held by	Date of Decree
1	Bear	11,600 <sup>3</sup> (14 million m <sup>3</sup> )	Irrigation	CRWCD <sup>1</sup>	9/30/61	15	Pleasant Valley	43,200 <sup>3</sup> (53 million m <sup>3</sup> )	Irrigation	CRWCD	6/29/59
2	California Park	36,000 <sup>3</sup> (44 million m <sup>3</sup> )	Irrigation	CRWCD	8/7/62	16	Rampart	12,100 <sup>3</sup> (15 million m <sup>3</sup> )	Irrigation	CRWCD	8/7/62
3	Craig	44,500 <sup>3</sup> (55 million m <sup>3</sup> )	Power	UC&MC <sup>2</sup>	--		Savery-Pot Hook				
4	Dunckley	57,100 <sup>3</sup> (70 million m <sup>3</sup> )	Irrigation	PSC <sup>3</sup>	7/20/63	17	Pot Hook Res.	60,000 <sup>3</sup> (74 million m <sup>3</sup> )	Irrigation	CRWCD	--
5	Hinman Park	44,000 <sup>3</sup> (54 million m <sup>3</sup> )	Power	PSC <sup>3</sup>	8/4/64	18	Sandstone Res. (in Wyoming)	15,500 <sup>3</sup> (19 million m <sup>3</sup> )	Irrigation	CRWCD	--
	<u>Juniper-Cross Mountain</u>						<u>Sheephorn*</u>				
6	Juniper Res.	1,080,000 <sup>3</sup> (1,332 million m <sup>3</sup> )	Power	CRWCD	6/8/54	19	Yampa River Res.	32,500 <sup>3</sup> (40 million m <sup>3</sup> )	Power	VTC <sup>5</sup>	--
7	Cross Mountain Res.	142,000 <sup>3</sup> (175 million m <sup>3</sup> )	Power	CRWCD	12/___/74	20	Morrison Creek Res.	12,500 <sup>3</sup> (15 million m <sup>3</sup> )	Power	VTC	--
	<u>Oak Creek</u>					21	Trout Creek	23,300 <sup>3</sup> (29 million m <sup>3</sup> )	Power	RMPC	4/28/67
8	Blacktail Res.	229,000 <sup>3</sup> (282 million m <sup>3</sup> )	Power	RMPC <sup>4</sup>	1/16/66	22	Twenty Mile <sup>3</sup> (19 million m <sup>3</sup> )	15,300	Irrigation	J.E. Lultrell	7/22/61
9	Childress Res.	24,200 <sup>3</sup> (30 million m <sup>3</sup> )	Power	RMPC	6/25/64	23	Yamcolo	9,000 <sup>3</sup> (11 million m <sup>3</sup> )	Irrigation	CRWCD	2/26/63
10	Lower Green Creek Res.	84,000 <sup>3</sup> (104 million m <sup>3</sup> )	Power	RMPC	1/16/66		<u>Yellow Jacket*</u>				
11	Lower Middle Creek Res.	25,200 <sup>3</sup> (31 million m <sup>3</sup> )	Power	RMPC	--	24	Thornburgh	31,800 <sup>3</sup>	Irrigation	YJCD <sup>6</sup>	8/7/62
12	Upper Middle Creek Res.	102,200 <sup>3</sup> (126 million m <sup>3</sup> )	Power	RMPC	--	25	Grouse Mountain	79,300 <sup>3</sup> (98 million m <sup>3</sup> )	Irrigation	CRWCD	6/4/63
13	Main Green Creek Res.	103,200 <sup>3</sup> (127 million m <sup>3</sup> )	Power	RMPC	1/16/77	26	Hayden	8,600 <sup>3</sup> (11 million m <sup>3</sup> )	Power (?)	CUEA <sup>7</sup>	6/24/64
14	Service Creek Res.	22,000 <sup>3</sup> (27 million m <sup>3</sup> )	Power	RMPC	1/16/77	27	Woodchuck	43,200 <sup>3</sup> (53 million m <sup>3</sup> )	Irrigation	CRNCD	--

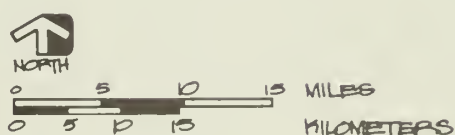
<sup>1</sup>Colorado River Water Conservation District  
<sup>2</sup>Utah Construction and Mining Company  
<sup>3</sup>Public Service Company of Colorado  
<sup>4</sup>Rocky Mountain Power Company

<sup>5</sup>Vidler Tunnel Company and City of Golden  
<sup>6</sup>Yellow Jacket Conservancy District  
<sup>7</sup>Colorado Ute Electric Association  
 \*Project involves other reservoirs outside of Yampa Basin





- LEGEND
- 3 ■ POPULATED AREAS
  - 3 — RESERVOIR
  - 3 - - - BASIN BOUNDARY
  - 3 — SUBBASIN BOUNDARY
  - 3 - - - COUNTY BOUNDARY
  - 3 - - - STATE BOUNDARY
  - 3 - - - NATIONAL FOREST, MONUMENT AND WILDERNESS AREA BOUNDARIES
- SEE TABLE II-4 FOR NAMES AND OTHER INFORMATION ON RESERVOIRS.



# POTENTIAL YAMPA RIVER BASIN RESERVOIRS

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

WSRS | 20,053  
DSC | MAR 79



- LEGEND
- POPULATED AREAS
  - 3 RESERVOIR
  - BASIN BOUNDARY
  - SUBBASIN BOUNDARY
  - COUNTY BOUNDARY
  - STATE BOUNDARY
  - NATIONAL FOREST, MONUMENT AND WILDERNESS AREA BOUNDARIES

SEE TABLE II-4 FOR NAMES AND OTHER INFORMATION ON RESERVOIRS.



# POTENTIAL YAMPA RIVER BASIN RESERVOIRS

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WSRS | 20,053  
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development in a predominantly thermal generating system."<sup>8</sup> Cross Mountain Reservoir, with 142,000 acre-feet (175 million m<sup>3</sup>) of storage, would be located 50 miles (80.5 km) west of Craig and would flood Cross Mountain Canyon; it would serve as a reregulating dam for the fluctuating releases from Juniper Reservoir. Cross Mountain Dam would be approximately 8.5 miles (13.7 km) upstream from the east boundary of Dinosaur National Monument and the beginning of the wild and scenic river study area. This project would likely affect downstream flows significantly, primarily by sharply reducing and regulating present spring/early summer runoff while increasing the flow level during the rest of the recreation season. The altered flow would undoubtedly affect the endangered fish species adversely.

The Colorado River Water Conservation District filed for a preliminary permit with the Federal Power Commission (now the Federal Energy Regulatory Commission), to investigate feasibility on August 4, 1975; the permit was issued on February 14, 1977. In the intervening period, concerned state and federal agencies and others submitted comments on the application. The Interior Department's comments of January 14, 1976 included statements by the Bureau of Mines on the presence and significance of mineral resources in the area, including coal, oil and gas, uranium, and limestone. Other Interior comments related to:

- adverse impact on endangered endemic fish in the Yampa River and the Green River downstream of its confluence with the Yampa. The Department considered this potential impact serious enough to state that "There is every likelihood the Department would oppose construction of (this) project based

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8. Application presented to the Federal Power Commission for Preliminary Permit, Juniper-Cross Mountain Hydrocomplex, filed by the Colorado River Water Conservation District, August 4, 1975.

on anticipated destruction of habitat which is considered to be critical to two endangered species."

- "serious impact upon Dinosaur National Monument, both from the standpoint of a change in the natural environment and visitor use of the area."
- "greatly diminish(ed) . . . quality and integrity of the proposed wilderness (within Dinosaur National Monument)."
- an alteration of the natural environment of a proposed National Wild and Scenic River, a degradation "of the wilderness quality of river trips on the Yampa," and a reduction of "the diversity of river trips available."

2. Savery-Pothook Project: This is the only authorized Bureau of Reclamation project in the region. All planning is complete and a draft environmental impact statement was filed on September 29, 1976. In early 1977 the Executive Office of the President recommended that funding for this project cease and that it be deauthorized because of marginal economic benefits and substantial environmental effects. In September of 1977, the Commissioner of Reclamation recommended that the project be deauthorized. However, the project may yet be constructed.

Main construction features would be two reservoirs, Sandstone Reservoir on Savery Creek in Wyoming and Pothook Reservoir on Slater Creek in Colorado. Two conveyance systems, consisting of canals and laterals, would be constructed. The project objectives are to provide a supplemental irrigation supply for some lands inadequately irrigated and a full water supply for some unirrigated but arable lands. Fishery enhancement, recreation, and flood control benefits are also claimed for the project. If the project were to be developed, flows in the Yampa River would be reduced approximately 22,500 acre-feet (27.8 million m<sup>3</sup>) a year, or about 1.3 percent of the Yampa's flow in the study area.



Formal consultation between the Fish and Wildlife Service and the Bureau of Reclamation on the effects of the project on endangered fish and other species has not been completed. The downstream effects on esthetic, wilderness and recreation values would probably be relatively small.

3. Sheephorn Project: The Sheephorn Project, which would be situated in the upper part of the Yampa Basin south and southwest of Steamboat Springs, is one of the largest water development proposals ever planned in the upper Colorado River Basin. It is sponsored by the Vidler Water Tunnel Company and the City of Golden, Colorado. The Sheephorn Project, a multiple-purpose development, will produce hydro-electric power, supply water for domestic, municipal, industrial, and irrigation uses, and provide a measure of flood control.

As a part of the project, transbasin diversion would be made from the Yampa River and headwater tributaries, including Fish, Walton, Harrison, Service, and Morrison Creeks. This project includes 7 reservoirs, 662,900 acre-feet (817.6 million m<sup>3</sup>) of storage, and about 90 miles (150 km) of tunnels and pipelines. It would produce 283 million kwh of electrical power annually. This project would affect downstream flows by decreasing total flows and regulating a portion of the Yampa River flows, both on a daily and seasonal basis. From the information available to date, it has been difficult to assess the degree of impact this project would have.

Application for a Preliminary Permit was submitted to the Federal Power Commission on November 26, 1975. In comments on the permit application filed on June 8, 1976, the U.S. Interior Department questioned several possible impacts on the Sheephorn Project, including those on endangered endemic fish downriver in the Yampa, and potential adverse effects on the values for which the Yampa is being studied for possible inclusion in the National

Wild and Scenic Rivers System. The Department of the Interior concluded that "unless strong evidence is presented that these concerns have been eliminated it is quite probable that the Department will be opposed to the issuance of any license for construction . . . of this project."

4. Yamcolo Project: The Yamcolo Reservoir Project is proposed for the reaches of Yampa drainage on Bear River, south of Steamboat Springs and 12 miles (19.3 km) southwest of the town of Yampa. Sponsored by the Upper Yampa Water Conservancy District, the project (also known as Stillwater Reservoir #4) includes a mile-long, (1.6 km), 9,000 acre-foot (11.1 million m<sup>3</sup>) reservoir that would store runoff waters to serve industrial, supplementary irrigation, and municipal uses. Most of the water would be used near Craig and Hayden and in the Egeria-Bear River Divide area upstream from the Yampa.

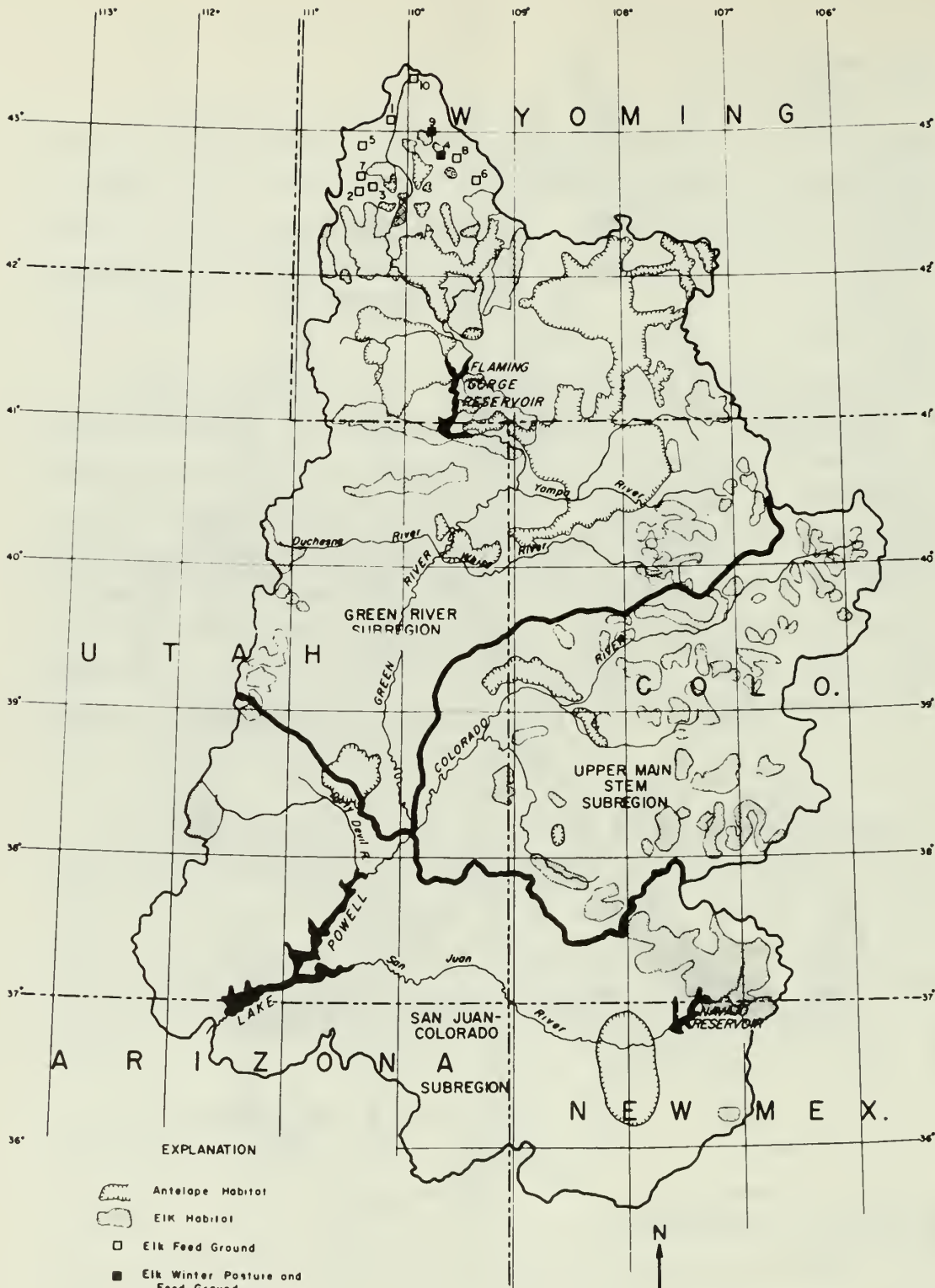
5. Oak Creek Project: This project proposes development of water from the Yampa River and several of its tributaries--Morrison Creek, Service Creek, Green Creek, Middle Creek, and Trout Creek--near the communities of Steamboat Springs and Oak Creek. The complex of reservoirs proposed would provide a total storage capacity of approximately 465,000 acre-feet (573.5 million m<sup>3</sup>).

## FISH AND WILDLIFE

The diverse fish and wildlife of northwestern Colorado and northeastern Utah are a function of the regional environment. Some species are tied to particular plant communities, vegetative types, and soil associations; others range widely and are found in different ecosystems from one season to the next. Nearly 300 species of wildlife exist in the Yampa River Basin, and about 365 species in the Green River area of Utah.



# **PRINCIPAL WILDLIFE RANGES UPPER COLORADO REGION GREEN/YAMPA WILD AND SCENIC RIVER STUDY**



# PRINCIPAL WILDLIFE RANGES UPPER COLORADO REGION GREEN/YAMPA WILD AND SCENIC RIVER STUDY





# PRINCIPAL WILDLIFE RANGES UPPER COLORADO REGION GREEN YAMPA WILD AND SCENIC RIVER STUDY





# PRINCIPAL WILDLIFE RANGES UPPER COLORADO REGION GREEN/YAMPA WILD AND SCENIC RIVER STUDY

Waterfowl Habitat

KEY HABITAT FOR WATERFOWL  
MAP 4 of 4

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Species distributed throughout the region include the mule deer, elk, black bear, antelope, beaver, cottontail rabbit, coyote, and magpie. Wildlife restricted to specific ecosystems include bighorn sheep, wild turkey, sage grouse, marten, several warblers, pinon jays, and the bandtail pigeon. Some populations are limited because of habitat deficiencies, e.g., moose (rarely seen in Colorado), whitetail deer, bandtailed pigeon, two-lined skink, and willow flycatcher. Several species of fish are found with the most prominent sport fish being the rainbow trout.

Threatened and endangered species on the federal, Colorado, and Utah lists exist in the study region. The following regional species are considered endangered by the U.S. Fish and Wildlife Service: American peregrine falcon, Colorado squawfish, humpback chub, southern bald eagle, and black-footed ferret (presence in the region not established). The bonytail chub and humpback sucker are proposed respectively as endangered and threatened species. The state of Colorado considers the greater sandhill crane to be endangered and the white pelican and the humpback sucker to be threatened. The state of Utah considers the humpback sucker, bonytail chub, and roundtail chub to be rare or threatened. In addition, the whooping crane, on the federal endangered species list, could become a regular migrant in the region because of efforts to start a new nesting flock in southeastern Idaho.

## POPULATION AND ECONOMY

The 9,930-square-mile ( $25,720 \text{ km}^2$ ) region is lightly populated and includes only two sizeable towns--Craig, Colorado, with a population of about 9,000 and Vernal, Utah, with a population of approximately 7,000. In 1975 approximately 27,000 people lived in the three-county region, and average density was only 2.7 people per square mile, compared with 24 per square mile in Colorado, 15 per

square mile in Utah, and 59 per square mile in the United States. Projections for population growth in Moffat, Uintah, and Daggett Counties are shown in table II-5.

As of 1975, regional employment was fairly evenly distributed among five sectors: agriculture, mining, wholesale and retail trade, services, and government employment. Table II-6 gives a distribution breakdown. Unemployment was lowest in Uintah County and highest in Daggett County. Per capita income in Utah was \$3,699 in Daggett County and \$4,400 in Uintah County (residence adjusted); in Moffat County it was \$5,228.

Table II-5

Population Projections, Green-Yampa Rivers Study Region

	<u>1975</u>	<u>1980</u>	<u>1985</u>	<u>1990</u>
Moffat County <sup>1</sup>	9,001	14,995	16,082	Not available
Uintah County <sup>2</sup>	17,500	21,375	23,180	21,450
Daggett County <sup>2</sup>	<u>800</u>	<u>1,125</u>	<u>1,220</u>	<u>1,150</u>
TOTALS	27,301	32,654	35,634	Not available

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1. From Moffat County Planner. 1975 figure from Final Environmental Statement, Northwestern Colorado Coal (Bureau of Land Management, June 1976) Regional Analysis, page II-121.

2. The Utah Process: Alternative Futures (5), 1975-1990, Vol. 1, 1975.

Table II-6

Employment  
Daggett and Uintah Counties, Utah, and Moffat County, Colorado<sup>1</sup>

	Moffat County 1975		Uintah County 1975		Daggett County 1975	
	Number	Percent	Number	Percent	Number	Percent
Agriculture	462	14	740	11	40	13
Mining	236	7	1,010	15	5	2
Construction	282	8	285	4	7	2
Manufacture	111	3	287	4	-	-
Transportation, Public Utilities	230	7	500	8	10	3
Wholesale and Retail Trade	659	19	1,175	18	35	12
Finance, Insurance, Real Estate	93	3	115	2	2	1
Other Private Services	348	10	1,070	16	10	3
Public Administration	698 <sup>3</sup>	21	995	15	165	54
Unemployed	270 <sup>3</sup>	8	426	7	30	10
TOTALS	3,389	100	6,603	100	304	100

1. Figures do not include self-employed, unpaid family labor, and domestics.

2. Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce, August 1978.

3. Colorado Division of Employment and Training, Research and Analysis, communication of March 5, 1979.

## LAND OWNERSHIP AND USE

The federal government is the principal landowner with 60 percent of the acreage divided among six different agencies, plus a portion of the Hill Creek Extension of the Uinta and Ouray Indian Reservation. Daggett County has the highest portion of federal lands (84.4 percent), followed by Uintah County (61.2 percent) and Moffat County (48.4 percent). Conversely, Moffat County has the highest amount of private land (35.8 percent), most of this patented in the late 1800s and early 1900s under the agricultural homestead laws. State lands account for only 7.1 percent of the acreage. Table II-7 gives a more detailed breakdown of land ownership.

Agricultural production is the dominant land use, with rangeland covering the greatest area. Irrigated cropland occupies only about 0.6 percent of the land area in Moffat County and 3 percent in Uintah and Daggett counties. Primary uses are for pasture and winter feed production for livestock. In the Yampa River Basin, irrigated cropland has increased slightly in recent years. Dry cropland covers only 1 percent of the region (mostly in Colorado); wheat is the most important crop, followed by non-irrigated hay, barley, and oats.

## TRANSPORTATION

Narrow, two-lane paved highways designed for light traffic are the main transportation arteries. U.S. Highway 40, a widened, two-lane highway running east-west between Denver and Salt Lake City, is the only major route. The major north-south route is Colorado 394, which traverses the study area from Baggs, Wyoming, and I-80 to Rifle, Colorado, and I-70.



Table 11-7

Land Ownership  
Moffat County, Colorado, and Daggett and Uintah Counties, Utah

	Moffat County			Uintah County			Daggett County			Total	
	Acres	Hectares	Percent	Acres	Hectares	Percent	Acres	Hectares	Percent	Hectares	Percent
FEDERAL											
Forest Service	41,763	16,908	1.4	270,430	109,486	9.4	258,938	104,833	59.1	571,131	231,227
Bureau of Land Management	1,516,363	613,912	50.0	1,362,572	551,649	47.6	98,983	40,074	22.6	2,977,918	1,205,635
National Park Service	165,318	66,930	5.4	42,094	17,042	1.5	--	--	--	207,412	83,972
Bureau of Reclamation	--	--	--	8,819	3,570	0.3	11,793	4,775	2.7	20,612	8,345
Department of Defense	--	--	--	58,931	23,859	2.1	--	--	--	58,931	23,859
Fish and Wildlife Service	13,544	5,483	0.4	10,966	4,440	0.4	--	--	--	24,510	9,923
TOTAL FEDERAL	1,736,988	703,233	57.2	1,753,812	710,046	61.2	369,714	149,682	84.4	3,860,514	1,562,961
STATE	210,435	85,196	6.9	232,221	94,017	8.1	34,359	13,911	7.8	477,015	193,124
PRIVATE											
Indian	--	--	--	426,751	172,734	14.9	--	--	--	426,751	172,734
Other	1,088,097	440,525	35.8	451,496	182,792	15.8	34,192	13,843	7.8	1,573,785	637,160
TOTAL PRIVATE	1,088,097	440,525	35.8	877,247	355,566	30.7	34,192	13,843	7.8	2,000,536	809,894
TOTAL	3,035,520	1,228,954	100	2,864,280	1,151,155	100	438,265	177,436	100	6,338,065	2,565,979
											100

No rail service is available to the two Utah counties; the Denver and Rio Grande Western tracks go only as far west as Craig and only freight trains (mostly coal) now travel them. A railroad to transport coal from Lay, Colorado north to Baggs, Wyoming, is being considered. Continental Trailways buses travel east-west on U.S. Highway 40, and Frontier Airlines has scheduled flights into both Vernal, Utah, and Hayden, Colorado. Dutch John and Manila in Daggett County also have municipal airports.

## RECREATION

Recreational resources are ample and diverse, and tourism is a substantial local industry. Flaming Gorge National Recreation Area in northeastern Utah received 1,250,000 visits in 1978, a substantial portion of tourist visits to the whole state of Utah.

Tourism does not rank as high in Moffat County; however, Dinosaur National Monument, situated in Moffat and Uintah Counties, has become a major tourist attraction, with over 401,000 visitors in 1976. The majority came from outside of the local area.

In all three counties, ample recreational opportunities exist because of the richness and variety of the natural landscape, the diversity of fish and wildlife, and the presence of several small manmade reservoirs and lakes. As of 1971, fishing, boating, and hunting were listed as the main recreational pursuits in northeastern Utah. The most popular recreation season is the summer, and the spring is the second most popular. In the fall of 1976, the three-county study area recorded 9,500 deer hunters, 3,450 elk hunters and 1,500 antelope hunters.

In Moffat County, developed camping is limited to 2 Forest Service sites, a private area near Massadona, and 5 BLM primitive camping

areas in the northwestern part of the county. The Bureau of Land Management, the Fish and Wildlife Service, and the National Park Service have camping areas on the Green River in Browns Park, and the Park Service has a number of either river- or vehicle-access campgrounds on the Green and Yampa in Dinosaur National Monument. Flaming Gorge National Recreation Area has 28 campground and picnic sites, 4 boat campsites, 3 marinas, 11 boat ramps, 2 visitor centers, and several miles of trails. Ashley National Forest has a number of popular streams, lakes, scenic roads and trails, and developed recreation sites.

Aside from the study segments, major river-running recreation opportunities are limited to the upstream portions of the Yampa River (above Dinosaur National Monument) and the downstream reach of the Green River (below the monument). With the exception of the formidable 3.5-mile (5.6-km) Cross Mountain Canyon on the Yampa River, outside of the study area, the portions of these two rivers that lie outside the Monument but within the region are generally flat and best suited for canoeing. Notable scenic features include Cross Mountain Canyon, the Little Yampa Canyon, and Juniper Canyon on the Yampa River; and the upper reach of Desolation Canyon on the Green River in southwestern Uintah County. In total, there are over 300 miles (480 km) of streams and rivers in the region which are suitable for some form of rafting, canoeing, and kayaking.

The maximum flow rate on the Green River below the Flaming Gorge Dam is approximately 4,600 cfs ( $130 \text{ m}^3/\text{s}$ ), which is sufficient for all types and sizes of river-running craft. However, flow rates under 1,600 cfs ( $45 \text{ m}^3/\text{s}$ ) will impede rafts more than 18 feet (5.5 m) in length; smaller rafts can be impeded in places. Below the Yampa confluence, a minimum flow rate of 1,200 cfs ( $34 \text{ m}^3/\text{s}$ ) is required for passage in rafts, kayaks, or canoes.

On the Yampa River in the monument, the suggested flows for various river-running craft are as follows:

Type of Craft	Minimum	Optimum Minimum
Kayaks and Canoes	800 cfs (23 m <sup>3</sup> /s)	1500 cfs (43 m <sup>3</sup> /s)
Raft (10-12 ft/3.0-3.7 m)	1000 cfs (28 m <sup>3</sup> /s)	3000 cfs (85 m <sup>3</sup> /s)
Raft (15-18 ft/4.6-6.5 m)	1200 cfs (34 m <sup>3</sup> /s)	3000 cfs (85 m <sup>3</sup> /s)
Raft (28-30 ft/8.5-9.1 m)	2500 cfs (71 m <sup>3</sup> /s)	5000 cfs (142 m <sup>3</sup> /s)

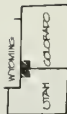
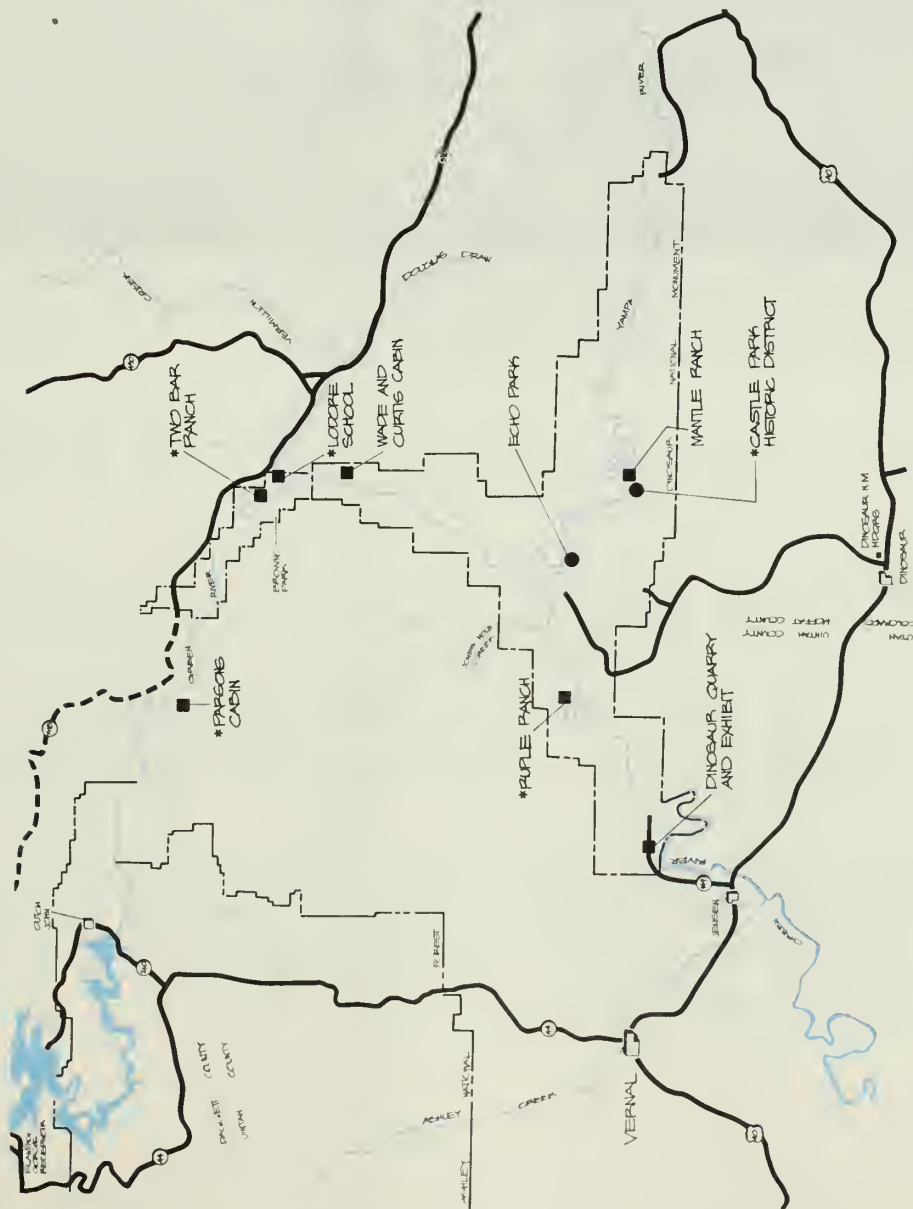
## ARCHEOLOGICAL AND CULTURAL RESOURCES

Archeological resources are believed to include artifacts covering a 13,000-year cultural sequence starting with evidence of the Clovis culture, one of the earliest paleo-Indian cultures known to exist on the continent. Succeeding the Clovis in the region were the Folsom, Plano, Desert Archaic and Fremont cultures; the most recent is predominantly Ute. Only scattered Clovis and Folsom points have been found and reported by local collectors. Most of the significant finds of the Plano and succeeding Desert Archaic cultures have been made in Dinosaur National Monument. Fremont sites are also known in the monument and in a number of canyons and washes in both Uintah and Daggett Counties.

European man's first well-documented journey into the region was in 1776 when the Dominguez-Escalante expedition traversed south of the Yampa River. Their route, which crosses the Green River near the town of Jensen, Utah, is being studied for potential inclusion in the National Historic Trails System. Beginning in the 1860s, settlers arrived in the region; many relics of those early years remain in various states of preservation. Among these are early homesteads, townsites, cow camps, old graves, wagon roads, canals, and cabins, some of which appear to be of state or local

# LEGEND

- PREHISTORIC FEATURE
- HISTORIC FEATURE
- \* NOMINATED FOR INCLUSION ON THE NATIONAL REGISTER OF HISTORIC PLACES



## CULTURAL RESOURCES

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
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The Dominguez-Escalante Expedition crossed the Green River near the southern boundary of Dinosaur National Monument in 1776. Shown are members of the Dominguez-Escalante Bicentennial Expedition, on September 15, 1976. Janice Daigh

significance. In Utah, Mormon settlement began in 1847. In 1878, Ashley Fork Center (Vernal), Jensen, and Mountain Dell were established, along with the Neill District, Naples, and Glines.

Table II-8 lists sites that are on or have been nominated for the National Register of Historic Places, and the Colorado and Utah State registers. Following is a map showing cultural resources in the study corridors.

## Historic Sites, Yampa-Green Study Region

Site or Area Name	Location	Register	Status	Interest
Old Lodore School	Moffat	National	added, 2/24/75	
David Moffat private car	Moffat	National	added, 6/20/75	
White-Indian Contact Site	Moffat	National	added, 3/8/77	
Castle Park Historic District	Moffat	National	nominated	1919 log cabin school building; area includes about 30 archeologic sites
Pool Creek Ranch Historic District	Moffat	National	nominated	Pat Lynch's cave and 1910 ranch (cabin)
Zenobia Basin	Moffat	National	nominated	two 1930s log cabins
Alhandra Stage Stop and Ferry	Uintah	National	nominated	ruins of buildings, ferry abutment
Cub Creek Archeological District	Uintah	National	nominated	varied archaeological sites, mostly Fremont Culture
Fort Duchesne	Uintah	National	nominated, 1/1/73	
Jones Creek-Ely Creek	Uintah	National	Nominated	archeologic sites from 500 B.C. to 1850, including deluge shelter
Whiterocks Village Site	Uintah	National	added, 1/1/76	archeologic site, Fremont Culture
Ashley Post Office	Uintah	Utah	nominated, 1/10/73	1879 structure (log)
Parcel Post Bank	Uintah	Utah	added	1916 structure (stone)
Caldwell Village	Uintah	Utah	added, 6/14/72	archeologic site, Fremont Culture
Dry Fork Valley Petroglyphs	Uintah	Utah	added	archeologic site, Fremont Culture
McKee Springs Petroglyphs	Uintah	National	nominated	archeologic site, Fremont Culture
Peltier Ranch Petroglyphs	Uintah	Utah	added	archeologic site, provenance unknown
Randlett Episcopal Church	Uintah	Utah	added, 8/4/71	1896 structure (white frame)
Uintah Tabernacle	Uintah	Utah	added, 5/30/73	1900-1907 structure (stone)
Ruple Ranch District	Uintah	National	nominated	1883 ranch settlement, uncompleted water tunnel, petroglyph

Table 11-8 (cont.)

Site or Area Name	Historic Sites, Yampa-Green Study Region			Interest
	Location	Register	Status	
McConkie Ranch Petroglyphs, Vernal vicinity	Uintah	National	added, 9/25/75	
Little Brush Creek Petroglyphs	Uintah	National	added, 3/15/76	
White River Archaeological District	Uintah	National	nominated, 11/3/76	
Cockleburrr Wash Petroglyphs	Uintah	National	nominated	
Bank of Vernal	Uintah	Utah	nominated, 1/10/73	
Manila Petroglyphs	Daggett	National	added, 10/6/75	
Doc Parson's Cabin Complex	Daggett	National	added, 11/21/76	
Swett Ranch	Daggett	National	nominated, 10/31/74	
Uncle Jack Robinson's Cabin	Daggett	Utah	added, 6/30/70	
Dowd's Grave, Dugout and Trail	Daggett	Utah	added, 4/7/71	

## CHAPTER III

### DESCRIPTION OF THE YAMPA AND GREEN RIVER CORRIDORS

The following description of the Yampa and Green River study area includes the immediate river corridor, which averages about one-fourth mile (0.4 km) in width on both sides of the river, and a broader visual corridor approximately one-half to 5 miles (0.8 km to 8 km) wide.

The Yampa River is the largest tributary to the Green. It flows about 200 miles (320 km) from its headwaters in the Park and Gore Ranges and Flattops Mountains of central and northern Colorado to its confluence with the Green River in Dinosaur National Monument. The Green, largest tributary of the Colorado, rises in a high mountain valley between Mammoth and Stroud glaciers in the Wind River Range of west-central Wyoming. From there, it flows generally in a south-southwesterly direction for 730 miles (1,175 km) and joins the Colorado River in Canyonlands National Park, Utah.

About 250 miles (400 km) from its source, the Green River flows into Flaming Gorge Reservoir. Where it emerges from Flaming Gorge Dam, the Green is midway through Red Canyon within Flaming Gorge National Recreation Area and flowing east. This is where the study begins.

## SEGMENT A - RED CANYON

### Physiography and Geology

This 15-mile (24.6 km) section of the river begins about 600 yards (550 m) below Flaming Gorge Dam in the Ashley National Forest and ends at the Bureau of Land Management's Indian Crossing boat ramp.

Red Canyon displays multiple personalities and striking contrasts. Sometimes the Green River flows through a deep, narrow canyon and at other times, between low, rolling hills. At its lower end, it flows across a broad, flat valley. Rocks of the canyon are dark and ancient; those of the gentler terrain are comparatively light and young.

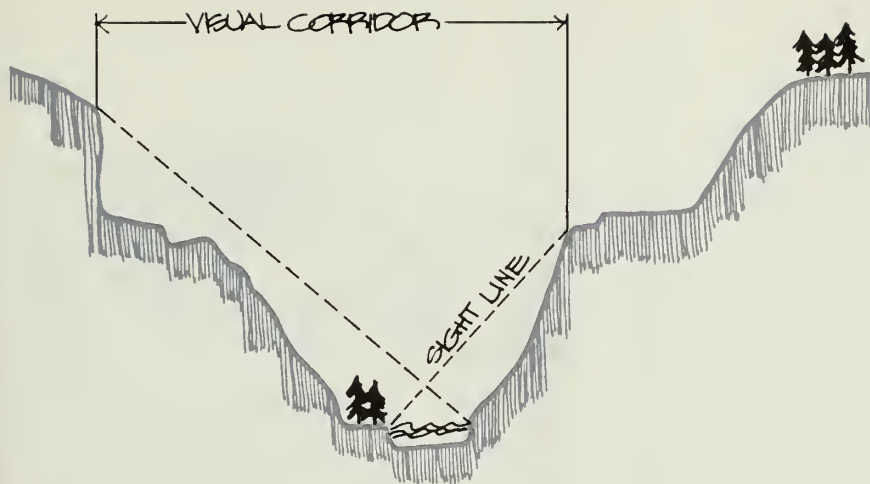
In terms of physiography, Red Canyon divides into two reaches: the first from Spillway boat ramp below Flaming Gorge Dam (mile 289.6)<sup>1</sup> to Little Hole (mile 282.7); the second from Little Hole to the end of the canyon (mile 276.6). Both are deep, rough, and rocky with irregular walls rising as much as 1,800 feet (550 m) from river to rim. Slope gradient is from 45 to 80 percent, with many sheer cliffs. Occasional steep breaks are seen along the river and small side drainages.

Ancient Precambrian rocks dominate Red Canyon. Deep red quartzites, sandstones, and conglomerates date back 600 million to 1.5 billion years and are among the oldest rocks on the 730-mile (1,175 km) Green River. All belong to the Uinta Mountain Group and were originally deposited as sediments, mostly on a flood plain.

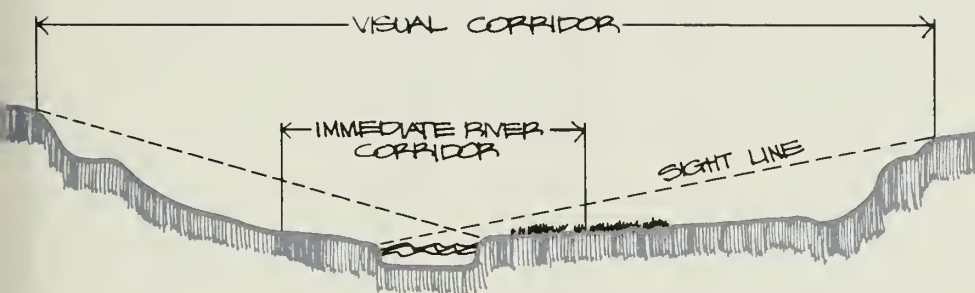
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1. All river mile figures in this report are from Philip T. Hayes and George C. Simmons, *River Runners' Guide to Dinosaur National Monument and Vicinity*, Powell Society Ltd., Denver, Colorado, 1973.

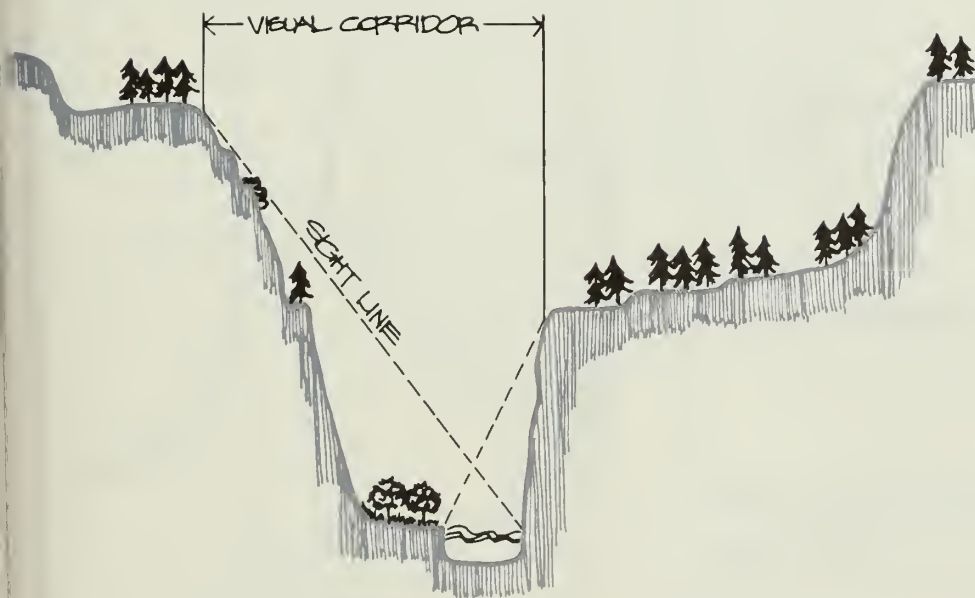




GREEN RIVER  
SEGMENT A  
(RED CANYON)



GREEN RIVER -  
SEGMENT B  
(BROWN PARK)

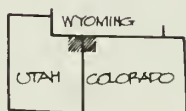


GREEN AND YAMPA  
RIVER CANYONS -  
SEGMENTS C & D

# TYPICAL CANYON AND VALLEY CROSS SECTIONS

GREEN/YAMPA WILD AND SCENIC RIVER STUDY





## PHYSIOGRAPHY MAP 1 OF 2

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
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# PHYSIOGRAPHY MAP 1 OF 2 GREEN/YAMPA WILD AND SCENIC RIVER STUDY

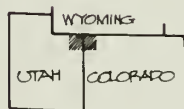
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## LEGEND

- AREA BETWEEN DOTS EQUALS TWO MILES



## PHYSIOGRAPHY MAP 2 OF 2

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

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Since then, forces have caused extensive fracturing and jointing, contributing to the canyon's present rough, stairstep appearance.

At Little Hole and Browns Park, the younger dull gray-to-white Browns Park Formation predominates. Deposited in Miocene time over the Uinta Mountain Group, this formation is about 15 million years old.

The local relief near Red Canyon is about 4,000 feet (1,200 m). Elevation below Flaming Gorge Dam is 5,606 feet (1,708.7 m), while the high points of this easterly spur of the Uinta Range rise above 9,700 feet (2,960 m) west and east of Red Canyon.

### Minerals

Studies by the Geological Survey and Bureau of Mines indicate that Red Canyon has no known commercially valuable minerals, although a number of placer gold mining claims existed in the area in 1906 and in the 1930s. Copper, tuff, and barite occurrences are also known. When the Flaming Gorge National Recreation Area was established in 1968, a total of 6 miles (9.7 km) of the corridor downriver from the dam and another 6.4 miles (10.3 km) of the north bank were withdrawn from mineral location. Leasable and common-variety minerals (such as sand and gravel) may be removed from the national recreation area only by special permits from the Secretaries of the Interior and Agriculture. None has been granted within the corridor. The area also remains under a Reclamation and Powersite Withdrawal which precludes mineral entry.

### Soils

The slopes of Red Canyon are mainly rock outcrop and talus and have shallow to moderately deep loams of up to about 30 inches,

underlain by quartzite bedrock. Soil reaction is moderately acid to neutral. The content of rock fragments ranges from 25 to 60 percent and inherent fertility is low; erosion hazard is moderate to high.

Valley soils at Little Hole and in upper Browns Park are mostly loams which have developed in alluvial materials. The depth of the soil to bedrock is over 40 inches (100 cm); beneath the surface are stratified, cobbly layers that are sometimes weakly cemented with calcium. Soil reaction is mild to moderately alkaline. The content of rock fragments ranges from 5 to 20 percent in the surface layers, and from 10 to 60 percent below. Fertility is moderate and the erosion hazard is low, except on the steep breaks where it is moderate to high. River banks are mainly sandy with small areas of sandy loam.

Recreation use and development areas are situated mostly on the valley soils. This soil type represents about 40 percent of the corridor area in Segment A. For additional information, see the soils map in Chapter II.

On the soils map, these valley soils are shown by the Typic Calciorthids--Ustollic Haplargids--Typic Torriorthents Association.

### Vegetation

A study in diversity and mixed associations, the vegetation can be divided into three basic communities. The river bank terrace community supports narrowleaf cottonwood, river birch, four species of willows, red osier dogwood, wildrose, and tamarisk. A complex of horsetails, rushes, sedges, grasses, and docks is also present. Big sagebrush edges down to the limited terrace areas.

GENERALIZED COMPOSITE SECTION OF ROCK FORMATIONS,  
EASTERN UINTA MOUNTAINS

Formation or Group	Period	Era
Browns Park Formation and Bishop Conglomerate Duchesne River, Uinta and Bridger Formations Green River Formation Wasatch Formation Fort Union Formation	Tertiary	Cenozoic
Mesa Verde Group Hilliard, Baxter and Mancos Shales Frontier Formation Mowry Shale Dakota Sandstone Cedar Mountain Formation	Cretaceous	Mesozoic
Morrison Formation Curtis Formation Entrada Sandstone Carmel Formation Glen Canyon Sandstone	Jurassic	
Chinle Formation Moenkopi Formation Dinwoody Formation	Triassic	
Park City Formation Weber Sandstone	Permian	
Morgan Formation Round Valley Limestone	Pennsylvanian	
Doughnut Shale Humbug Formation Deseret Limestone Lodgepole Limestone	Mississippian	
Lodore Formation	Cambrian	Paleozoic
Uinta Mountain Group Red Creek Quartzite	Precambrian	

The south-facing canyon slope community is dominated by Utah juniper and pinon pine; shrubs and herbs are scattered among exposed soil and bare rock. For about 3 miles (5 km) downriver from Flaming Gorge Dam, the red cedar (or mountain red juniper) is common. Conspicuous shrubs include jointfir, bitterbrush, and broadleaf mountain mahogany.

Tall conifers dominate the more protected north-facing slope community down to Little Hole. Douglas-fir is the most common and ponderosa pine grows either singly or in small groups. Common shrubs are broadleaf mountain mahogany, rock spiraea, bitterbrush, and chokecherry. Below Little Hole begins a gradual transition to pinon-juniper on the north-facing slope. Ponderosa pine continues to stand out on lower slopes and the flats adjacent to the river. Additional generalized information is provided by the vegetative cover map in chapter II.

### Wildlife and Fish

The varied topography and vegetation of this segment create a diversity of wildlife habitats. Most wildlife is as it was over a century ago when John Wesley Powell's party first explored the Green; only the grizzly bear and bighorn sheep are gone.

The mule deer is Red Canyon's most common large mammal, frequently watering at the river and gathering in numbers along the limited bottom areas in winter. Elk are well established but tend to stay at higher elevations except when forced down by rare heavy snows. Black bear are common but seldom seen. Because of large territorial requirements, mountain lions are few. Other mammals include coyotes, bobcats, badgers, ring-tailed cats, porcupines, skunks, beavers, raccoons, weasels, muskrats, and many rodents.



Bird life is also abundant and waterfowl are most frequently seen. Canada geese and several species of ducks--mergansers, mallards, gadwalls, teal--nest along the river, especially below Little Hole and in Browns Park. The high cliffs and abundant prey (rodents, waterfowl, and fish) attract many raptors to Red Canyon, both as year-round residents and to winter. Golden and bald eagles are common, the latter only during the winter. Ospreys and six other species of hawks and falcons are present, plus several species of owl.

Small birds are plentiful; blackbirds, swallows, flycatchers, and magpies are common nesting species. There are also interesting specialized associations; for example, flocks of bohemian waxwings gather at Little Hole each winter to feed on red cedar berries.

Knowledge of rare or endangered species is incomplete. Ecological studies in 1959 listed the prairie falcon as the most common raptor in the Flaming Gorge basin at that time. This raptor is now uncommon, but is still believed to be a resident. There have been two sightings of peregrine falcons, the last in 1975.

Before the installation of Flaming Gorge Dam, the Green River through Red Canyon was warm water fish habitat. This changed abruptly when the gates were closed. Trout and grayling were introduced, but frigid dam releases and daily fluctuations in water levels have inhibited optimum growth. The Utah Division of Wildlife Resources and the Fish and Wildlife Service<sup>2</sup> have compensated for this with an active stocking program. Today, all 28.8 miles (46.4 km) of the Green River in Utah above Dinosaur National Monument (including this entire segment) are rated as a "Class I" fishery. The Utah Department of Natural Resources considers a "Class I"

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2. The Fish and Wildlife Service has stocked rainbow, cutthroat, brown, and brook trout in the Green River since 1961.

fishery as "large enough to withstand heavy fishing pressure, . . . in scenic surroundings and . . . very productive."<sup>3</sup> At present, the Green River in Utah accounts for almost half (46.6 percent) of the entire state's "Class I" fisheries.

The Bureau of Reclamation has completed a \$4 million modification of the penstock intakes of Flaming Gorge Dam. The reason for the modification was to warm the frigid dam releases and thereby increase the probability of natural trout reproduction and growth and the productivity of aquatic insects (an important source of trout food). Conditions for a self-sustaining fishery may then exist.

A possible side benefit of the warmer releases may be to increase the range of the endangered or threatened fish that formerly inhabited the Green River. Warmer releases may allow the fish to migrate further up the Green River from the Yampa confluence.

### Water Quality

The water quality of the Green from Flaming Gorge Dam downstream to Red Creek (mile 278.8) is excellent and suitable for primary contact (i.e., swimming, wading), except for the prohibitively cold temperature during the late fall and winter. The highest turbidity recorded at Little Hole in 1964-1965 was only 62 JTU.<sup>4</sup> No major pollutants exist, but drinking the water is discouraged because of

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3. Utah State Department of Natural Resources, Utah Fishing Waters Inventory and Classification (August 1970), p. 10.

4. Jackson Turbidity Units, a measurement of water turbidity based on the distance a standard disc can be seen in the water. This rating indicates minimal turbidity.

the livestock, wildlife, and human use within the area. The water is so clear that the river bottom is visible even in the deep holes.

The Green River and its tributaries are rated "Class C" by the Utah State Division of Health, which means that water quality must be maintained to permit the following uses: domestic water supply after treatment and "aesthetics, irrigation, stock watering, propagation, and perpetuation of fish, other aquatic life, and wildlife, recreation (except swimming), and as a source for industrial supplies."<sup>5</sup>

Red Creek can empty sediments into the Green River during spring runoff and after heavy summer showers. Peak spring flows in Red Creek are around 40 cfs ( $1.1 \text{ m}^3/\text{s}$ ) while normal flows in August are less than 5 cfs ( $0.1 \text{ m}^3/\text{s}$ ). Daily fluctuations in water levels due to dam releases wash some sediments into the river when the water is rising and at high levels.

#### Water Flow

Before Flaming Gorge Dam was put into operation, the flows of the Green River were similar to the present flows of the Yampa. From base flows in the winter of about 400-500 cfs ( $11\text{-}14 \text{ m}^3/\text{s}$ ), the river gradually rose to a spring peak, in May or June, of 10,000-20,000 cfs ( $280\text{-}560 \text{ m}^3/\text{s}$ ). The river then fell back to base levels by the end of the summer. It was coldest and clearest in midwinter, with temperatures near 32F (0C), and most turbid in the spring flood, when temperatures had risen into the high 40s and low 50s (about 10C). By late summer the temperature could reach 80F (27C).

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5. Utah State Division of Health, Code of Waste Disposal Regulations (revised 1968), p. 11-6.

Flaming Gorge dam has greatly altered these seasonal flow patterns, replacing them with daily and weekly flow cycles.

Depending on hydropower demands, releases from Flaming Gorge Dam range from 800 cfs ( $22.7 \text{ m}^3/\text{s}$ ) to 4,600 cfs ( $130.3 \text{ m}^3/\text{s}$ ). At times, however, the flow has dropped to as low as 400 cfs ( $11.3 \text{ m}^3/\text{s}$ ). Daily powerload patterns require minimum releases in early morning; these increase sharply at about 8 a.m., and peak in the late afternoon and early evening. Minimum flows are most likely between 11 p.m. and 8 a.m. on weekdays, and during most of the day on Sundays and holidays. The river may rise a foot or two in minutes when releases are stepped up. During the summer recreation season, the Bureau of Reclamation attempts to maintain a minimum 1,200 cfs ( $34 \text{ m}^3/\text{s}$ ) daytime flow below the dam; however, this has not always been possible.

This segment of the Green River flows swiftly until Browns Park; thereafter, the velocity averages about 3 mph (4.8 kph) or less. The gradient is moderate: from the dam to Little Hole, 10.7 feet/mile (2.0 m/km); to the end of Red Canyon, 11.3 feet/mile (2.1 m/km). Seven easy rapids lie above Little Hole and two rapids are below. One of the latter is Red Creek Rapids, (Class III), the most severe on the segment with a drop of about 16 feet (4.9 m) in 600 yards (550 m), or 48 feet/mile. It is of moderate difficulty.

### Water Use

The only water used from the river in this segment is consumed by stock, wildlife, and recreationists.

## Access

Access to Segment A is limited to four sites; the Spillway boat ramp, Little Hole Campground, Fire Flat picnic area, and Indian Crossing. Boat ramps have been developed at Spillway, Little Hole, and Indian Crossing. The gravel roads to the Little Hole and the Spillway boat ramps may be closed during inclement weather to protect the roadbeds and for public safety.

The Utah Highway Department plans to construct a paved road connecting State Highway 260 at Antelope Flats (near Dutch John) with Colorado 318 in Browns Park. If built, this would replace an existing gravel road, providing improved access to this segment from northwestern Colorado and southwestern Wyoming. Paved access is now available via State Highway 44 and 260 north from Vernal, Utah.

## Land Ownership

The Forest Service administers all lands from the dam downstream to mile 284.0 and lands on the north side of the river to mile 277.6. On the lower reach, Forest Service jurisdiction extends across the river to the high water mark on the south side.

The Vernal District of the Bureau of Land Management manages most of the land on the south bank from mile 282 to mile 277.6 and most of the land on both sides from mile 277.6 to Indian Crossing. This involves about 7.7 river miles (12.3 km).

The Utah Division of Wildlife Resources owns approximately 1 mile (1.6 km) along the south bank of the river between the eastern boundary of the Ashley National Forest and the Glenn Estate property across from Little Hole Campground. There are no private lands in this segment.



Following are approximate acreages and percentages of government-owned lands in the corridor of Segment A:

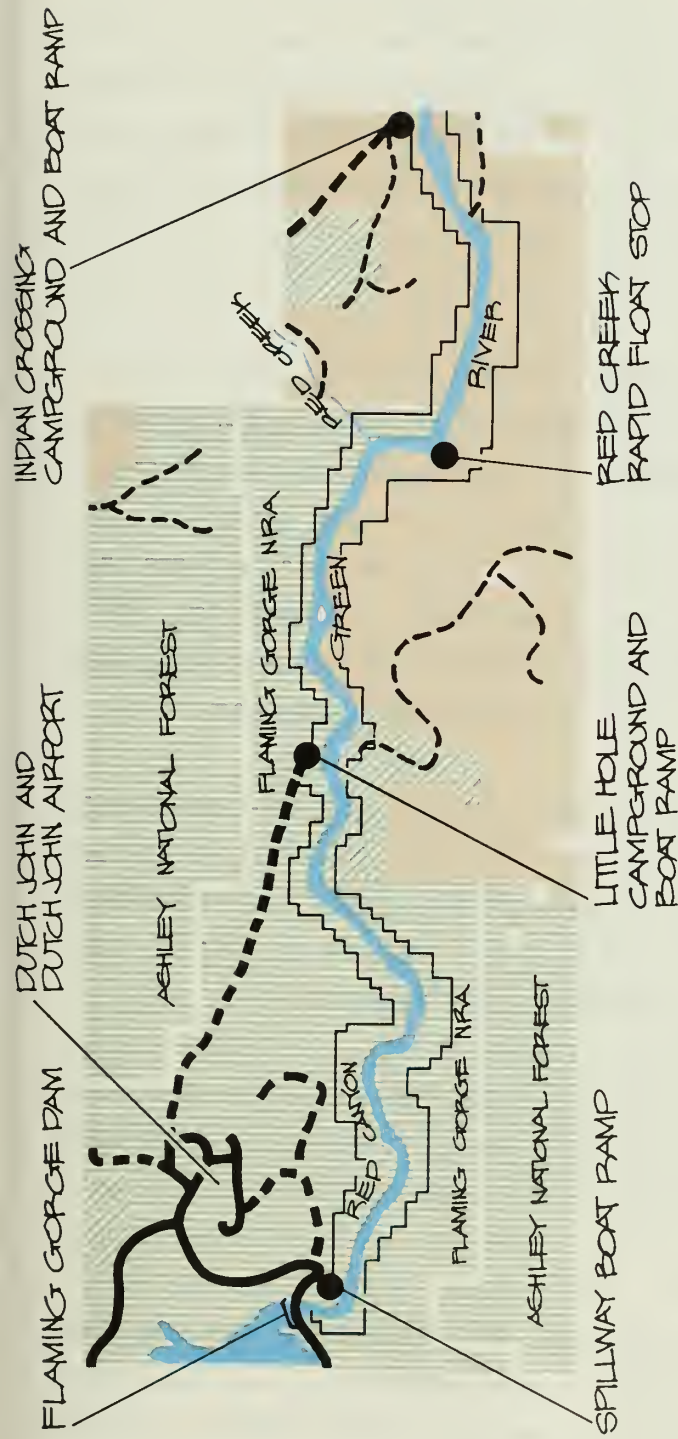
TABLE III-1  
Land Ownership, Segment A

	<u>Acres</u>	<u>Hectares</u>	<u>Percent</u>
U.S. Forest Service	2,880	1,166	59
Bureau of Land Management	1,760	713	36
Utah Division of Wildlife Resources	<u>260</u>	<u>110</u>	<u>5</u>
TOTAL	4,900	1,990	100

#### Land Use

Recreation is the primary use of the Green River corridor through Red Canyon. Much of the federally administered land is set aside for watershed protection, wildlife habitat, and for the protection of visual qualities.

Other uses are for livestock grazing in the Bureau of Land Management portion downstream from Little Hole; a right-of-way for a 26-inch (66-cm) natural gas pipeline owned by the Northwest Pipeline Company; and two electric transmission line rights-of-way, which are also used by telephone lines on the same poles. One is about 3/8 mile (0.6 km) below the Spillway boat ramp and the other parallels the river between Little Hole and Browns Park at distances of 100 yards (91 m) to more than a mile (2 km).



#### LEGEND

- RECREATION SITE
- DEVELOPED ROAD
- - - SEASONAL ROAD
- - - PRIMITIVE ROAD (4-WHEEL DRIVE)
- ||||| U.S. FOREST SERVICE LAND
- XXXXX STATE LAND - UTAH
- PRIVATE LAND
- PUBLIC LAND (BUREAU OF LAND MANAGEMENT)
- SUGGESTED WILD AND SCENIC RIVER BOUNDARY LOCATION



## SEGMENT A GREEN RIVER CORRIDOR

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

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## Recreation

Prior to the building of Flaming Gorge Dam, there was little recreation in Red Canyon. However, improved access, new trails and campgrounds, permanent boat ramps, the trout fishery, and the Flaming Gorge National Recreation Area have greatly increased use. It is now a popular summer and fall playground. The 7.5 mile (12.1 km) stretch from the dam to Little Hole is heavily used.

River running in inflatable rafts is becoming increasingly popular. Seven outfitter-guide permits have been authorized (jointly by the Forest Service and the Bureau of Land Management) for segments A and B. However, most of the commercial river use is derived from two private outlets in the Dutch John area. The present allocation for commercial use is 2,110 river user days. Commercial use in 1978 amounted to 769 river user days, about 5 percent of all rafting use, compared to 72 percent in Dinosaur National Monument.

River rapids in the west are usually too strong for open, rigid craft, but the stretch from the dam to Little Hole offers fast and pleasant running for canoes, kayaks, and dories. Rigid boats account for less than 10 percent of the river use in Red Canyon. No motorboats are allowed above Red Creek Rapids.

Between 15 and 20 percent of the river runners also fish, and many anglers hike along the shore. Warmer water releases have begun to increase water contact recreation in the area, although the river is still quite swift for wading.

In most years the fluctuating flows, but especially the low level flows, through this segment can cause difficulties for rafters and other boaters in maneuvering through rapids and past rocky obstructions, and in "hanging up" on sandbars and other shallow areas in the lower part of the segment. Below the 1,600 cfs (34

$\text{m}^3/\text{s}$ ) flow level, larger rafts (over 18 feet or 5.5 m) can find it difficult to get through the segment and also through segment B. At lower flow levels river banks are exposed, which detracts visually from the appearance of the river and which can make water access more difficult for recreationists. Below a flow of 1,200 cfs ( $34 \text{ m}^3/\text{s}$ ), suitable fish habitat area and the growth of organisms that serve as food for fish are also reduced.

Hiking occurs along the 7.2-mile (11.6-km) Little Hole Trail, which has been nominated for National Recreation Trail status and the trail upstream from Browns Park to the Red Creek Float Camp. Trails below Little Hole are not maintained.

No camping is allowed between the dam and Little Hole, but there is heavy camping at Little Hole and some at Indian Crossing, the only two developed sites. Picnicking is done only incidentally by river runners, anglers, and hikers.

Varied wildlife populations provide limited hunting in the fall, beginning with Utah's archery deer season in September. Waterfowl are hunted by boat and jump-shooting from shore.

Off-road vehicle use is unregulated at present, and motorcyclists have created a trail downriver towards Red Creek. Four-wheel drive vehicles have also been used to push impromptu roads upstream from Indian Crossing for fishing access.

Recreation facilities in Red Canyon are limited. The Forest Service's Little Hole Campground, with 17 camping units, vault toilets, and a parking lot and boat ramp, is the only relatively large and well developed site. Other recreation sites include the Spillway Boat Ramp, the Pugmire Pocket and Red Creek Float Stops, the primitive Fire Flat picnic site, and the Indian Crossing site, which includes a boat ramp, vault toilets, and 2 camping and





Red ledges and cliffs of Uinta Mountain Quartzite set off the green of Douglas-fir, Utah juniper, and box elder in Segment A. NPS



Red Canyon has a number of small, sparkling rapids which attract fishermen and boaters. HCRS



picnicking units; except for the Spillway ramp, all of the foregoing sites are situated below Little Hole and are managed by BLM.

Sanitation has been a concern in this segment, and additional vault toilets may need to be installed in the future.

### Historic and Archeologic Resources

Little is known of the pre-history of the Red Canyon segment. Documented archeological work has been limited to field reconnaissance and inventory; sites have been recorded but no systematic sampling has been done. Artifact hunters have taken or destroyed much of the archeologic surface evidence.

There are three sites within a half mile (0.8 km) of the river; one includes a low, irregular wall which may have been a crude fortification and campsite. The other two sites are rough masonry structures, one probably a storage bin and the other either a house or shelter.

Historic sites from the turn of the century era remain along this segment today. These include three relic homesteads in the general vicinity of Little Hole.

## SEGMENT B - BROWNS PARK

### Physiography and Geology

The 32-mile (51 km) Browns Park segment differs substantially from Red Canyon upstream and the deep, downstream canyons in Dinosaur National Monument. Here the Green River meanders across a gentle, rolling valley that is approximately 5 miles (8 km)

wide and 30 miles (48 km) long. Alluvial terraces, some rising to 50 feet (15 m), border the river on one or sometimes both sides.

Three small canyons are exceptions to the modest Browns Park relief. Little Swallow Canyon (mile 267.5-267.0), Swallow Canyon (mile 265.9-263.7), and an unnamed cut below the suspension bridge in Browns Park National Wildlife Refuge (mile 260.1-258.3) are all both short and low. Swallow Canyon, with its 400-foot (120-m) stairstep walls, is the most striking of the three.

Structurally, the valley is superimposed on the axis of the Uinta Mountain anticline. It formed partly by downfaulting along the anticlinal crest, and partly by erosion.

Exposed rock covers an immense span of geologic time; the oldest, Red Creed Quartzite, may be 2.3 billion years old and is the source of some sediments preserved in the Uinta Mountain Group.

The Uinta Mountain Group, a Precambrian formation, is up to 1.5 billion years old and appears in the three low canyons where the river has cut through northward-projecting spurs of the Uinta Mountains.

The Browns Park Formation is a late Tertiary mix of sandstones, clays, conglomerates, and tuffs extending from Flaming Gorge east to the Elkhead Mountains north of Craig, Colorado. It is known to be at least 1,500 feet (460 m) thick and about 15 million years old and is visible on many terraces, bluffs, and rounded hills along and near the river.

Quaternary alluvium is evident downriver from Willow Creek in well-developed Pleistocene terraces along the river. They are cut into the Browns Park Formation and were formed during a glacial maximum when the Green River had a greater volume of flow than it does now. Their age may be as young as 10,000 years.



In most of Browns Park, the river meanders through a broad terraced valley filled with the whitish Browns Park Formation. NPS

## Minerals

As in segment A, known commercial mineral values through the Browns Park segment are low to nonexistent. However, the Browns Park Formation contains large deposits of vitric rhyolitic tuff which has industrial potential as an abrasive in polishing powders, in ceramic glazes, and in enamels. High grade deposits occur in and near the river corridor in Utah.

Much of this area is covered by a Power Site and Reclamation Withdrawal which closed the area to mineral location. Lifting this withdrawal and replacing it with a protective withdrawal has been proposed; if this step is taken the area will still be withdrawn from mineral entry.

## Soils

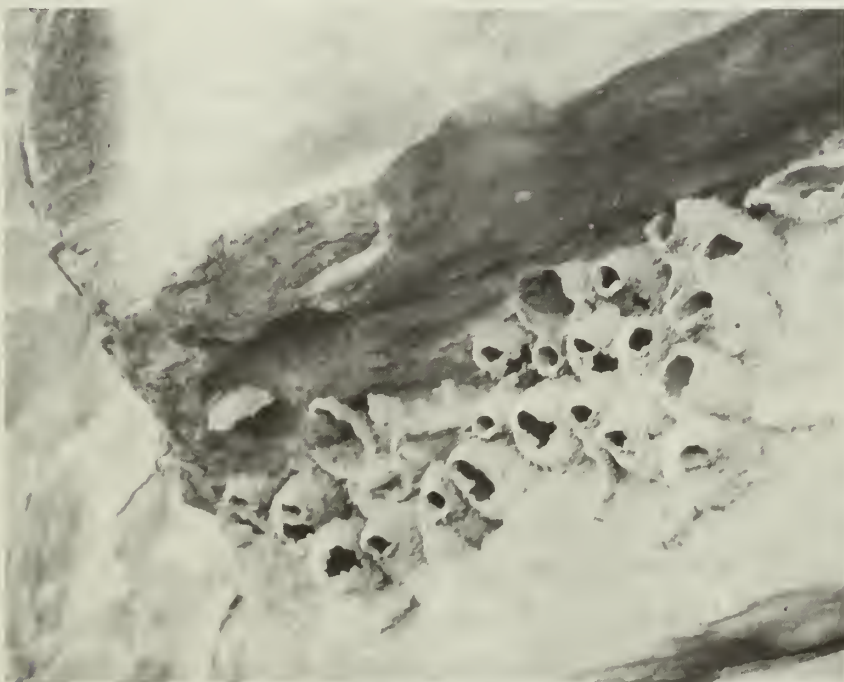
No detailed soil surveys have been conducted in Browns Park. The soils are of the Typic Calciorthids--Ustollic Haplargids--Typic Torriorthents Association and are relatively deep. The soil ranges from moderately to strongly alkaline.

Most soil deposition is a result of repeated flooding of the Green River; weathering and movement of parent materials from surrounding uplands also contribute. Actual soil textures are varied: (a) loams and sandy loams, (b) blankets of sand and clay from recent (Holocene period) floods, and (c) coarse pebbles and cobbles of quartzite and limestone in bench areas. Depending largely on slope, surface thickness ranges from 0 to 36 inches (0 to .9 m). Subsurface soils are generally greater than 40 inches in depth (1 m or more). The content of coarse fragments in the parent material ranges from 10 to 50 percent. Underlying gravel is generally less than 15 percent.





At three points in Browns Park, the superposed river encounters and cleaves spurs of the Uinta Mountains, creating small canyons. Swallow Canyon is shown. HCRS



Swallow Canyon received its name in 1859 when John Wesley Powell and his men noted the colonies of cliff swallows wheeling over the river from their mud nests. HCRS



## Vegetation

Vegetation falls into two basic categories; riparian and northern desert. A 1976 survey by the Bureau of Land Management noted eight major plant communities in this area: (1) flooded river bank, an association of sedges, small rushes and grasses; (2) marsh, a mix of cattails, bullrushes, reedgrass and sedges; (3) moist river bank, willow-squawbush with a diverse herb understory; (4) well-drained terrace, scattered large cottonwoods sometimes in extensive groves, medium shrubs (big sagebrush, greasewood), and a grassy understory; (5) poorly drained terrace, stands of almost pure saltgrass in a few isolated area; (6) north-facing bank, river birch and Rocky Mountain juniper, with diverse low shrubs and herbs; (7) meadow associations, well away from the river, sage-rabbitbrush and with an understory of grasses--an important vegetative type at lower elevations in Browns Park; and (8) canyon wall associations, on the steep slopes of Little Swallow and Swallow Canyons, a sparse mix of shrubs, small trees, herbs and grasses. Information on the extent of area covered by these communities has not been determined by the managing agencies.

## Wildlife and Fish

Historically, Browns Park has been an exceptionally rich wildlife area. The moderate winter climate has made it a favored winter range for big game, especially deer and elk. The annual flooding of the river created ample habitat for waterfowl and shorebirds, and many of them are nesters.

The flooding ceased when Flaming Gorge Dam was closed. Browns Park National Wildlife Refuge was created in 1963 to reclaim waterfowl habitat imperiled by the changed waterflow below the dam during breeding season. A network of pumps and dikes was

designed to draw water from the river to marshlands that would otherwise be dry. Utah's Browns Park Waterfowl Management Area and other Utah State lands are also managed for wildlife. The efforts have been successful; the Browns Park segment is once again an outstanding haven for large numbers of mammals and birds.

### Water Quality

The Utah portion of the Green River in Browns Park is of "Class C" quality according to the State Division of Health. Samples taken at mile 274 in 1975 and 1976 showed a maximum of 9 fecal coliform organisms per 100 ml and a maximum conductivity of 75 mmhos.

The Colorado portion has been examined more extensively at a sampling station at mile 260 (Swinging Bridge). Generally, the Green River meets federal and state standards for aesthetics, bacteriological contaminants, dissolved oxygen, chemical contaminants and radioactivity. Waters here failed to meet the primary contact criteria because of low temperature, slightly high alkalinity (pH), and occasional turbidity caused by silt from tributary creeks and washes (caused mostly by rainstorms and rapid spring runoffs).

### Water Flow

As in Red Canyon, the flows of the Green through Browns Park are controlled by releases from Flaming Gorge Dam. Downriver, the fluctuations become less extreme, since high flows move faster than low flows, and eventually override them.



Great blue heron nests are often found in the cottonwood trees in Browns Park, HCRS



A pronghorn (antelope) grazes by the river in Brown's Park, HCRS

The rate of flow of the Green River through Browns Park is approximately 1.5 mph (2.4 km/hr). Gradient is about 2 feet/mile (0.4 m/km). Except for a modest riffle at the head of Little Swallow Canyon (mile 267.6), this is a flat water segment.

### Water Use

Water use on this segment is as follows:

Mile 274: the Campbell property (now owned by Nature Conservancy) has a 2-inch (51-mm) pipe extending 25 feet (7.6 m) into the river from the north bank. Use is for irrigation and livestock watering; the right is for 4 cfs ( $0.11 \text{ m}^3/\text{s}$ ).

Mile 272: the Utah Division of Wildlife Resources has a pump on the north shore, also for waterfowl. Right is for 10 cfs ( $0.28 \text{ m}^3/\text{s}$ ).

Mile 262.5: the Utah Division of Wildlife Resources has a diversion on the south shore to provide for waterfowl habitat adjacent to the river. Total right is for 28 cfs ( $0.79 \text{ m}^3/\text{s}$ ).

Browns Park National Wildlife Refuge: the U.S. Fish and Wildlife Service has 89.41 cfs ( $2.50 \text{ m}^3/\text{s}$ ) in water rights at 15 ditch locations. Priorities date back to the late 1800s. Most water is pumped directly from the Green River, but some is diverted from Beaver Creek.

At present six pumps are installed to draw water from the river to marshes, shallow lakes, and bottomlands back from the river for shore-birds, nongame wildlife, and waterfowl. Additional development plans call for another six pumps in the river.



## Access

Access to the Utah portion of the Browns Park segment is available at four developed Bureau of Land Management (or cooperative BLM-Utah Wildlife Division) sites. They are the Indian Crossing boat ramp, the Bridge Hollow campground, and the Bridgeport and Swallow Canyon boat ramps. Gravel roads approach the river at several points as do extemporized four-wheel drive routes. The Swallow Canyon boat ramp (mile 263.4) is the main access point for float trips through Browns Park National Wildlife Refuge.

Within Browns Park National Wildlife Refuge in Colorado, many roads lead to the river's edge, but only two designated boat launching sites, ramps at Swinging Bridge and Crook campgrounds, are provided for public use.

## Land Ownership

A total of 9.6 miles (15.4 km) of the Green River in Utah are overseen by the Vernal District of the Bureau of Land Management. One parcel that fronts on 0.75 miles (1.20 km) of the north shore of the Green River in Browns Park is administered by the Utah State Land Board. Six parcels (five separated areas) involving 6.4 miles (10.2 km) of river shoreline are managed by the Utah Division of Wildlife Resources.

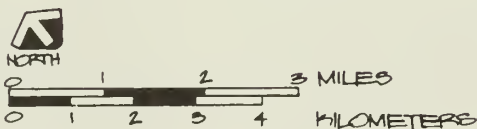
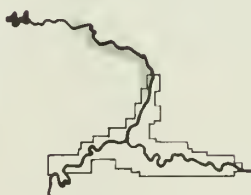
Three private holdings in Utah are scattered between river miles 273.8 and 262.8, occupying approximately 1 mile (1.6 km) of shoreline.

The Browns Park National Wildlife Refuge, which covers 14,129 acres (5,720 ha), is the only federal jurisdiction along the 16-mile (26-km) portion of the segment in Colorado. The refuge includes



# LEGEND

- RECREATION SITE
- DEVELOPED ROAD
- - - SEASONAL ROAD
- - - PRIMITIVE ROAD (4-WHEEL DRIVE)
- DINOSAUR NATIONAL MONUMENT
- PRIVATE LAND
- ▨ STATE LAND
- ▩ PUBLIC LAND (BUREAU OF LAND MANAGEMENT)
- ▧ BROWNS PARK NATIONAL WILDLIFE REFUGE
- ▨ BROWNS PARK STATE WATERFOWL MANAGEMENT AREA (UTAH)
- └ SUGGESTED WILD AND SCENIC RIVER BOUNDARY LOCATION



## SEGMENT B GREEN RIVER CORRIDOR

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
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# LEGEND

- RECREATION SITE
- DEVELOPED ROAD
- - - SEASONAL ROAD
- . - PRIMITIVE ROAD (4-WHEEL DRIVE)
- /// DINOSAUR NATIONAL MONUMENT
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- |||| BROWNS PARK STATE WATERFOWL MANAGEMENT AREA (UTAH)
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0 1 2 3 MILES  
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1,305 acres (528 ha) leased from the state and 280 acres (113 ha) in a private inholding. The private tract involves 0.6 miles (1.0 km) of riverfront.

TABLE III - 2  
Land Ownership, Segment B

	<u>Acres</u>	<u>Hectares</u>	<u>Percent</u>
Bureau of Land Management	3,070	1,243	30
U.S. Fish and Wildlife Service	4,990	2,020	49
National Park Service	800	324	8
Utah	1,020	413	10
Private	<u>370</u>	<u>150</u>	<u>3</u>
TOTAL	10,250	4,150	100

#### Land Use

Wildlife habitat, waterfowl production, and public use are the principal land uses in the Browns Park corridor. All Utah Division of Wildlife Resources and Fish and Wildlife Service lands are devoted to these uses.

Public lands are used primarily for recreation and livestock grazing; four Bureau of Land Management grazing allotments border the river. Cattle grazing is generally restricted from the river by fencing. The only grazing that takes place within the river corridor on public land is at Little Hole on the south side of the river (opposite the campground). The season of use is May to

October. The allotment involves 330 animal unit months, but only a small percentage of this use occurs in the river corridor.

Lands administered by the Utah State Land Board are under grazing lease to three operators; however, grazing within the river corridor on state lands is minimal. Private lands are used for ranching--primarily hay and livestock production.

### Recreation

Browns Park remains a generally undiscovered corner of the West as far as recreation is concerned. Holiday and weekend use is heaviest, from June to September, with some hunting in the fall. The Browns Park National Wildlife Refuge is closed to fishing from March 15 to June 15 to minimize disturbance to nesting waterfowl. Floating is not prohibited during this period, although it is not encouraged. Specific portions of the refuge may be closed at times during the hunting season.

Rafting in inflatable craft is infrequent; in 1975, four commercial outfitters ran a total of nine trips and took 154 customers through Browns Park National Wildlife Refuge. Use is not expected to increase dramatically, for most commercial river-running operations are geared to the excitement of fast water and dramatic canyon scenery in the segments below. In addition, the daily flow fluctuations mentioned in Segment A sometimes make it difficult to run the Browns Park segment; boats must be dragged across sandbars.

As visitor numbers become regulated on more western rivers to prevent overuse, the recreational significance of lightly used stretches of water such as the Green River through Browns Park

increases. The opportunities for flat water boating recreation in Browns Park, when mixed with fishing, hiking, bird watching, camping, and visiting historic sites, are excellent.

Improved hunting, especially for waterfowl, is a major goal of the Browns Park National Wildlife Refuge. Ducks and geese are hunted along the river and in meadows and marshes back from the bank. Deer hunting is also excellent.

The refuge plans 6,000 hunter days annually; in 1976, a total of 700 hunter days were logged, half of these for waterfowl and half for deer and small game.

As a result of the recent penstock modification in Flaming Gorge Dam, fishing in the Green River through Browns Park is expected to improve. The goal for Browns Park National Wildlife Refuge is 5,000 fisherman-days annually; in 1976, fishing accounted for about 4,000 visitor days of use.

The 1967 master plan for the refuge projects a goal of 30,000 visitor days annually for nature enjoyment, a nonconsumptive recreational activity which could include photography, bird and animal watching, nature-oriented hiking, and plant identification and study.

Camping is permitted at BLM's Indian Crossing and Bridge Hollow sites and at the Bridgeport and Swallow Canyon boat ramps. In the refuge, camping is permitted at Swinging Bridge and Crook campgrounds. None of these sites have complete facility developments. Camping within the refuge and at the BLM sites accounted for approximately 1,750 visitor days in 1976.



## Historic and Archeologic Resources

Archeological data from Browns Park are limited because no systematic surveys have been made. However, enough work has been done to indicate that this entire segment has outstanding archeologic and historic values.

On the Utah portion of the Browns Park segment, five sites of unknown provenance have been inventoried within 1/4 mile (.4 km) of the river--four surface campsites, and one of lithic scatter.

In 1975 and 1976, a National Park Service team conducted studies at and near a site in Browns Park National Wildlife Refuge now believed to be a late 1830s Indian-White contact site. In addition to evidence of the trading period, upper deposits have revealed facts about a ferry operation; lower deposits are of an unknown (apparently) Indian occupation. In addition, tipi rings, bedrock mortars, pictographs, petroglyphs, and camp or village sites were noted nearby. There is substantial rock art in canyons feeding the Green River.

In 1976, the office of the Colorado State Archeologist examined the Browns Park segment and found numerous buried cultural components in the eroding river banks and soil conditions suited to "excellent biotic preservation."

Browns Park was an early interface between Great Basin, Plains, and Southwestern Indian Cultures. From about A.D. 400 to 700, the western Colorado-eastern Utah area was site of the Fremont Culture--people who hunted, gathered food, raised simple crops, and made pottery. Browns Park marked the northeastern limit of this culture, which was the first in this area to live in villages. More recently, the Ute (from the south) and Shoshone (from the north) have occupied Browns Park sporadically. The area was also



Placid canoeing water and a diversity of wildlife help produce outstanding recreation in Browns Park. Taylor Flats Bridge. BLM



Browns Park is rich in historic resources dating from prehistoric times to present. This cabin remains from the period before the turn of the century, when ranchers, outlaws, and the first river runners shared the valley. HCRS

a rendezvous for fur trappers and Indians in the 1830s. By the 1890s, the area supported ranchers and outlaws, including the Wild Bunch.

Many historic sites from this recent period still exist in Browns Park, including old log ranch buildings, homesteads, bridge and ferry sites, a school and several cemeteries. The old Parsons Cabin above Swallow Canyon, on the National Register of Historic Places, is believed to be the earliest existing building in Browns Park; it burned in 1978. Two other important historic sites include the Lodore School (now a local community hall) and the Two Bar Ranch (relic of the cattle baron days of the 1890s). The school is on the National Register of Historic Places; both the ranch and the Indian-White contact site have been nominated for inclusion.

In addition, Browns Park may also have significant paleontological values. An early mastodon of Miocene age was found in the Browns Park Formation near the town of Greystone, and mammoths have been excavated from Pleistocene alluvium near Maybell. Although both these areas are situated well outside the Browns Park area, similar finds could be made in the park.

## SEGMENT C - LODORE THROUGH SPLIT MOUNTAIN CANYONS

### Physiography and Geology

Flowing through Dinosaur National Monument, this 44-mile (70.8-km) segment of the Green River has carved three deep canyons; it also passes through three broad, open "parks" and a smaller but still expansive "hole." The dominant feature behind these landmarks is the Uinta Mountain Range which exhibits several major geologic processes.

AND CURTIS  
ER  
CAMPGROUND



UPPER  
DISASTER FALLS

ER  
DISASTER FALLS

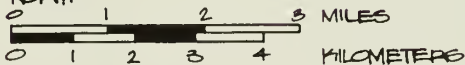
LET FALLS  
ER CAMPGROUND

## LEGEND

- RECREATION SITE
- DEVELOPED ROAD
- - - SEASONAL ROAD
- - - PRIMITIVE ROAD (4-WHEEL DRIVE)
- DINOSAUR NATIONAL MONUMENT
- PRIVATE LAND
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- PUBLIC LAND (BUREAU OF LAND MANAGEMENT)
- ..... TRAIL
- SUGGESTED WILD AND SCENIC RIVER BOUNDARY LOCATION



NORTH



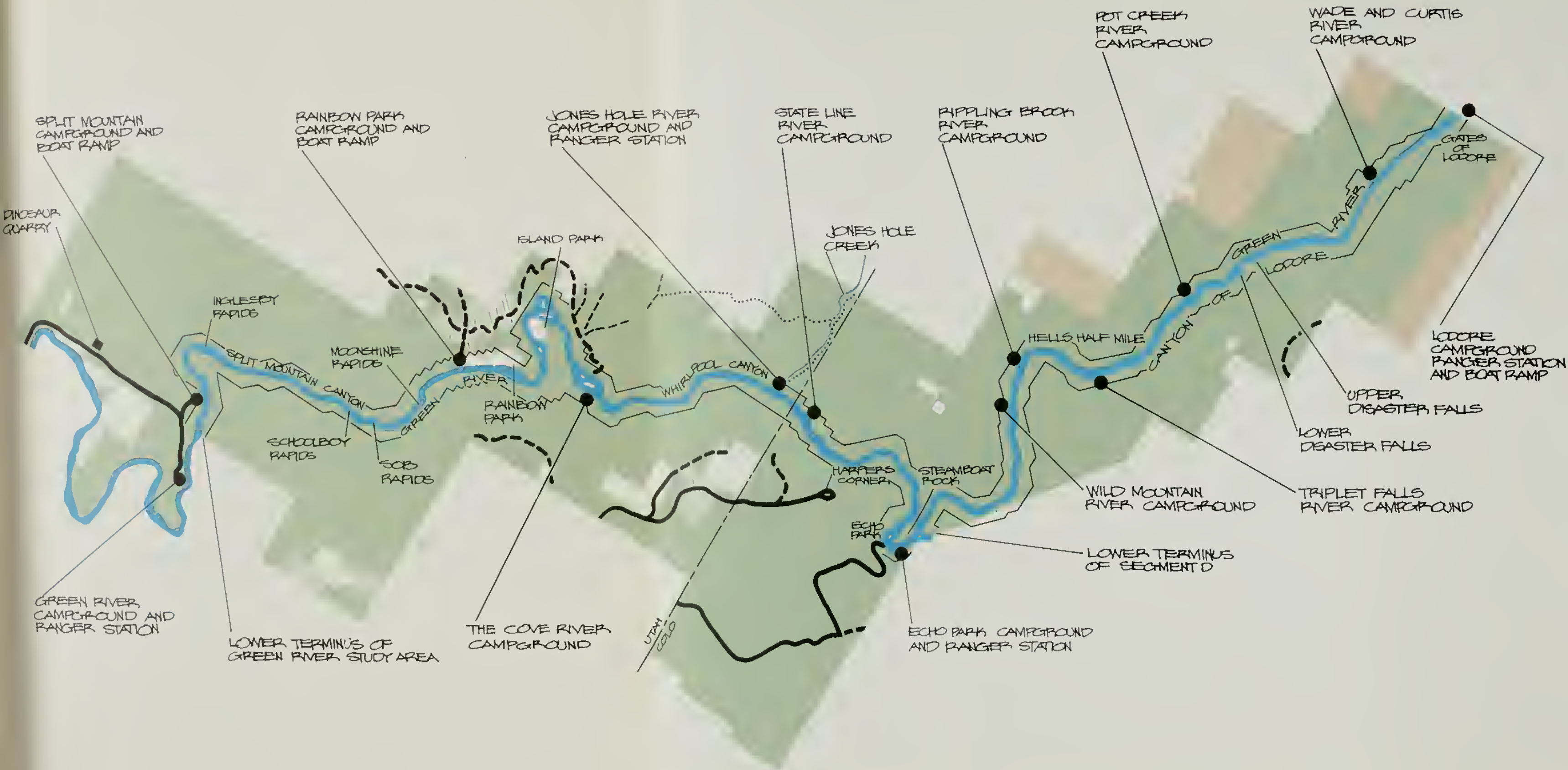
# SEGMENT C GREEN RIVER CORRIDOR

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

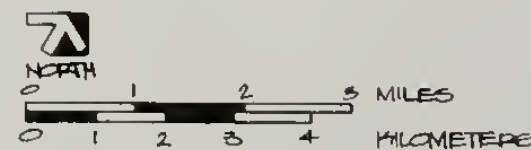
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- LEGEND
- RECREATION SITE
  - DEVELOPED ROAD
  - - - SEASONAL ROAD
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## SEGMENT C GREEN RIVER CORRIDOR

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

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The first canyon in Dinosaur National Monument is Lodore which begins approximately 2.7 miles (4.3 km) downstream from the monument boundary. Lodore's steep, rough fractured walls are primarily cut through the Precambrian Uinta Mountain Group. This formation is composed of metamorphosed sandstones, shales, and conglomerates originally laid down in a shallow-water environment beginning about 1.5 billion years ago. Much of the Uinta Mountain Group is maroon to deep brown in color, but as the light alters the rock varies in color from pink through red to orange. High on the rims, approximately 10 miles (16 km) into the canyon, the pink and buff colored late Cambrian Lodore Formation appears, capped by the light brown ledges of three Mississippian limestone formations; these are the Lodgepole, Deseret, and Humbug. All were deposited by seas which repeatedly flooded the area. The Lodore Formation contains fossil brachiopods, trilobites, and other marine crustaceans which are the oldest such remains found in the monument.

Lodore is the deepest canyon in the monument. Its greatest depth is near Rippling Brook where the inner canyon walls are about 3,400 feet (1,040 m) high. The maximum height of the outer canyon is about 3,800 feet (1,160 m).

Along its last 2 miles (3.2 km), Lodore Canyon undergoes an abrupt change approaching the Mitten Park Fault, one of several in the monument which developed during later periods of uplift. The river passes out of the upthrust block, and the Pennsylvanian Morgan Formation appears on the left bank. When in Echo Park, the river has crossed the fault and a massive fin of Weber sandstone dominates; this is Steamboat Rock, younger than the Morgan and composed of Pennsylvanian and Permian dune sands. The age of the Morgan is about 270 million years while the Weber is about 240 million years old--another testimony to the diverse origins of rocks exposed along this segment.

Whirlpool Canyon, 10 miles (16.1 km) long and immediately downstream from Echo Park, continues this diversity; it is the most geologically varied short stretch of river on the Green's entire 730-mile (1,175 km) length. At the head of Whirlpool Canyon, the river re-crosses the Mitten Park fault. Once again, the throw of the fault is about 3,300 feet (1,000 m) so the river passes from Weber sandstone into the rocks of the ancient Precambrian Uinta Mountain Group; in a few hundred yards, 1.2 billion years of geologic time are traversed.

Near its midpoint, Whirlpool Canyon opens briefly on the north or right bank at Jones Hole, where a long, U-shaped side canyon carved by Jones Hole Creek meets the river. Jones Hole Creek rises from springs in the early Pennsylvanian Round Valley limestone 5 miles (8.1 km) back from the river. Cambrian, Mississippian, and Pennsylvanian rocks are exposed in this side canyon. It has many deep, narrow tributary branches and draws that have earned the name of the Diamond Mountain Labyrinth.

Whirlpool is a relatively straight, deep canyon; maximum depth is 2,100 feet (640 m) to the inner rim and more than 3,300 feet (1,000 m) to the outer rim (Wild Mountain Summit).

In sharp contrast to the canyon physiography, Island and Rainbow Parks are vast and open. At the head of this meandering stretch of river, the Green crosses steeply drag-folded rocks along the Island Park Fault and moves into yet another geologic era, the Mesozoic. First to appear is Glen Canyon (or Navajo) sandstone (late Triassic to early Jurassic) which is distinctly crossbedded. Next in view are the yellowish-brown cliffs of Entrada sandstone and, below the Entrada, the Carmel. Above the Entrada is the Curtis which in turn is overlain by the Morrison Formation, all late Jurassic. The high mountain slopes surrounding Island Park on the east and south are topped by strata of the Morgan, Weber, and Park City Formations.



The geologic diversity of Whirlpool Canyon caused John Wesley Powell to consider two different names for it. At the upper end, sinister sheer walls of Uinta Mountain Quartzite produce whirlpools and boils. Flow about 20,000 cfs ( $570 \text{ m}^3/\text{s}$ ). HCRS



By the lower end of the canyon, the river has passed upsection into younger formations. The cliffs, amphitheaters and narrow sheer ridges suggested the name Craggy Canyon, later rejected in favor of the name the canyon now bears. HCRS

Lastly, the Green River loops out of Rainbow Park and into Split Mountain Canyon. Split Mountain is an anticlinal fold also shaped by portions of the Island Park Fault. How the Green came to flow through this uplift is not known. The most probable explanation is that the river established its course in overlying layers of the Browns Park formation which have long since eroded away. At that time, the structures that would become Split Mountain were buried under thousands of feet of sediments, emerging only later when erosion exposed the harder rocks of the anticline. Long before that, however, the Green was well entrenched in its course, so it had to cut the harder rocks when it encountered them, producing the striking canyon now visible.

Rocks exposed in Split Mountain Canyon are again varied. Sharply folded Weber sandstone appears at the mouth. Thereafter, Morgan limestone, Round Valley limestone, the Humbug Formation, and Deseret limestone occur. The Deseret is the low point reached in the geologic section; then the river crosses progressively younger beds to the Weber sandstone at which point the river leaves Split Mountain Canyon.

In total, the canyon rocks in Dinosaur National Monument span over 1.4 billion years and involve 13 different formations. Unusually dramatic evidence of faulting is seen near Echo Park, at the head of Island Park, and at the mouth of Split Mountain Gorge.

### Minerals

While minerals like zinc, copper, and iron are found in the monument, none are known to exist in sufficient quantity anywhere in this river segment or in the whole of Dinosaur National Monument to be presently worth mining. Mining in the monument is prohibited, and there are no valid existing claims.





The open, gentle topography of Island and Rainbow Parks provides a sharp contrast to the predominant canyon physiography of Segment C. Looking downriver at Island Park; the foot of Whirlpool Canyon may be seen at the upper left. NPS



## Soils

As in segment B, no comprehensive soil survey has been attempted in Dinosaur National Monument, so detailed soils data are lacking. Generally speaking, shallow, rocky, and well-drained steeply-sloping soils are most extensive. The surface of this type is a thin, moderately dark loam. No more than 20 inches (51 cm) beneath is quartzite or limestone bedrock.

Deep soils without high stone and cobble content are present only in valleys and at the bases of slopes. These soils may be loamy or quite sandy. Areas of bare sand also exist. The river bottom-type soils are often alkaline and sometimes unstable because of deposition or erosion by floods. Most recreation sites in the monument are situated on the more stable of the river bottom-type soils.

The soils types are primarily of the Lithic Ustic Torriorthents--Ustic Torriorthents Association, and the Lithic Haploborolls--Rock Land--Aridic Argiborolls Association. For the most part these soils are quite shallow. For additional information, see the soils map in chapter II.

## Vegetation

As in segment A (Red Canyon), the Green River corridor in Dinosaur National Monument supports a diversity of vegetative types and associations. Broadly speaking, this is an area of many ecotones. Mountains meet high desert, and both are bisected by the river canyons and their riparian zones.

No systematic survey of vegetative communities in the Green River corridor has been made. However, the following compendium of

information was drawn from several collections and various observations.

In Lodore Canyon, the dominant trees are box elder (along the river), Utah juniper, and pinon pine (the last two on the canyon slopes). Douglas-fir grows on some north-facing slopes, and ponderosa pine on the larger stream terraces. The canyon also contains two hackberry groves near its lower end, which are the dominant trees in this locality.

Major species along streambanks include golden aster, various poa species (bluestem-type grasses), Indian ricegrass, and needle-and-thread.

Among the plants found at Trailer Draw (mile 238.7) are Oregon grape, brittle fern, squawbush, poison ivy, dogbane, ocean spray, scouring rush, mockorange, snowberry, giant wild rye, and thickspike wheatgrass. Fendlerella has been found between Triplet Falls and Echo Park.

Douglas-fir dominates the steep canyon walls of Whirlpool Canyon-Jones Hole; pinon pines thin out and then disappear downriver. Rock spiraea also hugs the precipitous slopes. The flora at Jones Hole is particularly varied and includes box elder, rushes, snowberry, prairie cordgrass, and sedge.

In Island Park-Rainbow Park, large cottonwoods are most notable, including one of Utah's largest in circumference. In one location, Utah junipers grow down to the river. Sagebrush is the dominant shrub, and greasewood is prominent. Two species of broomrape and several small hawthorne trees have also been noted.

Utah junipers dominate growth on the canyon walls and slopes of Split Mountain Canyons. Douglas-fir, ponderosa pine, cottonwood,

and boxelder grow near the river. One endangered plant, the breviflora species of *Cryptantha*, may be found in the Island Park.

### Wildlife and Fish

Wildlife. The general profile of wildlife populations is similar to that of Red Canyon with the exception of bighorn sheep, which are present through Lodore Canyon to Echo Park and Harpers Corner. The bighorn herd occupies only a portion of its historic range, mostly the narrow strip along the river. The range is used year-round, a fact which may be detrimental to the population. National Park Service biologists estimate the herd numbers between 80 and 90.

Mule deer are the most numerous large mammals in the Green River corridor. Although some of them migrate out of the monument to higher summer range, many appear to be permanent residents along the river. A 1972 survey in Lodore Canyon noted 31 deer and only 7 bighorns. Elk appear to be increasing in the monument, but they rarely venture to the canyon bottoms. The black bear is extirpated in the monument except for occasional transients, and the mountain lion has been reduced by hunting outside of the monument boundaries. The monument itself is too small to contain a resident population of lions. Other mammals in or near the Green River corridor include coyote, bobcat, fox, badger, skunk, ringtail (rare), muskrat, weasels, mink, marmot, and various chipmunks and squirrels, mice, and rats. Beaver are common along the river where they feed primarily on cottonwoods and box elders.

Within recent years, feral horses increased at a rapid rate, to about 500 in and adjacent to the monument; these have now been captured and removed. A possibly significant overlap exists between the plant types consumed by these feral animals and those by bighorn sheep; a minor diet overlap exists with deer.



Bighorn sheep, by a combination of lost range and infestation by lungworms from domestic sheep, have died out in most of the west, but they are still common in Lodore Canyon. John Davidson



After the closing of Flaming Gorge Dam, seasonal high stages of about 15,000 cfs ( $425 \text{ m}^3/\text{s}$ ), indicated by the line of dark trees in the background, became daily peaks of about 3,200 cfs ( $91 \text{ m}^3/\text{s}$ ), indicated by the rocky bank. Low flows shown here (800 cfs or  $23 \text{ m}^3/\text{s}$ ) can cause difficulty. Winnies Rapid (Little Stinker). Earl Perry



Avian life in the canyons and broader parks is varied. A 1972 survey of Canada goose nests along the river suggested that about 200 goslings are produced annually. Other nesting waterfowl include mallards and green wing teals. The canyon walls are important nesting sites for golden eagles, turkey vultures, peregrine falcons, and other raptors. Bald eagles frequent the river corridor in the winter. Songbird populations are diverse; mountain bluebirds, meadowlarks, wrens, and robins commonly nest near the river. Cliff swallows and their nests are commonly seen on rock faces above the river.

The Green River in Dinosaur National Monument is significant habitat for the endangered peregrine falcon. Active nests were observed in Echo Park in 1972, 1973, 1975, and 1977; five other sightings are recorded in the monument in 1974, 1975 and 1976. Two other eyries are known, one in Whirlpool Canyon and one in Split Mountain. One of these may be inactive, however.

Fish. The fishery on this section of the Green River breaks into two distinct sub-segments. One is above the confluence with the Yampa in Echo Park; the other is below. Through Lodore Canyon, the influence of the cold, daily fluctuating releases from Flaming Gorge Dam remains the dominant factor. In this reach, turbidity increases, while temperatures moderate somewhat, as do the daily fluctuations in river level. The greater turbidity tends to downgrade the quality of the trout fishery, but both rainbow and brown trout exist in the Green downstream to Echo Park. Other species include flannemouth and bluehead sucker, speckled dace, roundtail chub, carp, Utah chub, creek chub, fathead minnow, red side shiner, white sucker, channel catfish, and black bullhead. Of the 14 species of fish now known in the Green River through Lodore Canyon, only 9 were present before Flaming Gorge Dam. The 5 others (brown and rainbow trout, Utah chub, fathead minnow, and white sucker) are present by virtue of the dam-altered aquatic ecosystem, or stocking.



Below Echo Park, the unregulated flow of the Yampa River greatly alters the Green River fishery. Pre-impoundment conditions are partially restored and a number of endemic, warm-water species continue to survive. Four of these, the Colorado River squawfish, the humpback and bonytail chubs, and the humpback sucker, are either endangered or proposed for the Federal Threatened and Endangered List. The status of each is discussed under wildlife and fish of the Yampa River segment.

### Water Quality

No water quality tests have been run on the Green River in the monument. Generally speaking, conditions are similar to those in Browns Park, with occasional added turbidity from tributaries in Lodore Canyon (i.e., during spring runoff and after heavy summer showers) and a substantial increase from the Yampa River. The Yampa also adds about 100 tons (90 metric tons) per day of salts, most of this attributable to irrigation discharge from river bottom lands upstream. In addition, its summer flow warms the cold waters of the Green.

### Water Flow

Water flow above the confluence of the Yampa River is a downstream extension of conditions prevailing for the Green in Red Canyon and Browns Park. Daily fluctuations in flow through Lodore Canyon, similar to that on the upper segments, usually range from 800 to 4,100 cfs (22.7 to 116.1 m<sup>3</sup>/s). Flows can drop to as little as 400 cfs (11.3 m<sup>3</sup>/s) and exceed 5,000 cfs (141.6 m<sup>3</sup>/s), although flows this high are unusual.

The river gradient through Lodore is approximately 15 feet/mile 2 m/km) and rate of flow averages 4 to 5 MPH (6 to 8 km/hr). This stretch of the Green River contains numerous rapids. Among the major whitewater runs are Winnie's Rapid, Upper and Lower Disaster Falls, Harp Falls, Triplet Falls, and Hell's Half Mile. Below Echo Park, the inflow of the Yampa increases and alters the Green's flow significantly, especially in the spring when peaks of more than 20,000 cfs (570 m<sup>3</sup>/s) are recorded.

Table III-3 shows average monthly and annual discharges (as well as average monthly water temperatures) of the Green River near Jensen, Utah, below the confluence of the two rivers. Since tributary inflow below the confluence is small, these figures closely approximate Green River flows at the Yampa mouth. Depending on the season, the Yampa River inflow moderates the magnitude of diurnal fluctuation on the Green River due to dam releases.

### Water Use

Other than one very small irrigation diversion on State land in Island Park, no water is diverted from the Green River in Dinosaur National Monument.

### Access

Access to segment C is available at four points: (1) Echo Park, with a dirt road leading to a boat ramp, car campground, and ranger station (mile 225.0); (2) Island Park, served by a dirt road on north side of the river to old Ruple Ranch and to the river opposite Big and Buck Islands (mile 213.5-215.0); (3) Rainbow Park, with a dirt road to the Rainbow Park boat ramp at the head

# Average Discharge and Water Temperature of the Green River Near Jensen, Utah<sup>1</sup> (1971-1976)

## Average Monthly and Annual Discharge

Water Year	October		November		December		January		February		March	
	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s
1971	1,939	54.9	1,878	53.2	1,953	55.3	2,489	70.5	1,790	50.7	2,595	73.5
1972	2,289	64.8	3,275	92.8	3,603	102.1	3,122	88.4	3,703	104.9	3,600	102.0
1973	3,655	103.5	4,233	119.9	4,071	115.3	3,927	111.2	4,287	121.4	3,022	85.6
1974	2,814	79.7	3,216	91.1	3,027	85.8	2,707	76.7	1,401	39.7	2,622	74.3
1975	3,422	96.9	3,154	89.3	2,842	80.5	2,941	83.3	3,437	97.4	2,632	74.6
1976	1,872	53.0	2,649	75.0	3,999	113.3	3,462	98.1	2,824	80.0	3,115	88.2
Average	2,665	75.5	3,068	86.9	3,249	92.0	3,108	88.0	2,907	82.4	2,931	83.0
Percent	5%		5%		6%		5%		5%		5%	

Water Year	April		May		June		July		August		September		Yearly Average	
	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s	cfs	m <sup>3</sup> /s
1971	7,128	201.9	10,570	299.4	13,160	372.8	4,629	131.1	2,762	78.2	2,550	72.2	4,454	126.2
1972	4,020	139.4	9,685	274.4	9,977	282.6	3,554	100.7	2,913	82.5	1,775	50.3	4,368	123.7
1973	3,654	104.6	14,000	396.6	12,020	340.5	5,660	160.3	4,016	113.8	2,949	83.5	5,461	154.7
1974	5,806	164.5	16,870	477.9	11,770	333.4	3,146	89.1	2,738	77.6	2,537	71.9	4,888	138.5
1975	3,193	90.5	9,141	259.0	14,160	401.1	8,835	250.3	4,002	113.4	1,979	56.1	4,978	141.0
1976	4,675	132.4	11,400	322.9	9,441	267.5	4,181	118.4	3,032	85.9	2,812	79.7	4,455	126.2
Average	4,903	138.9	11,944	338.4	11,755	333.0	5,001	141.7	3,244	91.9	2,434	69.0	4,767	135.0
Percent	9%		21%		21%		9%		6%		4%		8%	

## Average Monthly Water Temperature in Degrees Fahrenheit and Celsius (1962-1966)

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
°F	56	44	34	32	34	39	48	57	63	68	67	61
°C	13	7	1	0	1	4	9	14	17	20	19	16

<sup>1</sup>Gaging station is located 3 miles (4.8 km) downstream from the Split Mountain boat ramp and 14 miles (22.5 km) upstream from the Jensen Bridge.

Source: NPS - Dinosaur National Monument Draft River Management Plan (1977).

of Split Mountain Canyon, where a small primitive campground is available (mile 207.8); and (4) Split Mountain, served by a paved road to the boat landing and developed car campground at the mouth of canyon (mile 199.5).

A foot trail through Jones Hole Canyon connects the national fish hatchery and road on upper Jones Hole Creek with the Green River at Jones Hole Campground. Another foot trail follows Ely Creek and connects Island Park with Jones Hole Canyon. Otherwise the main canyons are accessible only by boat.

### Land Ownership

Title to all but two parcels of land within the Green River corridor is held by the National Park Service. These two are in Island Park and are held by the Utah Division of Wildlife Resources.

TABLE III-4  
Land Ownership, Segment C

	<u>Acres</u>	<u>Hectares</u>	<u>Percent</u>
National Park Service	13,600	5,510	96
Utah Division of Wildlife Resources	510	200	4
TOTAL	<u>14,110</u>	<u>5,710</u>	<u>100</u>

### Land Use

About 1,600 acres (650 ha) of the Green River corridor are under National Park Service grazing permit in Browns Park, Island Park, and Dinosaur National Monument. Cattle make minimal contact with riverbanks; however, most cattle and sheep grazing occurs during winter months. There is no grazing east of the river in Island Park.

**ACREAGES**





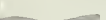
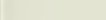
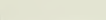


**GROSS PARK**

**FEDERAL LAND**

**NONFEDERAL LAND**

UNIT	WILDERNESS	WIL
GREEN - YAMPA 1	179,979	
BLUE MOUNTAIN 2	25,693	
<b>TOTAL</b>	<b>205,672</b>	

**LEGEND**

-  PROPOSED WILDERNESS
-  POTENTIAL WILDERNESS ADDITION
-  EXISTING MONUMENT BOUNDARY
-  STATE LAND RIGHTS
-  PRIVATE LAND
-  STOCK POND
-  MAJOR ROAD
-  PRIMITIVE ROAD - MAINTAINED
-  PRIMITIVE ROAD - UNMAINTAINED
-  TRAIL
-  RIVER CAMPGROUND



SCALE IN  
0 1 2

**WILDERNESS PLAN**

**Green River National Monument**

**h - Colorado**



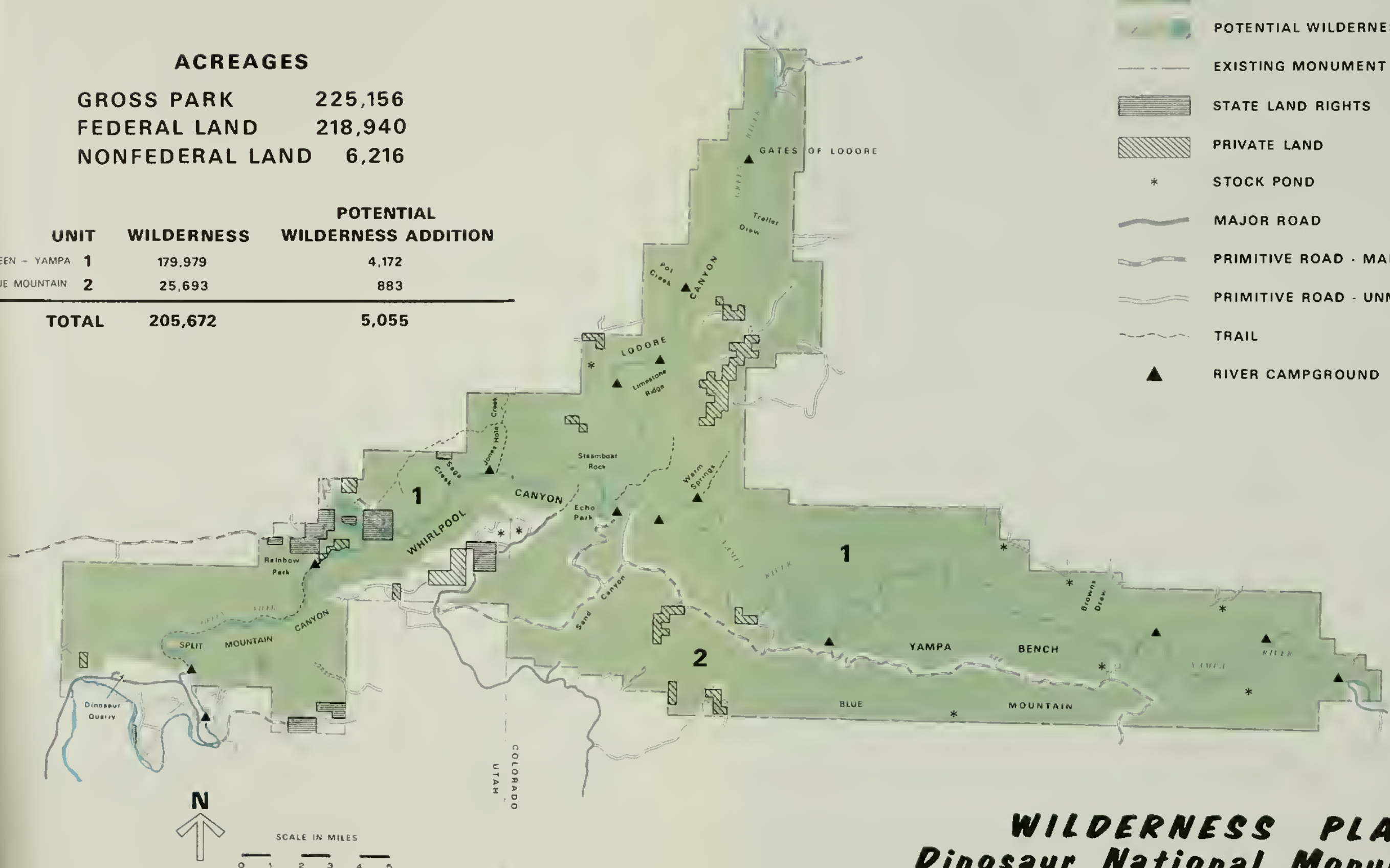
# LEGEND

-  PROPOSED WILDERNESS
-  POTENTIAL WILDERNESS ADDITION
-  EXISTING MONUMENT BOUNDARY
-  STATE LAND RIGHTS
-  PRIVATE LAND
-  STOCK POND
-  MAJOR ROAD
-  PRIMITIVE ROAD - MAINTAINED
-  PRIMITIVE ROAD - UNMAINTAINED
-  TRAIL
-  RIVER CAMPGROUND

## ACREAGES

GROSS PARK	225,156
FEDERAL LAND	218,940
NONFEDERAL LAND	6,216

UNIT	WILDERNESS	POTENTIAL WILDERNESS ADDITION
GREEN - YAMPA 1	179,979	4,172
BLUE MOUNTAIN 2	25,693	883
<b>TOTAL</b>	<b>205,672</b>	<b>5,055</b>



## WILDERNESS PLAN Dinosaur National Monument Utah - Colorado

In Dinosaur National Monument, the National Park Service has proposed designation of 205,672 acres (83,268 ha) as wilderness and 5,055 acres (2,047 ha) as potential wilderness addition. If the proposal is passed, approximately 95 percent of the river corridor will be designated wilderness.

### Recreation

The principal recreational use of the Green River corridor is whitewater boating, with about 90 percent of it in inflatable rubber rafts, and the other 10 percent in kayaks. In 1972, approximately 94 percent of this activity took place between May and August.

From 1967 to 1972, boating use in the whole monument increased by 589 percent. The increase in demand for privately run trips has been greater than that for commercially run trips. The great increase in popularity for both types of river running moved the Park Service to limit total river use in the monument at 17,000 people per year. All trips are run under permit from the National Park Service and use is carefully regulated and scheduled. Group size allowances may be lowered and different types of user limits may be established in the river management plan now being drafted by the Park Service.

Two categories of river trips are run on the Green, the largest of these being the commercially-outfitted trip on which professional boatmen take families or groups down the river. This category accommodated about 70 percent of all trip participants in 1976. Commercial boater-user-day allotments have been made to 11 rafting concessioners. The major river users are Hatch River Expeditions, Adventure Bound, Inc., Colorado Outward Bound School, Wild Water West, and Holiday River Expeditions. The other trip

category consists of noncommercial use and includes both the general public do-it-yourself trips and the broad spectrum of "outdoor experimental education schools."

Table III-5 shows the combined river use for the Green and Yampa Rivers from 1967 through 1976 (separate use figures for the two rivers are not available).

River running use mostly involves overnight camping at steamside campgrounds along the Green and Yampa. This use has grown significantly from a total of 6,202 camper nights in 1967 to 21,446 in 1975. Today, campground use is regulated as part of the boating permit procedure to minimize crowding and human impact (such as stripped firewood and accumulations of campfire ash, litter, sanitary wastes). Table III-6 lists the various campgrounds on this segment.

Table III-5  
Boater Use of the Green and Yampa Rivers (Combined),  
Dinosaur National Monument

Year	<u>Boaters</u>			<u>Boater-user-days</u> <sup>1</sup>		
	Commercial	Noncommercial <sup>2</sup>	TOTAL	Commercial	Noncommercial <sup>2</sup>	TOTAL
1967	1,168	1,325	2,493			
1968	1,891	1,864	3,755			
1969	3,192	2,548	5,740			
1970	7,699	2,063	9,762			27,438
1971	10,761	3,384	14,145	26,264	9,753	36,017
1972	12,829	4,330	17,159	29,324	11,318	40,642
1973	12,153	3,586	16,739	28,816	12,993	41,809
1974	9,219	3,655	12,874	22,244	11,847	34,091
1975	10,570	3,333	13,710	24,184	10,872	35,156
1976	10,570	3,010	13,580	26,673	10,080	36,753

<sup>1</sup>Boater-user-day figures include commercial crew members and persons participating in research and National Park Service Trips, which are not counted against commercial or noncommercial allocations.

<sup>2</sup>Includes members of the public who conduct their own trips ("Private") and outdoor experimental education schools. From 1972 to 1977 some of these schools, like commercial outfitters, had guaranteed user-day allotments, but the Draft River Management Plan proposes to allow these groups to compete for noncommercial user-days in the future.

Source: NPS-Dinosaur National Monument Draft River Management Plan (1977).

Table III-6

Designated Campgrounds, Green River Corridor,  
Dinosaur National Monument  
Colorado and Utah

<u>Name</u>	<u>Location (river mile)</u>	<u>Access</u>	<u>Capacity (groups/persons or units)</u>	<u>Facilities</u>
Lodore	243.7	car/boat	17 units	tables, toilets, water, trailer sites, concrete boat ramp
Wade and Curtis	241.0	boat	2 groups/50 people	tables, toilets, fireplaces
Pot Creek	235.3	boat	2/100	tables, fireplaces, pit toilets
Triplet Falls	232.4	boat	2/30	tables, fireplaces, pit toilets
Rippling Brook	230.5	boat	2/50	tables, fireplaces, pit toilets
Wild Mountain	229.5	boat	2/30	tables, fireplaces, pit toilets
Echo Park	225.0	car	20 units	tables, fireplaces, pit toilets water faucets, trailer sites, boat ramp, ranger station
State Line	219.2	boat	2/30	pit toilet
Jones Hole	218.6	boat	6/100	tables, fireplaces, pit toilets, ranger station, creek
The Cove	214.2	boat	2/30	pit toilet
Rainbow Park	207.8	car	4 units	tables, fireplaces, pit toilets, water faucets, boat ramp
Split Mountain	299.5	car/boat	35 units	tables, fireplaces, modern comfort station, water faucets, trailer sites, amphitheater, nature trail, wood, concrete boat ramp





Upper Disaster Falls. The rapids in Lodore Canyon, before the closing of Flaming Gorge Dam, were among the most formidable in the west. No longer large, they are still challenging. On his pioneering run in 1869, Powell's men lost a boat and three months provisions here. Earl Perry



Hell's Half Mile. Though normally quite clear, the Green River in Lodore sometimes carries flashflood runoff from upstream tributaries. This photo, taken June 12, 1965, shows runoff from the great storm of 2 days before, which created Warm Springs Rapid on the Yampa in Segment D. Flow about 5,000 cfs ( $142 \text{ m}^3/\text{s}$ ). Earl Perry



Other recreational use in the Green River corridor in the monument is sharply limited. Fishing in Lodore Canyon is fair to good for trout; below Echo Park it is limited mostly to catfish. The best trout fishing is on Jones Hole Creek, a tributary in the Whirlpool Canyon area. Most hiking is done in conjunction with river trips and up various side canyons where primitive trails have been worn. Since most river running permits limit onshore time, little extended hiking is done. Lack of water away from the river is another limiting factor.

Recreational impact caused by large numbers of people at confined river bench sites is an ongoing problem. Since the construction of Flaming Gorge Dam little driftwood is available for campfires above Echo Park (it is now caught by the dam), and some areas have been badly stripped of firewood. A strict "carry-in, carry-out" policy is in force for all noncombustible wastes. Sanitary waste disposal requires steady monitoring. Dam-caused low flow levels in Lodore Canyon (especially below 1,200 cfs) can sometimes cause acute problems in getting through rocky, shallow rapids, particularly since most use is in 27 or 33-foot pontoon rafts. Normally the high flows tend to over-ride the lows, moderating the problem, but prolonged low flows can cause difficulties that are compounded by the steepness of the river and the number of recreationists.

### Historic and Archeologic Resources

Early-period archaeological finds show the monument was an interface among three major cultural areas: the Great Basin, the Plains, and the Southwest. Later finds reveal the consolidation of the Fremont Culture between A.D. 400 and 700 in the Dinosaur National Monument area. The Fremont people were largely sedentary, with a subsistence pattern of hunting, gathering, and

simple horticulture. Among their most striking remains are pictographs, petroglyphs, and some pottery. In more recent times, Ute and Shoshone Indians moved in and out of the monument area; neither tribe occupied this country on a continuous basis, however.

No sites within the Green River corridor of Segment C are currently on the National Register of Historic Places, but the following properties which lie partly outside the corridor, have been nominated:

Pool Creek Ranch Historic District. The cave occupied by the hermit, Pat Lynch, and buildings form the old Jack Chew (Pool Creek) Ranch.

Zenobia Basin. Log cabins, vintage 1930, pertaining to historic ranching in this area.

Jones Creek-Ely Creek. Outstanding archeologic sites, most of them of the Fremont Culture.

Cub Creek Historic District. Excellent archeologic sites, one early-1900s log cabin in poor condition.

Ruple Ranch District. Evidence of historic ranching operations that began in Island Park in 1883. The ranch house and outbuildings burned in 1972.

## SEGMENT D - YAMPA RIVER CANYONS

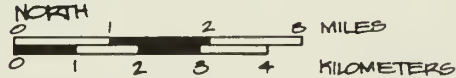
### Physiography and Geology

All but the first 2 miles (3.2 km) of the 47-mile (75.7 km) length of the Yampa River in Dinosaur National Monument lie in deep,

TERMINUS  
MENT D

# LEGEND

- RECREATION SITE
- DEVELOPED ROAD
- - - SEASONAL ROAD
- DINOSAUR NATIONAL MONUMENT
- PRIVATE LAND
- SUGGESTED WILD AND SCENIC RIVER BOUNDARY LOCATION



## SEGMENT D YAMPA RIVER CORRIDOR

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

WSRS | 20,068  
DSC | MAR 79

ECHO PARK  
CAMPGROUND, RANGER STATION,  
AND BOAT RAMP

BOX ELDER  
RIVER CAMPGROUND

WARM SPRINGS RAPIDS  
RIVER CAMPGROUND

BIG JOE RAPIDS  
RIVER CAMPGROUND

KATY'S NIPPLE

CLEOPATRA'S  
COUCH

TEPEE  
RAPIDS

TEPEE HOLE  
RIVER CAMPGROUND

ANDERSON HOLE  
RIVER CAMPGROUND

YAMPA  
RIVER

MANTLE  
CAVE

MANTLE  
RANCH

MATHERS HOLE  
RIVER CAMPGROUND

HARDING HOLE  
RIVER CAMPGROUND

DEER LODGE PARK  
CAMPGROUND, RANGER  
STATION, AND BOAT RAMP

UPPER TERMINUS  
OF SEGMENT D

CONFLUENCE WITH  
GREEN RIVER

# LEGEND

- RECREATION SITE
- DEVELOPED ROAD
- - - SEASONAL ROAD
- DINOSAUR NATIONAL MONUMENT
- PRIVATE LAND
- SUGGESTED WILD AND SCENIC RIVER BOUNDARY LOCATION



0 1 2 3 4 5 MILES  
0 1 2 3 4 KILOMETERS

## SEGMENT D YAMPA RIVER CORRIDOR

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

WSRS | 20,068  
DSC | MAR 79

extended canyons cut through Blue Mountain, the easternmost spur of the Uinta Range. Except for the Jurassic, Triassic, and Permian rocks exposed along its first 2 miles (3.2 km), a pair of Pennsylvanian formations line this segment. Although the variety of rocks in the Green River corridor is much greater, the down-cutting of the Yampa has created a narrow, twisting canyon that is unique in the region.

The Yampa River enters the monument at the west end of Lily Park, an area now known as Deerlodge Park. The relief is level with low, rolling hills back from the river. Four Jurassic and Triassic sandstone strata--the Dakota, Morrison, Entrada, and Navajo--are visible along with the Curtis, Chinle, Moenkopi, and Permian Park City formations. The dominant rock type is Quaternary alluvium which forms the broad river terrace.

Three miles (4.8 km) west of the Dinosaur National Monument boundary, the river slips abruptly into Yampa Canyon. The canyon was cut during the intermittent Uinta uplift which began about 65 million years ago in early Tertiary times. For its first 18 miles (29 km), the Yampa flows through the Pennsylvanian Morgan Formation, a mix of interbedded sandstones and limestones laid down during a long period of fluctuating shorelines. For much of this sub-segment, the canyon walls are sloping and irregular with many sheer cliffs topped by flat ledges. From river to inner rim, the height tops out at nearly 2,100 feet (640 m); the height of the outer canyon is as much as 3,400 feet (1,040 m). Color is varied; grays, tans, browns, reds, and maroons are present. Talus slopes slant from the bases of cliffs down to the river.

Just below Big Joe Rapids (mile 23.8), the face of Yampa Canyon abruptly changes as the river flows from the Morgan Formation to the overlying Weber sandstone. Color, bedding, and lithology change, as do canyon relief and the river course. The coloration





The first 20 miles (32 km) of the Yampa wind through a canyon cut in Pennsylvanian and Mississippian rocks. The middle and lower sections of Tepee Rapid, which at high water is almost 1.5 miles (2.5 km) long, are shown. Flow about 18,000 cfs ( $510 \text{ m}^3/\text{s}$ ). Earl Perry

of the canyon is a uniform bright tan darkly streaked in places by "desert varnish," a thin coat of manganese oxide deposited by water draining, then evaporating, on the cliff faces. Walls are massive, smooth, and often sheer with only narrow, banded ledges breaking the vertical rise. Some rise as much as 1,500 feet (460 m) directly up from the river, even overhanging it, with no intervening shore or talus slope. At several points, large, arching caves are formed in the sandstone, and at others, exemplary cross-bedding is visible.

Two other noteworthy geologic features are seen on this segment:

Meander migration scars - these are scarps along the north side of Yampa Canyon where it is cut through the Morgan Formation. They mark the river course at earlier stages as the Yampa slowly deepened its canyon and appear today as a succession of terraces on the higher walls and slopes. Meander migration scars also appear in the lower canyon at Warm Springs Draw (mile 4.1) where the Morgan Formation is again briefly exposed.

Warm Springs Rapid - this is the spectacular aftermath of a flash flood on the night of June 10, 1965. It contrasts sharply with other evidence of slow erosion elsewhere on this segment. Formerly, Warm Springs was a minor rapid. During the flash flood, a mass of rock debris was hurled down Warm Springs Draw in a few violent hours of erosion. Warm Springs Rapid is now the most dangerous rapid in Dinosaur National Monument.

### Minerals

Although occurrences of zinc, copper, iron, and other minerals are found in or near Dinosaur National Monument and along the Yampa

River, these deposits are not considered economical under present conditions because of their low grade, small size, or inaccessibility. There may be some potential for mineral development in the monument, but the area has long been closed to mineral exploration and removal. No claims were filed in Dinosaur National Monument pursuant to P.L. 94-429, which requires that claims not filed by September 28, 1977, would automatically be invalidated.

Of the oil fields scattered across the southern portion of Moffat County, the Elk Springs field, located about 8 miles (13 km) southeast of the eastern end of the monument, is the closest one in production.

The potential for petroleum production from sedimentary formations exposed in or near the Yampa canyon is minimal. The potential from unexposed lower sediments, such as the Mississippian limestones, remains unproven at this time.

### Soils

The soils are very similar to the soils of segment C; the most common are shallow, rocky, and sloping to steep. For the most part, the same soil types that exist in the Green River canyons or on the slopes above the canyons are present in and above the canyons of the Yampa; however, Ustollic Haplargids are the most common soils in the lower Yampa and in the Yampa-Green confluence area (see the soils map in chapter II).

### Vegetation

In general, plant life is similar to that of Whirlpool and Split Mountain Canyons and probably somewhat more diverse than that found

in Lodore Canyon (all in segment C). In particular, the Douglas-fir is less frequent, though at two points (miles 14.7 and 5.3) it grows at an unusually low elevation (5,100 feet or 1,555 m) for this latitude. Otherwise, vegetation is typical. Dominant trees along the river are cottonwoods (especially at Deerlodge Park), river birch, and box elder. Outstanding groves of box elder grow at Harding Hole. The sheer, smooth walls of Weber Sandstone above the river are all but devoid of vegetation, and the more gradual slopes of the Morgan Formation are dominated by Utah juniper and, to a lesser extent, pinon pine.

A checklist of common species lists the following at Castle Park (mile 12.2): box elder, water birch, Utah juniper, pinon pine, skunkbush sumac, big sagebrush, red osier dogwood, green ephedra, and serviceberry.

### Wildlife and Fish

Wildlife. Populations are similar to those along the Green with the exception of bighorn sheep, which are generally absent. Mule deer, the most common large mammal, are often seen on terraces and benches along the river. Other mammals include beaver, muskrat, fox, coyotes, mountain lion, black bears, badger, and bobcat.

Bird life is as varied as it is along the canyons of the Green River. Canada geese are common nesters. The river's natural flow also attracts other waterfowl, including pintails, American goldeneyes, and baldpates. The most common nesting duck is the mallard.

Ledges in the Morgan Formation and nooks and crevices in the Weber Sandstone are especially congenial for raptors. Most commonly seen is the turkey vulture; it is not unusual to see a





The towers and ledges of Weber Sandstone provide nesting habitat for raptors in the Yampa Canyon. Don Bock



dozen or more of these dark birds sitting in a row high on a cliff. Other raptors that may be seen include eagles, peregrine falcons, and several hawks, including the redtail, rough-legged, Coopers, and sharp-shinned.

The groves of cottonwood and box elder on the river terraces are rich habitat for many songbirds including ash-throated flycatchers, yellow warblers, rufous-sided towhees and lazuli buntings. Other commonly seen songbirds include mourning doves, meadowlarks, white-throated swifts, and violet-green swallows.

Fish. The lower Yampa River supports about ten native and twenty introduced fish species but is not considered to be a significant sport fishery. However, because of its relatively natural flows and runoff pattern, the Yampa appears vital to the survival of several unique, endemic species. Elsewhere in the region, the combination of such factors as dams (and resulting altered flow regimes), competition from exotic species, irrigation impacts, dewatering, channelization, pollution, eutrophication, and others have so greatly altered the historic fishery that two species, the humpback chub and the Colorado River squawfish, have been accorded "endangered" status by the Department of the Interior. Two other species, the bonytail chub and the humpback sucker, have been proposed for listing as endangered and threatened, respectively.

The world's largest minnow, the now "endangered" Colorado River squawfish once grew to over 6 feet (1.8 m) in length and near 100 pounds (45.4 kg) in weight. Formerly known as the Colorado or white salmon, it supported a commercial fishery until about 1910. Squawfish reproduction has declined in the upper basin since the early 1960s. The cold waters of the Green River above its confluence with the Yampa no longer support squawfish, but the presence of adults was recorded in the Yampa during 1968-1971 and 1974-1976.

Other factors besides dams have undoubtedly contributed to the squawfish's decline in the Colorado River Basin. Because it preys on game fish (introduced trout and bass, for example), fish and game departments have attempted to control it. Channel catfish are among the most deadly introduced species for this oversized native minnow; they feed on squawfish spawn, fry, and fingerlings.

The humpback chub, also classed as "endangered" by the USDI, was not discovered until 1946; apparently, it has never been abundant. In 1968-1971, only a few were captured in the monument. In 1975 and 1976, humpback chubs were found at three locations on the Yampa River; just above Echo Park, 2 miles (3.2 km) above Castle Park, and above the Yampa canyon in Deerlodge Park.

Once abundant, the bonytail chub has declined drastically since the closing of Flaming Gorge Dam. By 1968-1971, only a few were found, and none were collected in the monument from 1974-1976. In 1975, the Desert Fishes Council recommended that this fish be classified "endangered"; formal action has yet to be taken.

The humpback (also known as razorback) sucker has now vanished from large areas of the Colorado River Basin. Since 1970, investigators have considered it rare, and no juvenile fish have been reported in recent years. The humpback sucker has commenced to hybridize with the flannelmouth sucker and also the introduced Utah sucker. In 1975, the Desert Fishes Council recommended that the humpback sucker be placed on the Interior Department's "threatened" list.

Endangered and Threatened Fish of the Yampa River Study Area



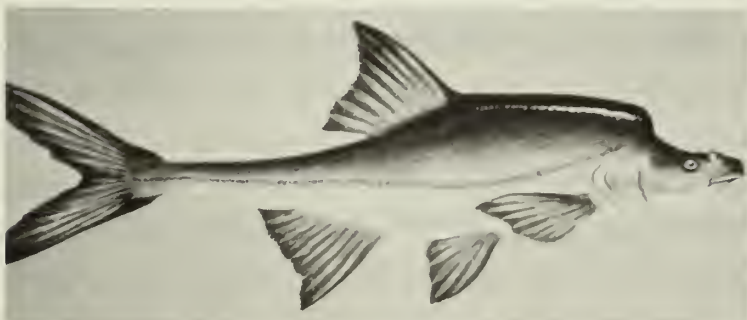
Colorado Squawfish (*Ptychocheilus lucius*). These giant minnows may reach 6 feet and 80 pounds (36 kg). Colorado Division of Wildlife



Bonytail Chub (*Gila elegans*). Another large minnow, which may attain lengths of 18 inches (0.5 m). Colorado Division of Wildlife



Humpback Chub (*Gila cypha*) This remarkably-shaped large minnow may grow to 18 inches (0.5 m). Colorado Division of Wildlife



Humpback (Razorback) Sucker (*Xyrauchen texanus*). The knife-like dorsal hump helps stabilize the fish in the rapid currents of high water. May grow to 16 pounds (7.3 kg). Colorado Division of Wildlife

While these endemic species have been declining, new exotics have been turning up. Among the species recently collected from the Yampa River in the monument for the first time are the plains killfish (July 1975), the Utah chub (April 1976), and the sand shiner.

### Water Quality

Except for some limited testing by Dow Chemical Corporation, no water quality testing has been done on the Yampa River in Dinosaur National Monument. However, no point sources of pollution exist within the monument boundaries. Upriver, inadequately treated municipal wastewater is a frequent concern. In 1975, the Colorado Water Quality Control Commission reported that wastewater treatment plants in the Yampa River Basin were meeting state effluent standards only about 40 percent of the time. The 2 largest plants in the basin, located at Steamboat Springs and Craig, 88 miles and 50 miles (142 and 81 km) upstream from the monument boundary, respectively), are both overloaded.

Nonpoint sources of pollution affecting water quality upstream on the Yampa River are runoff from winter cattle feedlots; irrigation return flows; runoff from Mesozoic and Tertiary shale outcrop areas; and septic tank effluent from small communities along the river, including Yampa, Phippsburg, Milner, and Maybell.

At present, septic tank effluent does not appear to affect the Yampa River seriously. Silt and salts from shale areas enter the river primarily after summer thunderstorms. According to the Environmental Protection Agency, irrigation returns add over 100 tons (90 metric tons) per day of salt to the Yampa drainage, or 400 to 600 pounds (180 to 270 kg) per year per acre. Manure accumulations from feedlots wash into the Yampa primarily in late



April and early May with the spring runoff; these accumulations are high in nitrates and bacteria. The high spring stream flow minimizes their impact.

The effects of these factors on the Yampa River study segment have been measured at the Colorado Water Pollution Control Commission's Water Quality Station #40 located at the eastern Dinosaur National Monument boundary. A discussion of specific water quality parameters follows:

Aesthetic considerations. These are specified in EPA's Water Quality Criteria, 1972. The Yampa, in general, meets these standards for esthetics. It is free from matter that settles to form objectionable deposits; floating debris, oil, or scum; substances producing objectionable color, odor, taste, or turbidity; and substances or conditions producing undesirable aquatic life.

Microbiological considerations. These are also discussed in Water Quality Criteria, 1972; they deal with pathogenic bacteria which might pose health hazards. Fecal coliform is the primary index. Between March 1968 and April 1976, the Colorado Water Quality Control Division made 50 tests on the Yampa (above the monument); results showed the river to be within the state's standards for fecal coliform. About 30 percent of these tests showed violations of the state's maximum limits for fecal coliform. Most of the violations were caused by high amounts of runoff from feedlots during the spring. A second index of microbiological quality is dissolved oxygen. At no point did concentrations drop below specified levels.

Chemical considerations. The Yampa River at Station #40 showed traces of only one potentially harmful chemical--selenium; the concentration of this naturally-occurring substance was far below



the permitted level. State and federal radiation standards were also met.

Temperature. The Water Quality Criteria, 1972, stipulate that recreational waters should not appreciably increase or decrease deep body temperatures of swimmers or bathers. Colorado standards state that water temperatures should follow natural daily and seasonal fluctuations, with no abrupt changes.

Temperatures of the Yampa River follow a typical, natural cycle both seasonally and daily. In the boating season, the river is usually too cold for prolonged body contact.

pH. The federal standard specifies a pH between 6.5 and 8.3 to minimize eye irritation; Colorado standards for primary contact are between 6.5 and 8.5. According to 48 samples taken between 1968 and 1976, pH ranged from 7.6 to 9.0, with an average of 8.45. Approximately 31 percent of the measurements exceeded Colorado's maximum levels for alkalinity of primary contact waters. The high alkalinity appears to result from the river's natural geology which yields a predominately calcium bicarbonate type water.

Turbidity. According to Water Quality Criteria, 1972, waters used for swimming should be clear enough for swimmers to locate submerged hazards easily. According to the Colorado Department of Health, nonnatural substances should not increase turbidity by more than 10 Jackson Turbidity Units.

Almost all turbidity in the Yampa River is from natural sediments eroded into the stream from dry areas with sparse vegetation. Agricultural activity (primarily irrigated farming) also increases siltation. Turbidity is greatest during high water in the spring and early summer and is too high for swimmers to see well; however, low temperatures and rapid current dissuade swimmers.

## Water Flow

The Yampa River is a relatively free-flowing stream since there are no dams on the main stem; its flow mostly follows the natural seasonal pattern. Low winter flows occur from December through February, followed by a sharp increase to a runoff peak in May or June. Thereafter a rapid decline occurs through August with a steady low flow in the fall.

From one year to the next, flows also vary with weather patterns. The high for the Yampa (measured at Maybell, Colorado) was in the spring of 1917 at 17,900 cubic feet per second (507 m<sup>3</sup>/s). The low was in the winter of 1932 at only 2 cubic feet per second (.06 m<sup>3</sup>/s). The average high from 1904 to 1959 was 9,937 cfs (281.5 m<sup>3</sup>/s); the average low was 124.5 cfs (3.5 m<sup>3</sup>/s). Since the Little Snake River joins the Yampa below this station, but above the monument, actual flows in Segment D are about one-third higher than these figures show. Tables II-2 and II-3 in the Regional Description chapter show the flows of the Yampa and Little Snake rivers above segment D.

## Access

Access to the Yampa River in Dinosaur National Monument is available at only three points: Deerlodge Park, where there is a paved road to the park, then a gravel road to the boat ramp, campground, and ranger station (mile 46.5); Castle Park/Mantle Ranch, with a dirt road to a private ranch (mile 12.0); and Echo Park, with a gravel road to the boat ramp, ranger station, and car campground (mile 0). There are no foot trails in the corridor.

## Land Ownership

Within the Yampa River corridor, only the Mantle Ranch (mile 12.0) is in private ownership. A working ranch operation of 160 acres (65 ha), its improvements and activities include an orchard, irrigated pasture lands, livestock grazing and corrals, and residences.

TABLE III-7

### Land Ownership, Segment D

	<u>Acres</u>	<u>Hectares</u>	<u>Percent</u>
National Park Service	14,880	6,020	99
Private	<u>160</u>	<u>60</u>	<u>1</u>
TOTAL	15,040	6,080	100

## Land Use

About 5,000 acres (2,000 ha) of the Yampa River corridor are under National Park Service grazing permit, including parts of five grazing allotments: Mantle, Iron Mine, Campbell, Richardson, and Sawmill Canyon. However, only small segments of these allotments are within the river corridor, and grazing in the inner canyon (the river corridor) is minimal.

Both cattle and sheep are grazed. Under present management plans, nearly all the use is for winter range (from November 15 to March 1; occasionally later on three allotments). Since the primary recreational season for boating takes place from late spring to mid summer, direct conflict is not an issue.

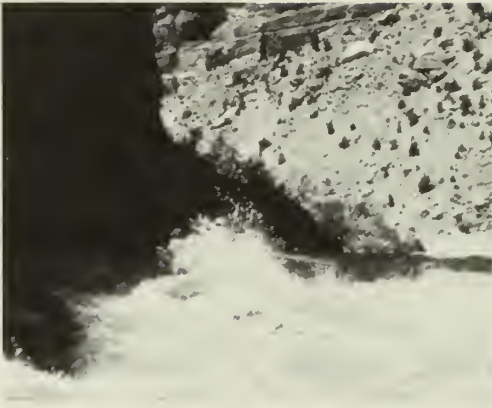
Approximately 99 percent of the Yampa River corridor will be wilderness if the proposed wilderness designation for Dinosaur National Monument is authorized.

### Recreation

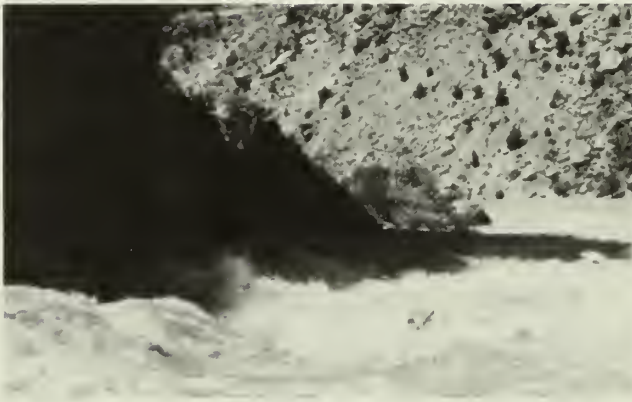
The prime recreational use is whitewater boating, with about 90 percent in inflatable rubber rafts, and the rest in kayaks. As on the Green, the number and difficulty of rapids on the Yampa segment varies with the flow in the river. A few of the rafting parties put in at Deerlodge Park and take out at Echo Park, but most continue on along the Green River through Whirlpool and Split Mountain Canyons. Notable whitewater areas on the Yampa study segment include Teepee Rapids, Five Springs, Big Joe Rapids, and Warm Spring Rapids, rated at Class III-IV. The Yampa's rapids require little maneuvering. However, the large waves and undammed runoff produce an exhilarating experience now relatively rare in the United States.

Along with challenging whitewater are other recreational attributes. Many consider the Serpentine Bends beneath the massive walls of Weber sandstone (mile 20 to mile 4.2) to be one of the most scenic stretches of river in the West. Hiking in the side canyons at Harding Hole is also popular, as is the exploration of caves and archeologic sites. Mantle Cave (mile 11.2) was the site of major Fremont culture occupations and is now posted with interpretive signs.

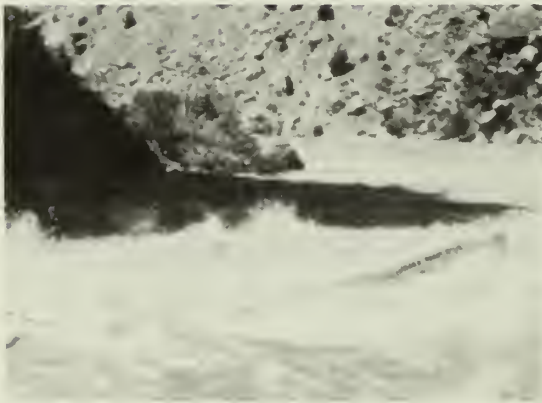
In 1976, approximately 45 to 50 percent of all river use in the monument originated on the Yampa, with peak use in June when 59 percent of the trips were run. May is the only other month when the Yampa receives substantial use (25.3 percent); a small percentage of trips also put in during April and July. Before and



Study team members about to capsize . . .



capsizing . . .



capsized.

Warm Springs Rapid, created by a spectacular flashflood on an ephemeral tributary in June of 1965 and complicated by rock fall from the 1,800-foot (550-m) cliff that overlooks it, is the monument's roughest. NPS



after spring runoff, water in the Yampa River is insufficient for rafting. This is a notable contrast with the Green River, as the regulated releases from the Flaming Gorge Dam enable river-running through the entire summer and into the fall. As a general rule, rafting on the Yampa River ceases when flow drops below 1,000 to 1,200 cfs (28 to 34 m<sup>3</sup>/s).

A mix of commercial and noncommercial trips are also run on the Yampa River. As on the Green, overnight camping is almost exclusively associated with river running. Table III-8 lists the various campgrounds in the Yampa River corridor.

### Historic and Archeologic Resources

The aboriginal history of the Yampa River corridor is generally similar to that of the Green in the monument and also the Browns Park area. However, the unique geology of the lower segment, where the Weber sandstone walls prevail, has been conducive to especially rich archeological deposits and excellent preservation. In particular, the large arching caves common in this formation were favored shelter for early Americans as far back as 2,500 B.C. Because these caves are protected from rain and are in an arid area as well, ordinarily perishable items have been preserved intact, especially objects of feather, plant fiber, wood, and leather.

Between 1939 and 1949, the University of Colorado excavated three caves in the Castle Park area and uncovered relics dating from about 1,500 B.C. to A.D. 800, a 2,300-year span. From the earliest to most recent occupation, these sites are as follows:

Hell's Midden. This was a stratified deposit under a rock ledge. Trenched to 15 feet (4.6 m), it showed discontinuous occupation

TABLE III-8

Designated Campgrounds, Yampa River Corridor, Dinosaur National Monument, Colorado

<u>Name</u>	<u>Location (river mile)</u>	<u>Access</u>	<u>Capacity (groups/persons)</u>	<u>Facilities</u>
Deerlodge	46.5	car, boat	---	Tables, fireplaces, pit toilets, boat ramp, trash cans
Anderson Hole	41.8	boat	2 groups/60 people	Tables, fireplaces, pit toilets firewood
Tepee Hole	36.4	boat	2/30	Pit toilets, no water, limited firewood, tables, fireplaces
Big Joe Rapids	23.8	boat	2/30	Pit toilets, limited firewood, no water
Harding Hole	20.1	boat	4/100	Tables, fireplaces
Mathers Hole	17.6	boat	2/30	Pit toilets, limited firewood, no water
Warm Springs Draw	4.2	boat	2/60	Tables, fireplaces, pit toilets, limited firewood
Box Elder	2.1	boat	4/100	Tables, fireplaces, pit toilets, limited firewood

from about 1,500 B.C. to the Fremont period of 400 to 700 A.D. The lower, older layers yielded artifacts from a hunting and gathering culture--people who ate deer, bighorn sheep, bison, fox, beaver, prairie dog, marmot, woodrat, rabbit, and fish. Implements including projectiles, scrapers, and awls were also found.

Mantle Cave. A large cave, 130 by 350 feet (107 by 40 m), this site consisted of 6 caches of Fremont culture artifacts dating between 400 A.D. and 700 A.D. One cache held a buckskin pouch containing a headdress of 350 flicker feathers and three ermine skins. Another cache yielded a headdress of tanned deer scalp with erect ears still attached.

Marigold Cave. This site contained remains from the final phase of Fremont culture, to about 800 A.D. Stone, bone, clay, and vegetable fiber artifacts were found, including some small clay bird figurines. Also found were a cook pit, slab-lined storage pits, and primitive shelters. The latter consisted of horizontal beams between two posts, and a reed-and-cedar bark roof held in place by thin sandstone slabs.

Historic artifacts from Ute and Shoshone sources have also been found in the Yampa River corridor. Based on these discoveries, plus a 1963-1964 University of Colorado survey of the entire monument, it appears that the prospects for finding more significant archaeological resources along the Yampa River are extremely good.

No sites in the Yampa River corridor are currently on the National Register of Historic Places. A Castle Park Historic District has been proposed because of the archaeologic and historic ranching sites in the area.



## CHAPTER IV

### WILD AND SCENIC RIVER ELIGIBILITY AND CLASSIFICATION

#### ELIGIBILITY FOR NATIONAL WILD AND SCENIC RIVER DESIGNATION

Eligibility determinations were based on the criteria in the Wild and Scenic Rivers Act (P. L. 90-542) and the joint Interior/Agriculture "Guidelines for Evaluating Wild, Scenic and Recreational River Areas Proposed for Inclusion in the National Wild and Scenic Rivers System Under Section 2, P. L. 90-542." These documents describe the general characteristics of rivers to be included in the System and outline the approach to be used in the evaluation process.

The Act states that, to be eligible for inclusion in the System, the river or segment of river must possess one or more outstandingly remarkable values,<sup>1</sup> and it must be free-flowing. The Federal Guidelines additionally require that the segment or segments must be of length sufficient to provide a meaningful experience; there should be sufficient volume of water during the recreation season to permit full enjoyment of water-related outdoor recreation activities; and the river should have high quality water or be susceptible to restoration to that condition. Table IV-1, "Summary of Eligibility

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1. The Act and "Guidelines" do not define "outstandingly remarkable," but general concepts have evolved in this and other wild and scenic river studies which approximate a definition of the term. Outstandingly remarkable values are usually those which are of national importance and which are unique or very rare when compared with values in similar areas. In this report, the terms "outstandingly remarkable" and "outstanding" are used interchangeably.



Table IV-1  
Summary of Eligibility Criteria, Green and Yampa Rivers

	RIVER SEGMENTS			
	A	B	C	D
Eligibility Criteria	Flaming Gorge Dam to Indian Crossing Boat Ramp	Indian Crossing Boat Ramp to Gates of Lodore in Dinosaur NM	Gates of Lodore to Southern Boundary of Dinosaur NM	Yampa River With Dinosaur NM
<u>Free-Flowing Factors</u>				
Impoundments	None	None	None	None
Diversions	None	One	None	None
Pumps & Related River Modifications	None	Seven	One	One
RIVER FREE-FLOWING?	Yes	Yes	Yes	Yes
<u>Volume of Water</u>	Sufficient for recreational use	Sufficient for recreational use	Sufficient for recreational use	Sufficient for recreational use
<u>Length</u>	15 Miles (24.6 km)	32 Miles (51.0 km)	44 Miles (70.8 km)	47 Miles (75.7 km)
<u>Water Quality Factors</u>				
Meets Primary and Secondary Contact Recreation Criteria	Yes <sup>2</sup>	Yes <sup>2</sup>	Yes <sup>2</sup>	No <sup>3</sup>
Primary Contact Criteria Exceeded Because of Natural Conditions				Yes
<u>Outstandingly Remarkable Values</u>				
Scenic	Yes	No	Yes	Yes
Recreation	Yes	Yes	Yes	Yes
Geologic	No	No	Yes	Yes
Fish and Wildlife	Yes	Yes	Yes	Yes
Cultural (historic, archeologic, and architectural)	No	Yes	No	No
ELIGIBLE FOR INCLUSION IN NATIONAL SYSTEM?	Eligible	Eligible	Eligible	Eligible

1. Depending on the location, these modifications consist of either protective rip-rap work, installation of pump stands, channel deepening, or fence in river.

2. Penstock modifications allow releases of water varying seasonally in temperature from 40° to 55°F (4-13C); winter releases thus do not meet primary contact standards due to low temperature.

3. Fails to meet primary contact criteria because of both seasonal low water temperature and turbidity.

Factors," presents criteria from the Act and "Guidelines." The table shows the degree to which these criteria were met in making the determination that all four segments of the Green and Yampa are eligible for designation.

## SUMMARY OF OUTSTANDING VALUES BY RIVER SEGMENT

### Segment A, Red Canyon of the Green River

Scenic Values. The Red Canyon segment of the Green presents striking, abrupt contrasts--sometimes flowing through a deep, narrow gorge, sometimes between low, rolling hills, and sometimes across an almost flat-bottomed valley. Most of the segment winds placidly through pine and shrub-covered canyons. In places, reddish rock walls rise or staircase away from the river to heights of up to 800 feet (250 m). Maximum canyon depth is 1,800 feet (550 m). The river is an appealing clear green in color; deep holes and mostly small rapids or sparkling riffles add to the highly relaxing colorful scenery. Based on the above, the study team found the scenic values of this reach "outstandingly remarkable."

Recreation Values. The river corridor provides enjoyable, relaxing, and nonstrenuous opportunities for rafting, canoeing, hiking, fishing, camping, picnicking, and nature study. These activities are enhanced by both outstanding scenery and fish and wildlife values. The recreational values of the river corridor are outstanding and unique.

Fish and Wildlife Values. Although it is the values associated with the fish and fish habitat that have been determined to be "outstandingly remarkable" in this segment, the corridor also contains a diversity of wildlife habitats and species. This segment

is rated as a blue ribbon trout fishery by the Utah Fish and Game Department. Rainbows up to 5 or 6 pounds (to 2.7 kg) are taken.<sup>2</sup> Modification of the penstocks in Flaming Gorge Dam allows water to be released from a higher reservoir level, resulting in rises in river water temperatures and oxygen content, which will further improve the fishery.

### Segment B, Browns Park - Green River

Recreation Values. Except for 3 miles (4.8 km) of river in the scenic, rock-walled Swallow Canyon, the Green River throughout the length of the 32-mile (51 km) long Browns Park segment flows quietly through a continuous series of oxbows, bends, and meanders. The slow-moving river, and the presence of numerous waterfowl and wildlife species provide good opportunities for fishing, hunting, waterfowl viewing, floating, and camping. The segment provides fine canoeing in an attractive pastoral setting. The study team rated the recreation values of this segment as outstanding.

Fish and Wildlife Values. A large portion of this segment is managed primarily to provide high quality nesting and migration habitat for Canada geese, ducks, and other migratory birds. At times, waterfowl populations are diverse and very high, especially during the spring nesting period and fall migration. Great blue herons and turkey vultures often nest in the same trees. A variety of shore and songbirds is also seen. Other commonly seen wildlife include mule deer and beaver.

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2. Larger rainbows are occasionally taken in the tailwaters area, immediately below the dam.

Approximately the upper half of the segment contains prime trout habitat and is a continuation of the blue ribbon trout fishery in segment A. As turbidity increases downstream, the fishery decreases in value. Because of the unique concentrations of wildlife and the seasonally excellent opportunities for wildlife viewing and hunting, the study team rated the fishery and wildlife values of this segment as "outstandingly remarkable."

Cultural Values. Browns Park has a colorful past of Indians, mountainmen, traders, cattlemen, cowboys, and outlaws. Indians, the first residents, valued the park as a sheltered wintertime haven where game and fish were plentiful. From 1826 to 1840, Browns Park was the site for several of the spring rendezvous staged by the fur companies. In 1837, early settlers built Fort Davy Crockett.

A number of historic sites still exist in Browns Park, and add interest to a visit; these include ranch buildings, homesteads--notably Two Bar Ranch, bridge and ferry sites, the Lodore School, and the remains of several outlaw cabins. Several sites including an important Indian-White contact site have been nominated for inclusion on the National Register of Historic Places.

Although little archeological information has been extracted, the potential is considerable, and the area is thought to be outstandingly significant for archeological as well as historical values. This conclusion is based on the hundreds of known archeological sites in adjacent areas, the flat topography of bottomland suitable for habitation and horticulture, abundant fish and wildlife, and the opportunities for stratified flood plain archeological sampling.

The cultural values of the Browns Park are clearly "outstandingly remarkable."

### Segment C, Lodore Through Split Mountain Canyons - Green River

Scenic Values. Starting at Gates of Lodore on the north and continuing past Split Mountain, 44 miles (70.8 km) to the south, the Green River winds and plunges through steep-sided Lodore, Whirlpool, and Split Mountain Canyons. Contrasts are provided between canyons as the river passes the massive Steamboat Rock and through the opened-up terrain at Echo Park and in Island and Rainbow Parks. The magnificent canyons present steep, high walls and a panorama of ever-changing geology and colors. Vistas vary from sheer rock walls to eroded spires high up on the steep canyon slopes. Through Island and Rainbow Parks, the river moves slowly and sluggishly, and the scenery becomes almost pastoral. However, the change presents a respite from the existing canyon scenes above and below.

The scenery is some of the most dramatic and unique in western Colorado and eastern Utah and is truly "outstandingly remarkable."

Recreation Values. The outstanding recreation values of the Green River canyons are enhanced by the scenic, geologic, and fish and wildlife values present. Opportunities exist for 1 to 4 day rafting trips from May through September, with access to a number of National Park Service campsites and side visits to canyons, petroglyph sites, and other points of interest. About 10 major rapids and many riffles attract boaters from all over the United States, to enjoy about 37,000 boater days of use annually. The recreation values easily rated "outstandingly remarkable."





Pictographs are typical of the prehistoric artifacts in segments B and C. Earl Perry



Exfoliation and vandalism have damaged the figures. Earl Perry

Geologic Values. The uplifting of mountains in this area from ancient sea floors some 60 to 70 million years ago was accompanied by compressional stresses that pushed the bedrock into spectacular folds, or fractured it into faults. The rock was further sculptured and carved by nature to form rugged, steep-walled canyons, representing a cross-section of geologic history.

The heavily spalled and fractured rock of the walls and steep slopes of Lodore Canyon are believed to be the oldest exposed on the entire 730-mile (1175 km) length of the Green. In Whirlpool Canyon, the geology is more diverse than on any comparable section of the entire river. Split Mountain Canyon is unique in that the river has carved a canyon along the axis and through the middle of a high upwarp. The folding and faulting associated with this "breached anticline" are textbook-quality features which readily lend themselves to study and public interpretation. The geology of this segment is clearly "outstandingly remarkable."

Fish and Wildlife Values. From the standpoint of the viewer and photographer, the most prized animal in the segment is the bighorn sheep, which may be seen at almost any time of the year in Lodore Canyon and on rare occasions in Whirlpool Canyon. Even rarer, but still sometimes seen, is the mountain lion. Mule deer and beaver are commonly seen. Birdlife is rich and varied and includes the golden eagle and red-tailed hawk; bald eagles are sighted occasionally. In addition, two endangered fish found in the Yampa River, the humpback chub and the Colorado squawfish, are also presumed to be present in this segment below the Yampa confluence. The presence of these remarkable wildlife and fish species in the river corridor adds significantly to the unique scenic and recreation values.



The Mitten Park Fault, shown on the opposite side from photo 2. The river travels two miles (1.2 km) around Steamboat Rock to cover the quarter-mile (400 m) between the photo points. HCRS



The river cleaves strata bent by the Island Park Fault at the entrance to Split Mountain Canyon. HCRS

Folding at the margin of two of the faults along the river reveals the geologic processes that have shaped the area.



## Segment D, Yampa River Canyons

Scenic Values. After the pastoral 1.5 miles (2.4 km) of river in Deerlodge Park, the Yampa penetrates the folded layers at the edge of a fault block and winds through a continuous canyon before meeting the Green at Echo Park. Although the scenic qualities of the Yampa Canyons are not as diverse as those of the Green, they are awesome in form and scale. About halfway down this segment's 47-mile (75.7-km) length, the character of the canyon changes from a rough, irregular appearance with numerous talus slopes to smooth, vertical cliffs and sculpted walls of light tan Weber sandstone that sometimes rise more than 1000 feet (300 m) from the water's edge. In an impressive 7-mile (11-km) canyon stretch below Harding Hole, the river curves and twists beneath massive walls and picturesque spires and domes, covering a mere 1.7 miles (2.7 km) on a direct line. Deeply incised and winding side canyons add to the outstanding scenic values of this segment.

Recreation Values. The recreation values of the Yampa and its canyons are very similar to those of the Green below the Gates of Lodore. However, the Yampa is an undammed river with a high spring runoff followed by vastly reduced flows; as a result, commercial river rafting is usually not feasible after early July. Relatively easy boating on such high flows is rare enough to make Yampa River boating a nationally sought after experience. Mantle Cave, with its Indian relics, provides a point of interest in addition to the opportunities and facilities generally available on the Green.

Geologic Values. Although the geologic history of the Yampa River canyons is very similar to that of the Green River canyons, they are not the same in appearance. From Deerlodge Park downstream to Big Joe Rapid, the steep slopes and fossil-bearing ledges of the Morgan Formation predominate. From Big Joe Rapids to Echo Park,



A natural river like the Yampa briefly overtops its banks about every second year. The boat ramp at Lily Park, start of the trip through segment D, is under about a foot (0.3 m) of water in this 1974 photo. Flow about 22,000 cfs (620 m<sup>3</sup>/s). High, undammed flows are an important factor in the recreational values of the Yampa. Earl Perry





Meanders entrenched 800 feet (240 m) below the plateau carry the Yampa 7 miles (11 km) to cover 1.7 miles (2.7 km) in a straight line. Earl Perry

smooth vertical cliffs and sculpted walls of light tan Weber sandstone dominate the riverscape. The folds and faults along the Yampa, the long sequence of rock types, and the scenic examples of incised meanders and meander/migration scars induced the study team to find the geologic values of the Yampa "outstandingly remarkable."

Fish and Wildlife Values. Except for an absence of bighorn sheep, the wildlife values are essentially the same as those for segment C of the Green River. In addition, this section of the Yampa contains the two endangered fish species, the humpback chub and the Colorado squawfish. The presence of these fish alone is sufficient to rate the fish and wildlife values of this segment as "outstandingly remarkable."

## CLASSIFICATION DETERMINATION

The classification levels for each segment were also based on criteria in the Wild and Scenic Rivers Act and the "Guidelines." These documents describe flow, accessibility, shoreline, and water quality conditions appropriate or required for the three classification levels--wild, scenic, and recreational. These criteria are presented in table IV-2.

Following are brief descriptions of the attributes of Yampa and Green River segments that determined their appropriate classification potential.

### Segment A, Red Canyon - Green River

Flow. Large sustained flow, controlled by Flaming Gorge Dam. Fluctuates between 800 and 4,600 cfs (22.7 to 130.3 m<sup>3</sup>/s, generally

on a daily basis. River between 75 and 250 feet (23 to 76 m) in width, with an average gradient of about 11 feet per mile (2.1 m per km). Excellent opportunities for whitewater and semiplacid river floating and canoeing.

Accessibility. Limited access. Boat ramps at the Flaming Gorge Dam spillway, Little Hole Campground, and Indian Crossing. No other roads into river corridor except for primitive road to Fire Flat picnic site which cannot be seen from river, and road into south end of Little Hole. Little Hole foot trail parallels left bank of the river between the Spillway boat ramp and Little Hole Campground.

Shoreline. Mostly canyon and narrow valley bottom, with striking and colorful contrasts between reddish rock, large pines and other conifers, and green water of the river. Shoreline mostly primitive and appealing to floaters and hikers. Intrusions (see Visual Intrusions map) limited to Flaming Gorge Dam, a trail footbridge, roads seen briefly at put-in sites, a transmission line, a natural gasline crossing, and Little Hole Campground. When viewed from river, none seriously take away from overall scenic character of shoreline environment.

Water Quality. Excellent. Normally clean, with much of bottom visible. Meets primary contact recreation criteria, though winter releases have low water temperature. Red Creek in lower part of segment can empty thick, reddish sediments into river during spring runoff and after heavy summer showers.

Most Protective Classification for Which Segment Qualifies Based on Existing Conditions--SCENIC.

Table IV-2  
Classification Level Criteria

The following criteria, summarized from the evaluation "Guidelines" were used to determine the classification suitability of the four river segments.

#### WILD

1. Flow - Free Flowing. Low dams, diversion works, or other minor structures which do not inundate the natural riverbank may not bar consideration. Future construction restricted.
2. Accessibility - Generally inaccessible by road. No roads in narrow, incised valley. If broad valley, no road within  $\frac{1}{4}$  mile (0.4 km) of riverbank. One or two inconspicuous roads to the area may be permissible.
3. Shorelines - Shorelines essentially primitive. One or two inconspicuous dwellings, limited amount of domestic livestock, and land devoted to production of hay may be permitted. Watershed natural-like in appearance.
4. Water Quality - Water quality meets minimum criteria for primary contact recreation except where such criteria are exceeded by natural background conditions. Also, water must be capable of supporting propagation of aquatic life normally adapted to habitat of the stream.

#### SCENIC

1. Flow - Same as for wild.
2. Accessibility - Accessible by roads which may occasionally bridge the river area. Short stretches of conspicuous and well-screened roads or railroads paralleling river area may be permitted, but consider type of road use.
3. Shoreline - Shoreline and immediate river environs still have over-all natural character. Small communities limited to short reaches of total area. Agricultural practices which do not adversely affect river area may be permitted. This could include unobtrusive row crops and timber harvest.
4. Water Quality - Water quality should meet minimum criteria for desired types of recreation except where such criteria are exceeded by natural background conditions and esthetics. Also, water must be capable of supporting propagation of aquatic life normally adapted to habitat of the stream or is capable of and is being restored to that quality.

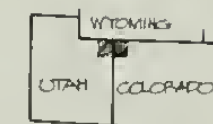
#### RECREATIONAL

1. Flow - May have undergone some impoundment or diversion in past. Water should not have characteristics of an impoundment for any significant distance. Future construction restricted.
2. Accessibility - Readily accessible, with likelihood of parallel roads or railroads along riverbanks and bridge crossings.
3. Shoreline - Some shoreline development. May include all agricultural uses, small communities, or dispersed or clustered residential.
4. Water Quality - Same as for scenic.









# **VISUAL INTRUSIONS** GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
 NATIONAL PARK SERVICE

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 DSC | MAR 79

## Segment B, Browns Park - Green River

Flow. Large sustained year-long flow. Subject to same pattern of releases from Flaming Gorge Reservoir as the river through Red Canyon, but fluctuations are somewhat less than those in segment A. River 75 to 1,000 feet (23 to 300 m) in width, the latter where islands and sandbars are present. Average gradient 2 feet per mile (0.4 m per km); thus, river is quiet, flat, and slow-moving. Conditions permit use of nearly all types of watercraft, including motor-propelled boats and canoes.

Accessibility. The most accessible segment. Three boat ramps and a number of primitive or secondary roads lead to or parallel riverbank. Some roads lead to ranch buildings or wildlife improvements adjacent to river.

Shoreline. Immediate shoreline principally cutbank. In other places, riverbank sloping or marshy. Short, low, rocky canyons in three locations; only prominent one is 3-mile (4.8-km) long Swallow Canyon in upper part of segment. Bottomlands and dry benches and meadows lie back of most of shoreline. Cottonwood groves are common.

The 32-mile (51-km) segment contains a number of manmade intrusions, although most are seen only briefly; these include boat ramps and roads that lead to or parallel the river. Also, two bridges, two ranch houses, several small campgrounds, a diversion canal, several pumps and related structures--including rip-rap and pilings, various historic sites, and headquarters buildings for both Utah's Waterfowl Management Area and Browns Park National Wildlife Refuge. The National Park Service Lodore Ranger Station, campground, boat ramp, and maintenance yard is also located at the extreme lower end of this segment within the river corridor.

Water Quality. Good. Turbidity caused by silt loading from tributary creeks and washes sometimes occurs. River is more turbid than in segment A. Water quality suitable for body contact recreation, except for cold winter and early spring temperatures.

Most Protective Classification for Which Segment Qualifies Based on Existing Conditions--RECREATIONAL by federal agency determination, SCENIC by Colorado Department of Natural Resources determination.

### Segment C, Lodore Through Split Mountain Canyons - Green River

Flow. Large, year-round flow. Fluctuations in water level normally have only minor effects on recreation and aesthetics. Width of river from less than 100 feet (30 m) in Lodore and Split Mountain Canyons to about 1,200 feet (370 m) in Island and Rainbow Parks area, where islands and sandbars divide or braid channel. Average gradient varies from 20 feet per mile (3.8 m per km) in Lodore and Split Mountain Canyons to about 2 feet per mile (0.4 m per km) in Island-Rainbow Park area.

Accessibility. Primitive segment. Access very limited. Other than the Lodore Campground and put-in site and the Split Mountain Campground and take-out site, vehicle access confined to a primitive road into Island Park, the Rainbow Park boat ramp, and the Echo Park Campground. A trail from Jones Hole National Fish Hatchery, well outside canyon area, provides foot access to Jones Hole Campground in Whirlpool Canyon.

Shoreline. Natural and primitive. Mostly canyon. Immediate shoreline varies from sheer rock walls to gentle, sandy, or grassy banks. Some cutbanks in Island-Rainbow Parks area. Intrusions limited, consisting of eight National Park Service floater-use campgrounds, Echo Park Campground (vehicle access), Island Park road (unobtrusive), and Rainbow Park Campground, boat ramp, and road end. Old farm machinery, a pump, fuel tanks, and National Park Service trailer are in Island-Rainbow Parks area, but most of these are somewhat difficult to see.

Water Quality. Similar to segment B. Spring runoff and summer storms can produce heavy silt load from tributary streams and washes, especially from Vermillion Creek, which enters the river in Segment B. Water suitable for body contact except for cold winter and early spring temperatures. Low water temperature less of a problem below Yampa confluence.

Most Protective Classification for Which Segment Qualifies Based on Existing Conditions--WILD.

#### Segment D, Yampa River Canyons

Flow. Undammed river with high spring runoff and low flows rest of year. Typical rafting season between early or mid-May and early July, but varies. Average monthly spring-early summer flow about 10,000 cfs ( $280 \text{ m}^3/\text{s}$ ) and low (fall-winter) flow averages about 400 cfs ( $11.3 \text{ m}^3/\text{s}$ ). River width varies from 300 to 600 feet (90 to 180 m). Overall river gradient 11 feet per mile (2.1 m per km), varying in places from 5 to 28 feet per mile (0.9 to 5.3 m per km).





Roads into Deerlodge Park at the beginning and Echo Park (shown) at the end, are the only public accesses in the 47 miles (75.7 km) of segment D. The Green River (left background) meets the Yampa (right background) under the 600-foot (180-m) wall of Steamboat Rock (left). Don Bock

Accessibility. Between Deerlodge Park and Echo Park Campground at Yampa-Green confluence, only access point to the river is at privately owned Mantle Ranch (closed to public). Except as noted below, canyons are completely natural and primitive.

Shoreline. Completely natural and primitive except for half-mile stretch of bank at Mantle Ranch and Deerlodge Park Campground and Echo Park campground at the ends of the segment. Seven National Park Service floater-use campgrounds along river; these are minor intrusions. Immediate shore area varies from sheer rock walls to gentle banks and beaches. Timbered areas sloping into river and cutbanks in some locations.

Water Quality. Fair to good. Lower than quality of Green, but easily meets secondary contact recreation criteria. Fails to meet primary criteria because of low water temperatures in winter and spring; and turbidity, mainly during spring runoff. However, low temperatures, turbidity and driftwood represent a natural condition, and for this reason are enjoyed by many boaters.

Most Protective Classification for Which Segment Qualifies Based on Existing Conditions--WILD.



## CHAPTER V

### FINDINGS AND RECOMMENDATIONS

Following are the findings, classification and management recommendations, management objectives, and estimated costs as determined by this study:

#### FINDINGS

1. The entire study area, consisting of 91 miles (146.5 km) of the Green River from Flaming Gorge Dam to the southern boundary of Dinosaur National Monument (Utah and Colorado) and 47 miles (75.7 km) of the Yampa River from the eastern boundary of Dinosaur National Monument to the river's confluence with the Green River (in Colorado), is eligible for inclusion in the National Wild and Scenic Rivers System. The two rivers and their corridors possess outstandingly remarkable natural values as described in chapter IV.

2. The National Economic Development (NED) alternative, designed to maximize recreation use (see chapter XI), offers no guarantee of long-term preservation of natural values and could permit visitor-use levels that would degrade outstanding values. Environmental Quality (EQ) Alternatives 3 and 4, the "Green only" and "Yampa only" alternatives, would each designate only one of the rivers, leaving the other river "available" for resource development (or use) in a manner that would probably not be possible if both rivers were included in the National System. However, Alternatives 3 and 4 offer incomplete protection of the study area's outstanding natural and recreational values. The recommended plan based on EQ Alternative 1, (see chapter XI and

recommendation 2), was selected by the federal study team members as offering the greatest degree of resource protection consistent with designating the rivers as components of the National System and classifying the segments at the most restrictive level for which they now qualify. Since the Colorado Department of Natural Resources found segment B to qualify for scenic classification, the CDNR selected EQ Alternative 2 as its recommended plan, as it offers a slightly greater degree of resource protection than EQ 1.

3. Since management of the Green and Yampa Rivers involves several agency jurisdictions, there is a need at present for greater coordination in management and planning, and this need will be increased if the Yampa and Green Rivers are added to the National System. However, preparation and implementation of a cooperative management plan following designation will aid considerably in achieving coordinated management.

4. Potential exists for additional water resource development in the upper Yampa River Basin. The basin has relatively little development and now provides a natural May-June runoff in contrast to the controlled flow of the Green. Several major and lesser projects have been tentatively proposed or considered (see chapter II). From available data, the study team was unable to make a detailed analysis of the effects of these projects on the Yampa within Dinosaur National Monument. However, the team concluded that construction of one or more of the proposed major projects<sup>1</sup> (with the possible exception of Savery-Pothook) or several of the lesser projects<sup>2</sup> could result in: (1) a modification of the

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1. The major proposed developments are the Juniper-Cross Mountain, Sheephorn, Oak Creek projects, and Savery-Pothook Projects.

2. The cumulative impact of several lesser water resource projects could have a direct and adverse effect on the Yampa River study segment, depending on the number, type, and size of projects involved. No advance determination could be made as to what combination would produce "adverse effects."



present, essentially natural flow patterns of the lower Yampa; (2) a decrease in the quality of the unique wilderness character of segment D and the wilderness river trip experience; and (3) a decrease in the diversity of recreation environments in the monument.<sup>3-4</sup>

Major new water resource developments in the basin could also severely reduce existing numbers of two endangered fish species, the humpback chub and the Colorado squawfish, that are found in the lower Yampa River and in the Green below the Yampa confluence.<sup>5</sup> According to the Fish and Wildlife Service,<sup>6</sup> the Endangered Species Act of 1973 (and critical habitat designation, if it is established) provides statutory protection for the endangered fish species in the Yampa and Green Rivers. This Act is expected to be the instrument that limits or modifies major water project development in the Yampa Basin. However, as FWS has stated, the Wild and Scenic Rivers Act can be considered as "complementary or backup protection."

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3. These conclusions are in agreement with and based on the Secretary of the Interior's 1/14/76 comments to the Federal Power Commission on the application for a preliminary FPC permit for the Juniper-Cross Mountain Project.

4. Alternatively, major water resource development upstream could extend the rafting season through impoundment of spring-early summer flows and release of water during mid and late summer, and also augment fall and winter flows.

5. The humpback sucker and the bonytail chub, which have been proposed for addition to the threatened and endangered species list, also could be adversely affected by upstream water development in the Yampa Basin.

6. Memorandum from Area Manager, Fish and Wildlife Service, Salt Lake City, Utah, dated December 3, 1976 (see appendix B).

If the Endangered Species Act does not first limit major Yampa Basin water development, individual findings will need to be made by the Secretary of the Interior to determine if the degree of project-caused changes would constitute a "direct and adverse effect on the (outstanding) values for which the river (study segment) might be designated," or "unreasonably diminish the scenic, recreational, and fish and wildlife values present. . . ." <sup>7</sup> Detailed project data, which to date has not been made available, will be needed to make these findings.

5. As stated earlier in this report, low level flows on the Green River below Flaming Gorge Dam can cause problems for rafters and other recreationists, as well as for fish and esthetics. Additional water resource project developments in the Yampa Basin could adversely impact esthetics and wilderness qualities, as well as rafting, in the Yampa River study segment. As a result, there is a need to establish minimum and maximum flow guidelines for rafting, other recreation uses, and fisheries in the event the projects are built.

## CLASSIFICATION AND MANAGEMENT RECOMMENDATIONS

1. The 91 miles (146.5 km) of the Green River between the Forest Service Spillway boat ramp (0.3 miles or 0.5 km below Flaming Gorge Dam) and the southern boundary of Dinosaur National Monument (0.7 miles or 1.1 km south of the Split Mountain boat landing), and the 47 miles (75.7 km) of the Yampa River between the east boundary of Dinosaur National Monument and the

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7. From section 7 of P.L. 90-542, which describes conditions under which federal assistance or permits will be granted or denied to water resource projects.

confluence with the Green should be designated components of the National Wild and Scenic Rivers System.

2A. Based on physiographic and manmade characteristics, the Green and Yampa Rivers were divided into four segments. The federal study team agencies recommended the following classifications for these segments:

Segment A, Green River: From the Forest Service Spillway boat ramp below Flaming Gorge Dam to the Bureau of Land Management boat ramp at Indian Crossing: 15 miles (24.6 km) - - - - -SCENIC.

Segment B, Green River: From the Bureau of Land Management boat ramp at Indian Crossing to the Gates of Lodore in Dinosaur National Monument: 32 miles (51.5 km) - - - - -RECREATIONAL.

Segment C, Green River: From the Gates of Lodore to the southern boundary of Dinosaur National Monument, south of the Split Mountain boat landing: 44 miles (70.8 km) - - - - -WILD.

Segment D, Yampa River: From the eastern boundary of Dinosaur National Monument to the river's confluence with the Green: 47 miles (75.7 km) - - - - -WILD.

2B. Based on finding segment B of the Green River eligible for scenic classification, the Colorado Department of Natural Resources concurs with the federal study team agencies in the recommended classification for segments A and C of the Green River and segment D, Yampa River, but recommends the followup classification for Segment B, Green River:

From the Bureau of Land Management boat ramp at Indian Crossing to the Gates of Lodore in Dinosaur National Monument: 32 miles (51km)- - - - -SCENIC.

3. Management of the river and the river corridor should be continued under present agency jurisdictions and responsibilities:

Segment A, Green River: Forest Service, Bureau of Land Management, and the State of Utah

Segment B, Green River: Bureau of Land Management, Fish and Wildlife Service, National Park Service, and the State of Utah (primarily the Utah Division of Wildlife Resources)

Segment C, Green River: National Park Service and Utah Division of Wildlife Resources (inholding within Dinosaur National Monument)

Segment D, Yampa River: National Park Service.

As required in the Wild and Scenic Rivers Act, a detailed (cooperative) management plan must be developed for the area within one year following river designation. The plan should coordinate the individual river management plans of the various agencies, emphasize river management actions that ensure protection and enhancement of outstanding natural values and provide for high-quality visitor experiences. The plan should be prepared by the agencies named above, the Colorado Department of Natural Resources, and the Bureau of Reclamation. Inputs should be solicited from other interested entities, including the public.

Items to be covered in the cooperative management plan should include recreational and interpretive developments, scenic and

access easements, scenic enhancement work, Flaming Gorge Reservoir releases, water quality safeguards, site protection and restoration, recreation site and riverbank cleanup and maintenance arrangements, river patrols and law enforcement, user regulations and limits, user permits, fire protection, plant disease and insect protection, endangered species protection, search and rescue, and signing. As part of management planning, provisions should be made for greater coordination among river management agencies and for management plan revision. Preparation of a cooperative management plan should result in compatible individual agency river management plans and policies.

4. Federal Energy Regulatory Commission (FERC) licenses to construct the Juniper-Cross Mountain, Sheephorn, and Oak Creek Projects should not be granted unless project sponsors can provide data at the time the projects are proposed and preliminary permits or licenses are sought from FERC that shows that these projects will not have "a direct and adverse effect on the values for which the river (study segment) might be designated."<sup>8</sup> The determinations of effect, to be made by the Secretary of the Interior, should be based on detailed project information, including projected daily and seasonal changes in the flow regime and the effects of those changes on esthetics, wilderness values, and recreation use in the Yampa study segment. Should the Savery-Pothook Project be proposed for construction funding, a similar finding should be made for it.

Secretary of the Interior findings on "direct and adverse effects" should be made for all lesser Yampa Basin projects that are to be

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8. These values, which are referred to as "outstandingly remarkable values," are detailed in chapter IV. "Designated," as used here, means designated by Congress as a component of the National Wild and Scenic Rivers System.



federally assisted or licensed, to avoid significant cumulative impact on the study segment of the Yampa.

Because of differences in the Wild and Scenic Rivers Act and the Endangered Species Act, including resource values these acts protect, Secretarial findings under the former should be made independently of any studies, consultation, or preparation of biological opinions that may be in progress under the Endangered Species Act.

5. Based on rafting, other recreation, fisheries, and maintenance of present ecotypes, (excluding the needs of two endangered fish species), the following minimum and maximum river flows are recommended as guidelines for the Green and Yampa River study segments:

#### GREEN RIVER

	<u>Period</u>	<u>Flow</u>
Minimum	May 15-Sept. 15	1,600 cfs ( $45.3 \text{ m}^3/\text{s}$ ) <sup>9</sup>
	Rest of year	800 cfs ( $22.7 \text{ m}^3/\text{s}$ )
Maximum	Year-round	4,600 cfs ( $130.3 \text{ m}^3/\text{s}$ ) (present maximum release)

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9. Minimum flow recommended by Forest Service and Bureau of Land Management (also see footnote 10).

## YAMPA RIVER

	<u>Period</u>	<u>Flow</u>
Minimum	May 1-July 1	2,500 cfs (70.8 m <sup>3</sup> /s)
	July 2-Sept. 10	1,200 cfs (34 m <sup>3</sup> /s)
	Rest of year	250 cfs (7.1 m <sup>3</sup> /s)
Maximum	Year-round	Historic maximum seasonal flow--24,000-25,000 cfs (680-710 m <sup>3</sup> /s)

The flow guidelines suggested for the Yampa River are flows that should be sought for rafting and other recreation uses should major water resource development and modification of main stem flows be permitted in the Yampa Basin. The guidelines should not be construed as recommendations for such development. These flows may involve significant decreases in wilderness values, the diversity of recreation environments, and numbers of remaining endangered fish in the Yampa study segment, and would require the allocation of up to 181,000 acre feet (223 million<sup>3</sup>) of storage to maintain them in both high and low run-off years.

For the Green River, the suggested flows are for releases from Flaming Gorge Reservoir. While the Forest Service (Ashley National Forest) and the Bureau of Land Management (Vernal District) have recommended minimum flows of 1,600 cfs for good rafting, the Bureau of Reclamation has stated that such releases would conflict

with Flaming Gorge Dam power generating requirements.<sup>10</sup> Nevertheless, this should be further pursued in management planning if the river is designated.

## MANAGEMENT GUIDELINES

During the cooperative management planning process, a detailed boundary description should be prepared for the river area included in the National System. The boundaries of the proposed river corridor management zone should largely coincide with the visual corridor in canyon areas. In the canyon sections of segments A, C, and D, the visual corridor averages slightly over one-half mile (1 km) in width. In the flatter areas of segments A, C, and D, and throughout most of segment B, the corridor boundary should be placed approximately one quarter of a mile (400 m) back from each bank of the river.

River mileages and approximate acreages in federal, state of Utah, and private ownerships for all four segments are shown in table V-1.

Since the primary purposes of river designation are to preserve the river environment and provide for public recreation uses, additional

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10. According to the Bureau of Reclamation, by law Flaming Gorge Dam must be operated so as to maximize power production; at present BR attempts to maintain 1,200 cfs (34.0 m<sup>3</sup>/s) as the normal minimum daytime flow. However, at night and on infrequent occasions during the day, summer low flows drop to 800 cfs (22.7 M<sup>3</sup>/s) or even lower. It is believed some upward adjustment might be made if the release pattern is analyzed on a year-long or multi-year basis.

controls on land uses in the corridor will be necessary. These can best be provided through coordinated agency regulations and agreements, and, in the case of private lands, by the purchase of scenic and public access easements. Scenic easements generally bind present and future landowners to existing uses and prevent developments that detract from the natural, scenic, or pastoral character of the land.

Public access easements allow access to a river or use of a continuous strip or corridor along the shore. Generally, the width of the latter would not exceed 100 feet (30.5 m) above the river high-water line. Greater widths may be required in special circumstances.

Cultural resources on or eligible for inclusion on the National Register of Historic Places are entitled to the protection afforded by Section 106 of the National Historic Preservation Act. In addition, Section 2(b) of Executive Order 11593 directs federal agencies to exercise caution to ensure cultural resources that may qualify for inclusion on the National Register are not inadvertently transferred, sold, destroyed, or substantially altered pending a determination as to whether or not they are eligible for the Register. Accordingly, the management plans for the area should be developed in consultation with the Colorado and Utah State Historic Preservation Officers and the Advisory Council on Historic Preservation.

## PROPOSAL DEVELOPMENTS AND COSTS

No need for fee title land acquisition is foreseen as part of this proposal. However, scenic easements on an estimated 108 acres (43.7 ha) of riverfront land will cost approximately \$162,000. The two private tracts involving probable easement needs are situated in the Utah portion of segment B.

The proposed recreation developments itemized in table 3 of appendix A include improvements at the Forest Service Spillway and Little Hole boat ramps, at the Little Hole Campground, and on the Little Hole foot trail. Additional recreational expenditures would be made in segment A for signing, a visitor brochure, to control noxious weeds, and to rehabilitate the toilet at Red Creek Rapid. A new 10-unit campground and picnic site will be developed by BLM at Bridge Hollow. Plans also call for protection and interpretation of historic sites in Browns Park National Wildlife Refuge.

As a part of the Browns Park National Wildlife Refuge master plan development (improvements that are not dependent on river designation), a number of recreational and other improvements will be made. These improvements include rehabilitation of two existing campgrounds and boat ramps and construction of one new campground and boat ramp. Other developments include a small visitor center, an additional Green River bridge, and a number of miles of new and improved roads. No new river-related recreation site developments are planned within Dinosaur National Monument as a part of this proposal.

Total recreation improvement costs associated with this proposal would be \$912,650; annual additional administration, operation, and maintenance costs for recreation would be approximately \$12,000.

The total estimated easement acquisition and development costs of the proposed designation would be \$1,074,650 (1978 dollars).



Table V-1  
River Mileage and Approximate Corridor Acreage by Federal,  
State, and Private Ownerships

Ownership	Miles and Acreage	GREEN RIVER			YAMPA RIVER	Total Study Area
		Segment A	Segment B	Segment C	Segment D	
Forest Service	River Miles	9.0 (14.5 km)				9.0 (14.5 km)
	Corridor Acreage	2,880 (1,170 ha)				2,880 (1,170 ha)
Bureau of Land Management	River Miles	5.5 (8.9 km)	9.6 (15.4 km)			15.1 (24.3 km)
	Corridor Acreage	1,760 (710 ha)	3,070 (1,240 ha)			4,830 (1,950 ha)
Fish and Wildlife Service	River Miles		15.6 (25.1 km)			15.6 (25.1 km)
	Corridor Acreage		4,990 (2,020 ha)			4,990 (2,020 ha)
National Park Service	River Miles		2.5 (4.0 km)	42.5 <sup>1</sup> (68.4 km)	46.5 (74.8 km)	91.5 (147.2 km)
	Corridor Acreage		800 (320 ha)	13,600 (5,510 ha)	14,880 (6,020 ha)	29,280 (11,850 ha)
State of Utah	River Miles	0.8 (1.3 km)	3.2 (5.2 km)	1.5 (2.4 km)		5.5 (8.9 km)
	Corridor Acreage	260 (110 ha)	1,020 (410 ha)	510 (200 ha)		1,790 (720 ha)
Private	River Miles		0.8 <sup>2</sup> (1.3 km)		0.5 (0.8 km)	1.3 (2.1 km)
	Corridor Acreage		370 (150 ha)		160 (60 ha)	530 (210 ha)
All Lands	River Miles	15.3 (24.6 km)	31.7 (51.0 km)	44.0 (70.8 km)	47.0 (75.7 km)	138 (222.2 km)
	Corridor Acreage	4,900 (1,990 ha)	10,250 (4,150 ha)	14,110 (5,710 ha)	15,040 (6,080 ha)	44,300 (17,930 ha)

1. The Colorado portion of Segment C includes 23.5 miles (37.8 km) of NPS-managed river. The remainder of the segment C river mileages are in Utah.

2. Of this total, 0.5 miles (0.8 km) of river are in Utah; 0.3 miles (0.5 km) are in Colorado.



# DRAFT ENVIRONMENTAL STATEMENT



## SUMMARY

Draft (X)                      Final ( )                      Environmental Statement

Department of the Interior, National Park Service

1. Type of Action: ( ) Administrative (X) Legislative
2. Brief description of action: The Green and Yampa Wild and Scenic Rivers Study was conducted pursuant to the Wild and Scenic Rivers Act, Public Law 90-542, as amended, and the request of the Governor of Utah. The study team recommends legislative action to include a 91-mile segment of the Green River and approximately 29,120 acres of adjacent land located in the states of Utah and Colorado and a 47-mile segment of the Yampa River and approximately 15,040 acres of adjacent land in the state of Colorado in the National Wild and Scenic Rivers System, classified as 91 miles of Wild River area, 15 miles of Scenic river area, and 32 miles of Recreational river area. Administration of the Green River segments would be by the Forest Service (USDA), the Bureau of Land Management, Fish and Wildlife Service, the National Park Service (USDI), and the Utah Department of Natural Resources (Division of Wildlife Resources); administration of the Yampa River segment would be by the National Park Service.
3. Summary of environmental impact and adverse environmental effects: Inclusion of 91 miles of the Green River and 47 miles of the Yampa River and approximately 44,160 acres comprising their immediate environment in the National Wild and Scenic Rivers System will have an overall effect of preserving the existing natural, recreational, cultural, and water resource values of the rivers. Adjacent land uses would remain



relatively unchanged and scenic easements on 108 acres will prevent incompatible developments on private land. Water resource developments within the two river proposal areas and possibly upstream from the Yampa study segment will be prohibited; this may indirectly affect mining outside the study area to a limited extent. Minor disturbances to soil, vegetation, and wildlife will occur at recreational development and improvement sites.

4. Alternatives considered: In addition to the proposed action, other alternatives considered were the (1) No Action Option, (2) National Economic Development Option, (3) designation of the Yampa River only, (4) designation of the Green River only, and (5) one classification option.

5. Comments were requested from the following:

Advisory Council on Historic Preservation

Water Resources Council

Department of Agriculture

Department of Defense

Department of Commerce

Environmental Protection Agency

Department of Energy

Department of Health, Education and Welfare

Department of Housing and Urban Development

Department of Transportation

Department of the Interior:

Fish and Wildlife Service

Heritage Conservation and Recreation Service

Bureau of Land Management

Geological Survey

Bureau of Reclamation

Bureau of Mines

State of Colorado Clearinghouse  
State of Utah Clearinghouse  
Colorado West Area Council of Governments  
Uintah Basin (Utah) Association  
Colorado River Water Conservation District  
City of Golden, Colorado  
The Wilderness Society  
Western River Guides Association  
University of Colorado Wilderness Study Group  
Colorado Whitewater Association  
Sierra Club  
Colorado Open Space Council

6. Date statement made available to EPA and the public:  
Draft:  
Final:



# C O N T E N T S

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## CHAPTER VI

### DESCRIPTION OF THE PROPOSAL

#### THE PROPOSAL

The U.S. Department of the Interior proposes that the 91 miles (146.4 km) of the Green River between the Spillway boat ramp below Flaming Gorge Dam and the southern boundary of Dinosaur National Monument and the 47 miles (75.7 km) of the Yampa River between the eastern boundary of Dinosaur National Monument and its confluence with the Green be designated components of the National Wild and Scenic Rivers system, as follows.

The 15-mile-long (24.6 km) segment of the Green River from the boat ramp below Flaming Gorge Dam to the boat ramp at Indian Crossing is recommended for scenic classification.

The 32 miles (51.0 km) of the Green River from the boat ramp at Indian Crossing to the Gates of Lodore in Dinosaur National Monument is recommended for classification as recreational.

The 44-mile-long (70.8 km) segment of the Green River from the Gates of Lodore to the southern boundary of Dinosaur National Monument (0.7 mile (1.1 km) south of Split Mountain boat landing) is recommended for wild classification.

The 47-mile-long (75.7 km) segment of the Yampa River from the eastern boundary of Dinosaur National Monument to its confluence with the Green River is recommended for wild classification.

## Background

The National Wild and Scenic Rivers Act of 1968 (P.L. 90-542) created a system of wild, scenic, and recreational rivers, designated the initial components of the system, and set forth procedures by which additional rivers could be studied for possible inclusion in the system. In January 1975, an amendment to the Act (P.L. 93-621) directed that the Green River within the state of Colorado and the Yampa River within the boundaries of Dinosaur National Monument were to be studied and reported on to Congress by October 2, 1979. Due to the proximity of the two rivers, it was decided to treat them in a single study.

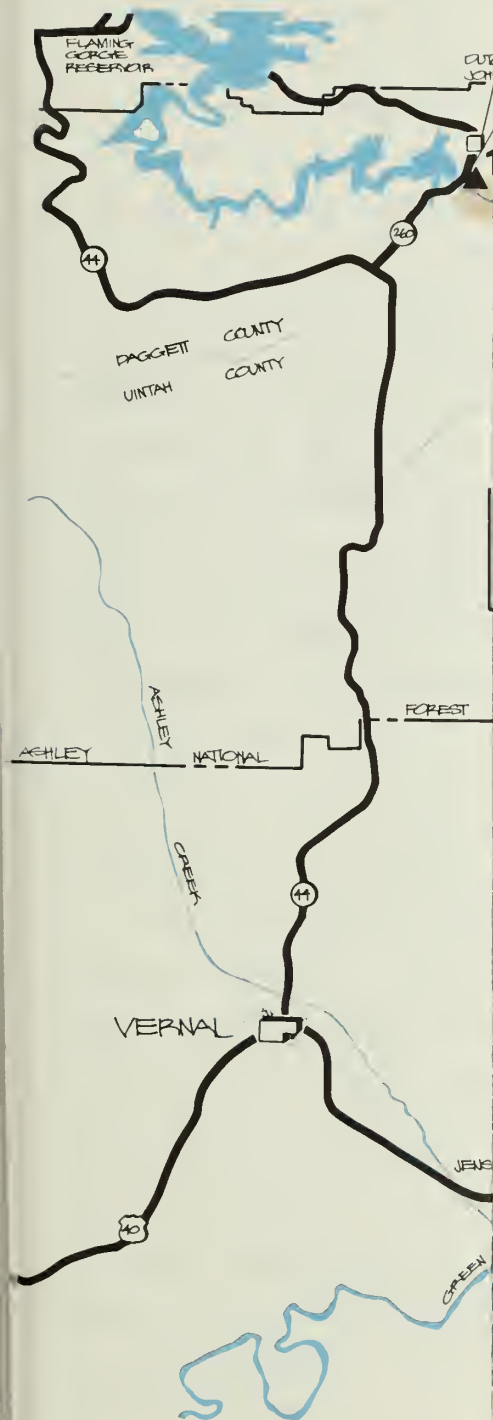
In August 1976 the Assistant Secretary of the Interior, Nathaniel P. Reed, approved Utah Governor Calvin L. Rampton's request that the Green River study be extended into Utah, both upstream to Flaming Gorge Dam and downstream to the southern boundary of Dinosaur National Monument.

## CORRIDOR AREA, ACQUISITION, AND DEVELOPMENT

Of the 44,300 acres (17,930 ha) in the river corridor, about 530 acres (215 ha) are privately owned. No need is foreseen for outright acquisition of any private lands. However, scenic easements will be acquired from the owners of two tracts on the Green River in the Utah portion of segment B. These easements, which involve approximately 108 acres (43.7 ha) of land, will be needed to prevent incompatible and visually obtrusive future developments and protect natural features. Generally, scenic easements restrict land uses to those currently being practiced. The Bureau of Land Management will acquire and enforce the provisions of the easements. The total estimated easement costs are \$162,000.

## LEGEND

- 1 SPILLWAY BOAT RAMP
  - 2 LITTLE HOLE CAMPGROUND,  
BOAT RAMP, AND TRAIL
  - 3 RED CREEK FLOAT STOP
  - 4 PROPOSED BRIDGE HOLLOW  
CAMPGROUND AND PICNIC AREA
  - 5 BROWNS PARK NATIONAL  
WILDLIFE REFUGE
- BUREAU OF LAND MANAGEMENT  
RECREATION SITES
- ▲ U.S. FOREST SERVICE  
RECREATION SITES



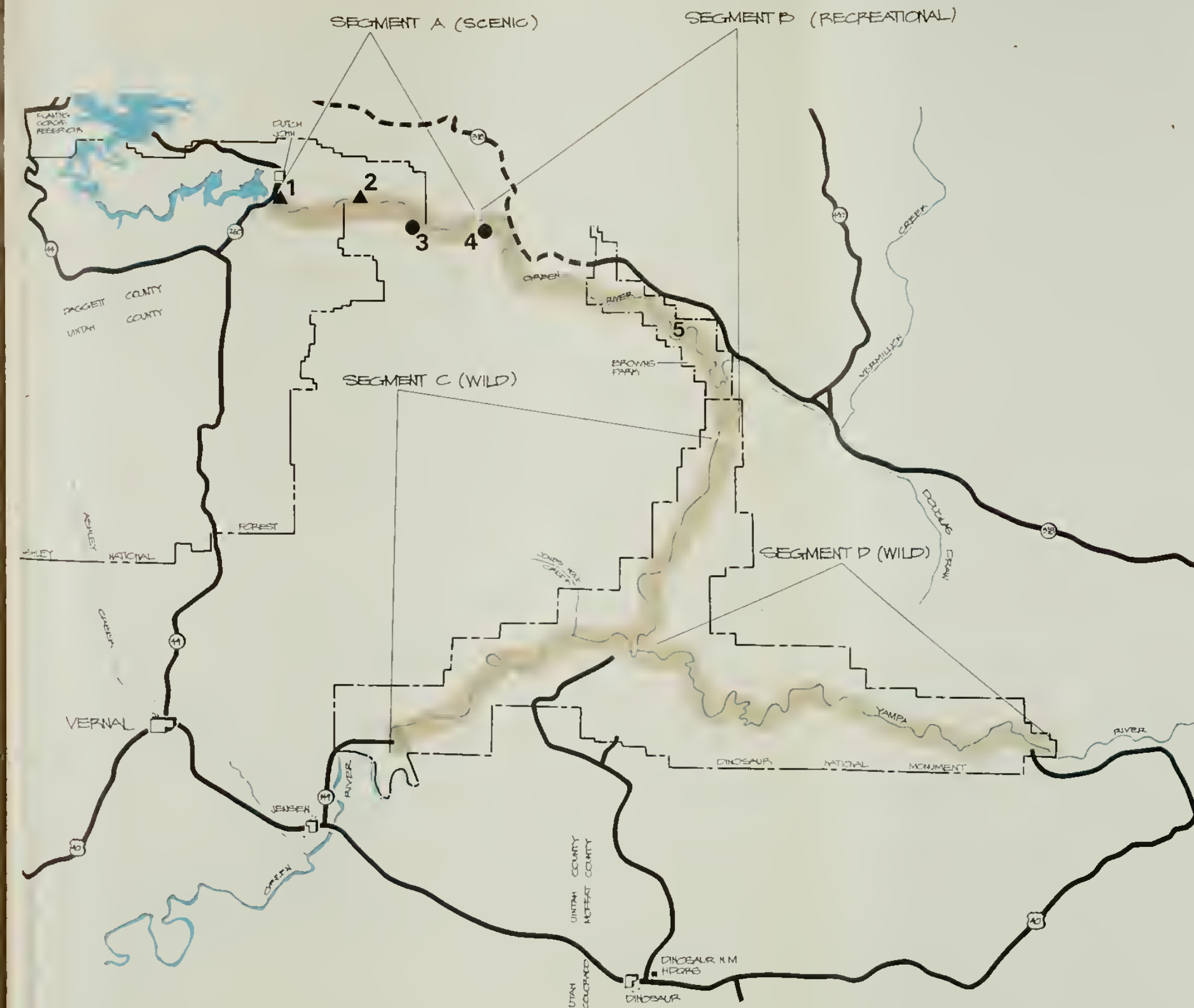
## PROPOSED DESIGNATION, CLASSIFICATION, AND RECREATION DEVELOPMENTS

GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

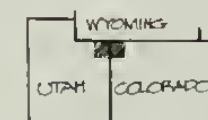
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# LEGEND

- 1 SPILLWAY BOAT RAMP
- 2 LITTLE HOLE CAMPGROUND, BOAT RAMP, AND TRAIL
- 3 RED CREEK FLOAT STOP
- 4 PROPOSED BRIDGE HOLLOW CAMPGROUND AND PICKNIC AREA
- 5 BROWNS PARK NATIONAL WILDLIFE REFUGE
- BUREAU OF LAND MANAGEMENT RECREATION SITES
- ▲ U.S. FOREST SERVICE RECREATION SITES



## PROPOSED DESIGNATION, CLASSIFICATION, AND RECREATION DEVELOPMENTS GREEN/YAMPA WILD AND SCENIC RIVER STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE  
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Some recreational developments planned by the Fish and Wildlife Service and the Forest Service under existing management plans are discussed in the section "Interrelationships with Other Programs and Projects," which follows. Additional recreation developments will be needed with Wild and Scenic River designation (see map). In segment A they involve general improvements at the Spillway boat ramp, along the Little Hole Trail, at Little Hole Campground and boat ramp (Forest Service), and at Red Creek Rapid (BLM). At Little Hole Campground, the improvements will entail rehabilitating 17 camping units, including the water system; hardening roads, spurs, trails, the parking lot, and the boat ramp; and expanding the site by constructing 30 additional units, 2 vault toilets, and additional water system. At Spillway, the boat ramp, parking area, and road will be upgraded and a foot trail and stairway will be constructed between the parking lot and the boat ramp. The Little Hole Trail, between Spillway and Little Hole Campground, will be improved. The toilet at Red Creek Rapid will be rehabilitated.

The proposal would also require that a new 10-unit campground and 4-unit picnic site be developed by BLM at Bridge Hollow in segment B. This development would include tables, grills, toilets, some shelters, parking, and a fish cleaning station. The Fish and Wildlife Service within Browns Park National Wildlife Refuge is and will be involved with historic site stabilization and preservation. As a part of this proposal, additional protection and visitor interpretation work would be done. Total recreation improvement costs associated with this proposal would be \$912,650. Annual additional administration, operation, and maintenance would be approximately \$12,000; this represents only the A, O, and M which is attributable to this proposal, and is based on agency estimates of increased costs.



The total estimated easement acquisition and development costs of the proposal are \$1,074,650.

## ADMINISTRATION AND MANAGEMENT

The entire 91-mile (146.4 km) study reach of the Green River as well as the 47-mile (75.7 km) study reach of the Yampa River will be managed in accord with classification criteria in the Wild and Scenic Rivers Act. Objectives included in these criteria are intended to:

- Preserve the river and its immediate environment, including the outstanding natural values it possesses.

- Preserve the free-flowing condition of the waters.

- Maintain or enhance the existing excellent water and air quality.

- Provide high quality recreational opportunities associated with a free-flowing river for present and future generations.

- Assure preservation of historic and archeologic values.

The U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service, and the Utah Division of Wildlife Resources will continue to administer their lands within the proposed river management zone. Adjacent lands administered by these agencies will be managed to protect the natural values of the visual corridor.

As required in the Wild and Scenic Rivers Act, a detailed cooperative management plan will be developed for the area within one year following designation. This management plan will have as its objectives the protection and enhancement of those outstanding values which qualified the rivers for inclusion into the national system. The plan will assure protection of the rivers by controlling use within carrying capacities established by the managing agencies. This plan will include coordinated and compatible agency policies relating to visitor use as well as agreements that limit land uses to those consistent with wild, scenic, or recreational designation criteria.

About three miles of unregulated motorcycle and four-wheel drive vehicle use and trails that have been established below Little Hole and above Indian Crossing in segment A will be eliminated under Wild and Scenic River management.

As part of cooperative management planning, a detailed boundary description will be prepared for the river area included in the National System. The boundaries of the proposed river corridor management zone should coincide approximately with the visual corridor in canyon areas. In the canyon sections of segments A, C, and D, the visual corridor averages slightly over 1/2-mile (0.8 km) in width. In the flatter areas of segments A, C, and D, and throughout most of segment B, the immediate river corridor boundary should be placed approximately one-quarter mile (0.4 km) back from each bank of the river. However, the visual corridor will be managed by public agencies to ensure that obtrusive developments and significant modifications of the natural environment are not permitted, even if such developments or modifications would be beyond the actual corridor boundary.

In the development of new and the improvement of existing recreation areas, planning and construction will ensure that all facilities and roads are unobtrusive and blend in with their natural surroundings as much as possible. This is especially important in wild and scenic river stretches. Recreational developments in the wild segments will be of the "primitive" type only. Except for access to boat ramps, new roads (proposed in segment B) will be kept back a reasonable distance from the immediate river bank.

Subject to valid existing rights, river segments designated as wild will be withdrawn from all forms of appropriation under the mining and mineral leasing laws as specified in section 9(a) of the Wild and Scenic Rivers Act. This will include the river bed as well as a corridor one-quarter mile (0.4 km) wide either side of the river. In scenic and recreational reaches, prospecting and mining may be conducted and mineral leases, licenses, and permits may be granted by managing agencies, subject to such conditions as the Secretary of the Interior may prescribe, as provided in section 9(b) of the Act. For the study segments of the Green and Yampa rivers, this will mean little change from present as the National Park Service, Forest Service, and Bureau of Land Management do not now permit mining or mineral exploration disturbance within the river corridors.

## INTERRELATIONSHIP WITH OTHER PROGRAMS AND PROJECTS

### Forest Service (Flaming Gorge National Recreation Area)

The Flaming Gorge Dam and Reservoir was established as a National Recreation Area (NRA) by Public Law 90-540 in 1968. The NRA incorporated a portion of the Ashley National Forest and is administered by the Forest Service under a comprehensive NRA management plan.

In the authorizing legislation, Congress directed the Secretary of Agriculture to administer the NRA in such a manner as to provide for (1) public recreation, (2) conservation of scenic, scientific, historic, and other values, and (3) such management, utilization and disposal of natural resources as are necessary and compatible with the purpose for which the recreation area was established.

An eastern arm of Flaming Gorge NRA takes in 12 miles (19.3 km) and approximately 3,600 acres (1,460 ha) of the Green River corridor below Flaming Gorge Dam. At the lower end of this area, the Forest Service and Bureau of Land Management (BLM) cooperatively administer about 4 miles (6.4 km) of the river corridor. The Forest Service-managed portion of the Red Canyon segment of the Green River is one of the most intensively used reaches in the entire study area. The Forest Service has plans to rehabilitate a toilet at the Little Hole boat ramp and pave the Little Hole access road under its existing management plans. Other plans for the Green River corridor are contained in the Wild and Scenic River proposal.

Since the Red Canyon segment of the Green is now being managed as though it were a component of the Wild and Scenic Rivers System with the area's outstanding values recognized and protected by the management plan, scenic river designation of this reach will be consistent with present NRA management policies and direction.

### Bureau of Land Management

The Bureau of Land Management manages about 80 percent of the lands in the Green River corridor between the Red Creek Float Stop in the Red Canyon segment and the Utah-Colorado state line in the Browns Park segment. The area is part of the Diamond Mountain

Resources Area. The Taylor Grazing Act of 1934 and Executive Order 10355 of May 25, 1952, have given the Secretary of the Interior and the Bureau of Land Management authority to manage, classify, and withdraw these lands for public purposes. The Classification and Multiple Use Act of September 19, 1964, provided for multiple use and sustained yield of public land products and services; this was superceded by the Federal Land Policy and Management Act of 1976 (the BLM "Organic Act"), which established public land policy and guidelines for its administration.

As set forth in 43 CFR 6,200, the BLM has the authority to preserve and protect significant natural, historic, and cultural resources, to provide for their public use, and to establish scenic corridors along rivers and streams, trails, and other lands. BLM has recognized the Green River corridor as an area with special values, and manages the area for preservation of those values and public use under a special Green River Interim Management Plan (1976). The BLM has no plans for recreational improvements or controls on use other than those in the wild and scenic river proposal and what may be agreed to and included in Wild and Scenic River management plan. Scenic and recreational river management will be consistent with present BLM management and management goals.

Utah Department of Wildlife Resources (Browns Park Waterfowl Management Area)

The Utah Department of Wildlife Resources manages a total of 1,869 acres (756.7 ha) of land and just over 6 miles (9.6 km) of Green River shoreline within the Browns Park Waterfowl Management Area. Most of this area is within the river corridor. The management area is within five separated, irregularly shaped tracts in the



upper part of the Browns Park segment and was purchased as mitigation for wildlife habitat losses connected with the development of Flaming Gorge Reservoir.

The area is managed to provide for waterfowl production, wintering, and resting. It also provides public recreation, including fishing, hunting, boating, birdwatching, and sightseeing. The area is open during duck and goose hunting season (October 1 to early January). The rest of the year, marsh and pond areas are closed to the public. However, the river and river banks are open to fishing and floating use throughout the year.

The Utah State Land Board manages one tract involving 0.75 miles (1.2 km) of river shoreline adjacent to the lower part of the Browns Park Waterfowl Management Area, near the Colorado state line.

Designation of the river with a recreational classification should be compatible with the purposes and management of the waterfowl management area and the State Land Board tract.

#### Fish and Wildlife Service (Browns Park National Wildlife Refuge)

The 14,000 acre (5,670 ha) Browns Park National Wildlife Refuge was established in 1965 to provide habitat for ducks, geese, and other waterfowl. The National Wildlife Refuge System Administration Act of 1966 constitutes the refuge "organic act"; it expresses Congressional policy and provides guidelines for the administration of the National Wildlife Refuge system. Under the Act's provisions, the Fish and Wildlife Service has complete control over access to and use of refuge lands.

The refuge is being managed primarily to provide for the production of wildlife, especially that of geese and ducks. A secondary purpose is to provide for outdoor recreation, which includes fishing, hunting, boating, camping, picnicking, birdwatching and nature study, and sightseeing. The river through the refuge is open throughout the year for boating; however, the river is closed to fishing between March 15 and June 15 to minimize disturbance to bird nesting.

The area is administered and will be developed according to a September 1967 refuge master plan. Several master plan improvements are scheduled that are not part of the Wild and Scenic River proposal. They include rehabilitation of two campgrounds and boat ramps and construction of one new campground and boat ramp, construction of additional riverside dikes for the development of new marsh areas, development of a small visitor center, and construction of a new Green River bridge which will be designed to be as visually attractive and unobtrusive as possible. Plans also call for purchase, on a willing seller basis, of approximately 1,504 acres (609 ha) of private and state inholdings within the refuge.

Designation of the Browns Park segment as a recreational component of the National Wild and Scenic Rivers System will be compatible with the purposes and management of the refuge.

#### National Park Service (Dinosaur National Monument)

Dinosaur National Monument was established by a 1915 Presidential proclamation to ". . . preserve an extraordinary deposit of dinosaurian and other gigantic remains . . ." The original area was only 80 acres (32.4 ha) in size.

A 1938 Presidential proclamation enlarged the national monument to 203,855 acres (82,532 ha). No purposes were stated for reserving this area; however, the proclamation cited "public interest" and the presence of "various objects of historic and scientific interest." Public Law 86-729 (1960) increased the monument to 206,662 acres (83,669 ha) and provided authorization to acquire land for access from U.S. Highway 40. The act of 1916 which created the National Park Service, directed the agency to "conserve the scenery and natural and historic objects and wildlife therein and provide for the enjoyment of same in such manner as will leave them unimpaired for the enjoyment of future generations." This act set forth the general objectives for management of all national parks and monuments.

In addition to preserving outstanding natural, cultural, and scientific features, Dinosaur National Monument provides high quality recreation experiences associated with use of the canyons of the Green and Yampa Rivers. In accordance with the Wilderness Act of 1964, 205,672 acres (83,268 ha) within the monument have been proposed for wilderness designation. This represents over 95 percent of the monument's total acreage and includes about 95 percent of the 91 miles (146.4 km) of river corridor in the monument. The rivers lie in the core area of this wilderness proposal and the National Park Service now manages the area as de facto wilderness by preventing degradation of the river's natural features and wilderness qualities. The 2.5 miles (4 km) of recreational river classification proposed for the reach above Gates of Lodore (lower Browns Park) is also compatible with NPS management. General guidance for management of the monument as a whole is provided by a "statement for management." A river management plan and user permit system limits and controls annual river use.

The National Park Service has no current plans for additional recreational developments in the river corridors, although one or two river campgrounds may be slightly relocated. At this time the monument's river management plan is being revised. This will probably result in the imposition of daily launch limits, reductions in the use levels permitted at most river campgrounds, specified launch dates for commercial rafters, and an increase in the permitted number of noncommercial rafters. The annual allotment of use to special interest groups will be eliminated. The types and annual amounts of river use that now occur are not expected to change significantly, although there will be some leveling out of use during the main recreation season. In addition, user impacts on certain campgrounds will be reduced slightly. Wild designation of the Yampa and Green Rivers will be compatible with present NPS management.

#### Utah State/Daggett County Highway Departments

Daggett County, with the aid of the State of Utah, has proposed to reconstruct the Utah portion of the Maybell to Dutch John road. (The Colorado portion is identified as State Highway 318.) This road provides access to segments A and B of the Green River from Highway 40 in Colorado, and from areas to the north via Utah Highway 260 and Wyoming Highway 373. A portion of this road may be realigned, and several alternatives that have been considered would place the road in the Green River visual corridor in the lower end of segment A and the upper end of segment B (Red Creek to Jesse Ewing Canyon). One alternative would closely parallel the river through much of segment A. If this portion of the Green is included in the National Wild and Scenic Rivers System, reconstruction of the road within the visual corridor will not be permitted (except at one point where it is already within the corridor), assuming a feasible and prudent alignment alternative exists.

## Endangered Species Act of 1973

Provisions of the Wild and Scenic Rivers Act concerning the preservation of outstanding values are in conformance with the Endangered Species Act of 1973 (P.L. 93-205). This act made it a violation of Federal law to take any species listed as "endangered" or to imperil the propagation or survival of such species, and established a new "threatened" classification.

The Salt Lake City Area Office of the Fish and Wildlife Service has advised that P.L. 93-205 offers full protection to the endangered fish and that its protective provisions should function independently of, or in conjunction with, protection that may be provided under the Wild and Scenic Rivers Act (see appendix B).

## Cultural Preservation

Section 10(a) of the Wild and Scenic Rivers Act states that wild and scenic river administration will give "primary emphasis" to "protecting . . . historic, archeologic, and scientific features." Cultural resources included in or eligible for inclusion in the National Register of Historic Places are also accorded the protection of Section 106 of the National Historic Preservation Act and section 2(b) of Executive Order 11593, in accordance with the Advisory Council on Historic Preservation's regulations for the Protection of Historic and Cultural Properties. A management plan for the area will be developed in consultation with the Advisory Council and the Colorado and Utah State Historic Preservation Offices. The coordinated management planning effort will include inputs from the State offices.



## Executive Orders 11988 and 11990-Floodplain and Wetland Developments

Although it appears the proposal will not involve wetlands, it does appear that recreation developments and improvements proposed at the Spillway boat ramp, Little Hole Campground and boat ramp, Red Creek Rapid Float Stop, and Bridge Hollow may lie in the 100-year floodplain. Since recreation is a permissible use of floodplains and since the facilities must be used at normal or low water stages, no practical alternative to siting them in the floodplain appears to exist. Other alternatives would entail environmental damage caused either by floaters descending to the river from the facilities or failing to use the facilities because of their inconvenient distance from the river. To the extent practicable, these facilities will be floodproofed and designed to minimize pollution during a flood.

In keeping with the provisions of E.O. 11988, public review of the proposal to develop or improve these facilities is being sought with the issuance of this report by submission to the A-95 clearinghouses. Further public involvement will be handled by appropriate management planning for the rivers and during site-specific planning. The agencies will also apply for the necessary permits and any required variances in the respective counties and states.

## Other Programs, Studies, and Mandates

The proposal is consistent with the goals of the Colorado (1976) and Utah (1972) Statewide Comprehensive Outdoor Recreation Plans and the Nationwide Outdoor Recreation Plan (Outdoor Recreation - A Legacy for America, 1973).

Two Federal resource studies are being conducted in the Yampa Basin. The first, "An Environmental Assessment of Impacts of Coal Development on the Water Resources of the Yampa River Basin, Colorado and Wyoming," is being conducted by the U.S. Geological Survey. This 2-1/2 year program is designed primarily to assess the availability and quality of the basin's water resources. It also will evaluate potential environmental and selected socio-economic impacts of energy resource development plans proposed by mining and power companies. The second effort, the "Upper Colorado Resource Study," is a two-year interagency study team program being led by the Bureau of Reclamation. This study will identify reasonable alternatives to meet water requirements for the most likely projected levels of oil shale production. Recreation and fish and wildlife enhancement, including rivers preservation, are included in the planning. The project incorporates previous investigative efforts including results of the Yellow Jacket Project, the Western Energy Expansion Study, the Lower Yampa Project Study, and others. The Green-Yampa Wild and Scenic River Study has been coordinated with these two studies, primarily to ensure consideration of the need for aesthetic and recreational river flows in the Yampa River through Dinosaur National Monument.

### Energy Developments

Energy resource development is the major industry in the Green River subregion, which includes the three-county study region (Moffat in Colorado and Daggett and Uintah in Utah). Coal, oil, gas, uranium, phosphate rock, trona (soda ash), and gilsonite are the significant minerals, and they have a major economic impact on a region-wide basis. As discussed in Chapter II, there is future potential for development of new supplies of coal, oil shale, low-grade uranium, hydroelectric power, and oil and gas.

Regionwide, the effects of future energy development are expected to be much greater than the effects on the Yampa and Green River study area, although this development may result in competition from Yampa River Basin water or the power it could generate. New and larger towns, resource recovery developments and plants, highways and railroad spur lines, electric transmission lines, and increased tourism and recreational developments will change much of the character of the three-county region and surrounding area.

### Water Resource Projects

The largest existing (or proposed) water development in the study region is Flaming Gorge Dam on the Green River. The Yampa River mainstem is undammed; however, about 50 relatively small impoundments, ranging from about 5 to 24,000 acre-feet (6,200-30 million m<sup>3</sup>) capacity, exist on tributaries. Existing and proposed projects are further discussed and displayed in chapter II under "Water Resources."

Wild and Scenic River designation would not affect or be affected by any new or proposed projects upstream from Flaming Gorge Reservoir. No water resource development projects have been proposed downstream from Flaming Gorge Reservoir, although those described in chapter II have been tentatively evaluated as a part of the Colorado River Basin Peaking Power Investigations. The effect of Wild and Scenic River designation of the Yampa on water development proposals upstream is discussed in the following chapters.

## CHAPTER VII

### DESCRIPTION OF THE ENVIRONMENT

A regional description and a description of the river corridors are given in chapters II and III of the study report portion of this document.

### DESCRIPTION OF THE PROBABLE FUTURE ENVIRONMENT WITHOUT THE PROPOSAL

The probable future environment without the proposal is described as the "No Action Alternative" in chapter XI.





## CHAPTER VIII

### ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

Inclusion of the 91 miles (146.5 km) of the Green and the 47 miles (75.7 km) of the Yampa in the National Wild and Scenic Rivers System will extend statutory protection over the entire study area, and provide long-term preservation of the river's natural and recreational values and free-flowing conditions.

The proposed action will also cause small increases in recreation use and attendant visitor impacts over those expected to occur without designation. These additional impacts will be confined to segments A and B of the Green River. The total increase in use over that anticipated with no wild and scenic river designation is estimated to be about 2 percent (3,750 recreation days).

#### LAND USE IMPACTS

##### Ownership and Management Impacts

Scenic easements, agreements in which the landowner sells the rights to make certain changes in land use which would degrade the natural values of the area, will be obtained from the owners of two tracts of private land (involving 108 acres or 43.7 ha) in the Utah portion of segment B. These easements will impact the owners by restricting uses to those currently being practiced--agriculture, grazing, and family residence occupancy. Unsightly future developments, such as large trash piles and signs will be prohibited. At the same time, the scenery, riparian vegetation,

and pastoral scenes will be protected and preserved. These easements, which will be individually written, will also prevent the lands from being developed, subdivided, or used for commercial recreation purposes. The acquisition of scenic easements could also result in minor loss of property tax revenue to Daggett County.

Implementation of the proposal will have some effects on federal and state agency management. For the Forest Service and Bureau of Land Management (segments A and B), current management direction will remain the same, because their river corridor areas are at presently being managed essentially as though they were already in the National Wild and Scenic Rivers System (see "Interrelationship with Other Programs and Projects" in the previous chapter). However, designation will provide more authority for and certainty that management decisions will be enforced. Thus, long term preservation will be assured. Designation will also result in somewhat more intensive management by the U.S. Forest Service and Bureau of Land Management. This will involve more river patrol and enforcement and eventually may require some restrictions in the amounts and types of recreation use permitted. At present there are tentative plans to impose restrictions when use reaches approximately 20,000 recreation days for floating; this plan projects a use of about 13,000 recreation days in 1990. This would require additional seasonal personnel, rafts, vehicles, and additional work by full-time employees.

Management of Utah's Browns Park Waterfowl Management Area and the Fish and Wildlife Service's Browns Park National Wildlife Refuge would be impacted primarily through the precautions and special measures that will be called for in the development of future improvements for waterfowl production and recreation use. These planned improvements, which will include additional pumps, dikes, roads, and recreation facilities, may require screening and other

measures to reduce obtrusiveness and partially restore the natural appearance of disturbed areas. Objectives and general standards for this work would be covered in the cooperative river management plan.

In both wildlife areas, but mainly in the refuge, somewhat more intensive management of river corridor recreation use will be required. This would involve some additional recreation site cleanup and increased visitor contact. Additional efforts, such as instituting patrols, educational and interpretational programs and stabilization measures, will be required to prevent vandalism and removal of materials at historic ranch and cabin sites.

Designation is not expected to affect National Park Service management of the river corridor within Dinosaur National Monument other than to require coordination with other Green River managing agencies.

### Agricultural Impacts

The proposal will, by the acquisition of scenic easements on 108 acres (43 ha) of private land, maintain those lands in agricultural, grazing, and residence use. No other effects on agriculture, including grazing, are foreseen in the corridor.

### SOILS AND VEGETATION IMPACTS

Expected additional recreation use of shorelines between the Spillway boat ramp and the Swallow Canyon boat ramp in the upper end of segment B will cause minor increases in soil erosion and compaction on about 15 acres (6 ha). Soils will also be affected at

Little Hole Campground and boat ramp, the Red Creek Rapid float stop, Indian Crossing, and at the Swallow Canyon boat ramp; these areas total about 50 acres (20 ha).

There will be temporary soil disturbances involving about 2 acres (0.8 ha) at the Spillway boat ramp, 20 acres (8 ha) at Little Hole Campground, and 10 acres (4 ha) at the Bridge Hollow Campground site for recreation facility rehabilitation and development and work on access roads and parking areas. At Little Hole, this work will include surfacing of roads and family unit areas.

The soil disturbance outlined above will also affect grasses, shrubs, and trees in segments A and B. Again, the increased impacts will be minor and losses minimal. These impacts will include a limited amount of additional vandalism and tree damage by firewood gatherers--mostly at developed recreation sites. The acquisition of scenic easements involving two tracts of private land in segment B will have the beneficial impact of protecting trees, mainly cottonwoods, from being removed within the immediate river corridor.

There will be a slight increase in the threat of wildfire; caused by increased use, the hazard involves mostly grass and shrubs. If a major fire were to occur, spreading up the canyon walls, vegetative cover, wildlife, and scenery would be altered; this impact would be major but improbable.

## MINING IMPACTS

Minerals in the corridor affected by this proposal are not present in quantities sufficient to be mined economically, and mining is not now permitted in any portion of the study area; the proposal is not expected to have any impact on mining in the corridor.

As discussed in Chapter II, there are significant oil, gas, coal, and uranium resources upstream from the study area. The implementation of this proposal may indirectly affect mining of them. Several estimates of coal production in 1990 are available. Figure R1-1 of the BLM's Northwest Colorado Coal EIS indicates an annual figure of 30-35 million tons (27-32 million metric tons). Steele<sup>1</sup> indicates the USGS Yampa River Basin Assessment is using a figure of 20 million tons (18 million metric tons) per year. To produce an estimate of maximum impacts, the larger figure was used in this analysis.

### Impacts on Electrical Power for Mining

If the Endangered Species Act does not prevent major upstream water development and the Wild and Scenic Rivers Act does, as discussed in the Water Resources Impact section, approximately 521,000,000 kwh/year of hydropower will not be generated. According to the Draft Environmental Statement on Mining and Reclamation, Westmoreland Resources Tract III, Crow Indian Ceded Area, Montana, 5,250,000 kwh is required to strip-mine one ton of coal. Thus to support production of 35 million tons (32 million metric tons), the largest amount predicted in the Northwest Colorado EIS, about 183,750,000 kwh/year would be required. This is about 35% of the output projected from the dams, but only about 5% of the output from a 500 MW coalburning plant.<sup>2</sup> Since there is

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1. Steele, Timothy Doak. "Coal Resource Development Alternatives, Residuals Management, and Impacts on the Water Resources of the Yampa River, Basin, Colorado and Wyoming." Paper available from USGS (1976).

2. Calculated by assuming the plant will be on-line 89.5% of the time, with 90% efficiency while on line.



about 1,190 MW generating capacity at area powerplants, with another 1,000 MW planned, sufficient electrical power should be available for mining from coalburning plants.

### Impacts on Water for Mining

The proposal may indirectly affect water used for coal production in the upper Yampa basin. Water use for coal production would be two kinds, that used in onsite plant operation (estimated at 12,000 acre-feet or 14.8 million m<sup>3</sup> a year in the Northwest Colorado Coal EIS), and that used in production, e.g., for coal washing and dust suppression. A range of figures for production water use was generated using various estimates<sup>3</sup>; these produced a projection of water use of 644-62,900 acre-feet (794,000-77.6 million m<sup>3</sup>) at an annual production level of 35 million tons (32 million metric tons).

These figures are in accord with the estimate of Freudenthal and others,<sup>4</sup> who cite a figure of 2,340,000 m<sup>3</sup> per million metric tons of coal mined. Their figure, which includes some irrigation for reclamation purposes, would produce 60,500 acre-feet (74.6 million m<sup>3</sup>) of annual water use for the mining of 35 million tons (32 million metric tons) of coal in the upper Yampa Basin.

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3. A report by Arthur D. Little, Inc., to the Federal Energy Administration produced the lowest figure; it stated that 6-14.7 gallons of water per ton were required. The U.S. Department of the Interior, in Water for Energy in the Northern Great Plains Area, (1975) states in Table 4-3 that production in 1980 in Wyoming of 35 million tons will require 28,400 acre-feet; of 64.2 million tons in Montana will require 78,800 acre-feet; of 59 million tons in North Dakota will require 100,000 acre-feet. These figures were used to produce the range in the text.

4. Freudenthal, D.D.; Ricciardelli, Peter; and York, M.N. Coal Development Alternatives--An Assessment of Water Use and Economic Implications. Wyoming Department of Economic Planning and Development, 101 p. (1974).

These figures deal only with water used in mining, processing, and burning coal. Two other uses of coal may also be considered; the first is gasification, and the other transport from the area by slurry pipeline. If the same figure for mining production--35 million tons or 32 million metric tons annually--is used, the 4.4 million tons (4 million metric tons) are subtracted for use in existing generating plants, then 31.6 million tons (28.7 million metric tons) would be available for gasification or transport. This would allow the production of approximately 1,250 million cubic feet (35.4 million  $m^3$ ) of gas per day, with consumptive use of up to 130,000 acre-feet (160 million  $m^3$ ) per year, depending on cooling processes; consumptive use could be only about 1/10 this level if once-through cooling were used, but about 200 percent of the river's annual flow would have to pass through the plant or plants.<sup>5</sup>

Railroads are used at present to export coal from the area; this method of transport would not be affected by river designation. If, however, the remaining 31.6 million tons (28.7 million metric tons) per year were exported by slurry pipeline, and none of the water used to transport the coal were returned to the Yampa basin, there would be consumptive use of approximately 23,250 acre-feet (28.7 million  $m^3$ ) of water per year in slurring the coal out of the basin.

Maximum water use would occur if 35 million tons were mined per year; existing plants used about 12,000 acre-feet (14.8 million  $m^3$ ); about 63,000 acre-feet (77.6 million  $m^3$ ) were used for processing and reclamation, including irrigating reclaimed land; and all the coal

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5. The figures in this and the next paragraph were generated using data from Steele, op. cit., pp. 7-10.

not used in existing thermal generating plants were used in gasification plants. Water usage for this combination of factors would total about 200,000 acre-feet per year (247 million m<sup>3</sup>). This combination of factors is unlikely, and represents the higher limit of possible water demand. More likely is a mix of coal use for thermal generation and gasification; any such combination would use less than 200,000 acre-feet (247 million m<sup>3</sup>) per year.

The flow of the Yampa river in the study area is about 1.5 million acre-feet per year (1.85 billion m<sup>3</sup>); the maximal water use figure represents about 13% of the annual flow. If depletions of this or lesser magnitude were not prevented by the Endangered Species Act, and if the Secretary of the Interior determined they would unreasonably diminish the values for which the Yampa River had been designated to the National Wild and Scenic River System, then preventing or modifying the depletions would be an effect of this proposal.

Another possible use of Yampa River water would be the production of shale oil. The main deposits, as discussed in chapter II, are in the basin of the White River. There are several estimates of the amount of water necessary to support a 1-million-barrel-a-day production ranging from 151,000 to 250,000 acre-feet (186-308 million m<sup>3</sup>) a year.<sup>6</sup> Since the White River, at the station nearest the main development area (the station is 10 miles or 16 km west of Meeker) has an average annual flow of approximately 460,000 acre-feet (500 million m<sup>3</sup>), it seems probable that the river closest to the development will be used to supply it. However, if the industry overcomes its technical problems and if it is expanded to double or

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6. Report by Little, Inc., op. cit., and unpublished data by Colorado State University.

triple the current maximum projected size, which is unlikely, designation of the Yampa River might act to prohibit substantial trans-basin diversions to the White, if the Secretary of the Interior finds such diversions would unreasonably diminish the values for which the downstream segment of the Yampa had been designated.

As stated in Chapter XI, there are uranium resources of up to 44 million pounds (20 million kg) of uranium oxide in the area upstream from the study area. While some exploration activity is going on, the only active facility in the area is the heap-leaching mill at Maybell, operated by Union Carbide. Unless new discoveries of higher-grade ore are made, the company plans to discontinue its operations in 1982 when it has extracted the available ores from tailings. This facility consumes 18 to 24 acre-feet (22,000-30,000 m<sup>3</sup>) per year from the Yampa River, as a replacement for evaporation losses incurred in concentrating the ore;<sup>7</sup> it does not discharge to the river. Since the ores of the area are relatively low-grade, any increase in mining will require concentration before the ores are transported, to reduce transportation costs.

Thus, unless a major discovery of high-grade uranium is made, it seems probable that future operations in the area will be of the same type and magnitude as the present one. It was therefore considered that impacts of river designation on water needed for uranium mining and processing upstream from the study area would be minimal.

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7. Conversation with Bob Beverely, Union Carbide Grand Junction Office, March 6, 1979.

## Impacts on Mining Resulting from Mining-Caused Changes in Water Quality

The study team considered that any limitations on effluent discharges from the upstream mining operations would be the result of existing water quality standards and efforts to protect the endangered species, rather than of this proposal.

### Summary--Indirect Impacts on Mining

In conclusion, implementation of the proposal could result in the elimination or modification of upstream water resource projects, which in turn could eliminate hydropower and water that might be needed for mineral production. This is assuming that implementation of the Endangered Species Act, which is more likely, does not first impact the water projects. There probably will be no impact on electrical power needed for mining, as sufficient power should be available from other sources.

There could be an impact on water that may be needed for mining and mineral production. This need would represent up to 13 percent of the average annual flow of the Yampa River; however, it is more likely the need would be less--possibly one quarter to one half this amount. The question as to whether this depletion would represent "a direct and adverse effect on the values for which the river might be designated" will have to be determined by the Secretary of the Interior at the time the water projects are actually proposed.

In summary, if the water is not available from the potential projects, it is unlikely that mineral production would be limited. However, production and transportation processes might have to be



modified and other sources of water sought. This would tend to increase costs of mineral production.

## WATER RESOURCES IMPACTS

### Flows Impact

Designation of the river segments will tend to preserve the existing flow patterns of the two rivers to the extent that present flows are an inextricable part of the values which caused the river to be designated to the National Wild and Scenic River System.

### Water Quality Impacts

In general, water quality will be preserved by existing laws and regulations, rather than by this proposal. The proposal will have a positive impact on water quality through calling for continuing monitoring and other efforts to see that present water quality levels do not decline. This will be covered in the cooperative management plan.

Implementation of the proposal will result in a minor increase in suspended sediments and litter in the Green River resulting from a small increase in recreation use (over the increase expected with a continuation of present management), and from additional recreation developments planned in segments A and B. In part this will stem from a slight increase in soil compaction and loss, and damage to vegetation, as mentioned earlier. Increases in suspended sediment in the Green River resulting from increased recreation use and development will not be noticeable, since below Red Creek the river gradually gathers sediment, and periodically carries a natural high suspended sediment load due to flash floods.

The increased recreation use in segment A will cause a minor increase in problems with human waste disposal. These problems would be confined to popular stopping points. Beneficial impacts on water quality are expected from construction and rehabilitation of sanitary facilities in segments A and B as a part of the recreation improvements entailed by proposal; these improvements will tend to cancel the negative impacts stated above.

### Impacts on Corridor Development Projects

The proposal will affect any water projects proposed in the river corridor, and perhaps those upstream. Those in the corridor could involve three now inactive Bureau of Reclamation development sites: Lily Park Dam on the Yampa, Echo Park and Split Mountain Dams on the Green. Public controversy essentially killed these projects in the 1950s; the powersite and reclamation withdrawals for them are being lifted. Since these projects are considered "dead," no impact on them by this proposal is anticipated.

The possible reregulating reservoir hydropower projects on segment A of the Green, described in Chapter II, will not be built if the rivers are designated to the system; however, these projects have not been proposed for detailed study and will probably not be built in any event.

### Impacts on Upstream Development Projects

No upstream projects on the Green River were identified that would be impacted by this proposal.



Designation of the river corridors would preclude federal licensing or assistance to water projects in the monument. Just below this point in Whirlpool Canyon was the site of Echo Park Dam, a Bureau of Reclamation structure that was the focus of national controversy in the 1950s. The dam would have backed water to the head of segments C and D. HCRS

Several to a number of the approximately 30 Yampa Basin water resource development projects, identified and discussed in Chapter II, could be impacted by this proposal, under certain circumstances. Any significant alteration of the flows, temperatures, or chemistry of the Yampa River caused by these projects could have an adverse impact on the endangered fish. To preserve them, the Endangered Species Act could either halt the projects or require them to be modified to eliminate the adverse impacts (see discussion under water resources impacts of the No Action Alternative in Chapter II). If this occurs, precluding the projects is an effect of present management and existing statutes, not of this proposal (see appendix B for a memorandum from the Fish and Wildlife Service on this topic).

Should provisions of the Endangered Species Act not be applied, the Wild and Scenic Rivers Act will require the Secretary of the Interior to determine if any upstream project requiring federal licensing or assistance will have a direct and adverse effect on, or unreasonably diminish, the values for which such river was established (appendix B also contains a solicitor's opinion discussing this point). If so, no federal assistance would be provided through loan, grant, or license unless the project(s) in question can be modified to eliminate significant adverse impacts. Precluding or modifying these projects would then be an impact of this proposal.

The general, undetailed information available to the study team about the projects planned upstream did not permit the kind of specific, case-by-case evaluation of which project, or combination of projects, would result in significant adverse impacts on the values for which the river was designated. That determination will have to be made by the Secretary of the Interior on the basis of more detailed project plans, when the projects are actually proposed and permits or licenses are sought from the Federal Energy Regulatory Commission.

Thus, if the Endangered Species Act does not affect upstream water development on the Yampa, designation of the river to the National Wild and Scenic River System would probably eliminate up to 521,400,000 kwh/year of potential power, and up to 600,000 acre-feet (740 million m<sup>3</sup>) of irrigation, municipal, and industrial water development. It is probable that not all development would be eliminated or would have to be modified to limit adverse impacts.

In conclusion, wild and scenic river designation may limit but probably will not eliminate additional water development in the Yampa Basin.

## AIR QUALITY IMPACTS

The proposal will have essentially no effect on designation of air quality for this area because the corridor lies in management units which are Class II floor area, i.e., areas which cannot be reassigned to Class III (maximum permissible degradation). Fish and Wildlife Service has requested reassignment to Class I for the Browns Park National Wildlife Refuge, and a task force for the Department of the Interior, acting under section 164 (d) of the Clean Air Act (P.L. 95-95) as amended in 1977, has requested Class I status for Dinosaur National Monument. The Forest Service has not taken a position on the Flaming Gorge National Recreation Area. Congress may approve these requests or remand them to the affected states. What action will be taken by Congress or the states cannot be predicted, but significant degradation of the regional air quality under either a Class I or II designation is unlikely.

As discussed below under transportation impacts, designation will probably prevent routing the Maybell, Colorado to Rock Springs,



Wyoming highway through any part of the corridor it does not now occupy. By displacing this route to a location out of the corridor, increased auto emissions from use of the highway will take place elsewhere, a beneficial impact of unknown but probably small proportion. Construction of recreational facilities in the corridor will cause small, temporary increases in fugitive dust and in air pollution from heavy equipment use.

Under this proposal the same facilities and new access roads will be constructed in Browns Park as will be developed if the proposal is not implemented; an approximate 6-fold increase in use (from about 7,500 recreation days to about 43,000 recreation days) will take place in the refuge, with concomitant increases in traffic, but the impacts are not attributable to this proposal. The expected 2 percent increase in recreation that will take place corridor-wide will cause proportionate deleterious impacts on air quality.

#### FISH AND WILDLIFE IMPACTS

By 1990, implementation of the proposal is expected to result in a 20 to 25 percent increase in the number of floaters and fishermen in segments A and B, over the use that would result without designation, i.e. from about 12,500 recreation days to about 16,300. The increase in fishing pressure will result in some reduction in fishing quality and catch-rate (mostly for rainbow trout) in these reaches. The increased use in segment A and the upper part of segment B will also result in minor increases in disturbance to wildlife, mostly big game, in the river corridor. Partly balancing these impacts will be the protection against development which the proposal gives to crucial big game winter range, by its probable routing of the Maybell-Rock Springs highway out of the corridor.

The most significant impact on wildlife will be a minor increase in disturbance to nesting waterfowl during the spring in Utah's Browns Park Waterfowl Management Area and the Browns Park National Wildlife Refuge in Colorado, but since no increases in recreation use over that which would take place without designation are expected through the two wildlife areas, this impact is not attributable to the proposal. Other expected impacts include a minor loss of streamside and island small game habitat resulting from the losses of vegetation cited earlier; about 15 acres (6 ha) of habitat would be involved. At the Bridge Hollow Campground site, there will be a disturbance of about 10 acres (4 ha) during and after development (due mostly to heavier use) that will decrease the numbers of wildlife in that immediate area.

Since the protection of habitat and species is mainly an effect of existing management, regulations, and statutes, the impact of the proposal will be slight. It will add another layer of legal protection for the fish and wildlife of the corridor, since they are among the values which would cause the river to be added to the system.

## ENDANGERED SPECIES IMPACTS

A somewhat complicated relationship occurs between water development projects, endangered fish, the Endangered Species Act, and this proposal. Past water development has resulted in altered flows both on a daily and seasonal basis, altered temperatures, altered water chemistry and the submergence of much of the habitat of the humpback chub and the Colorado squawfish, which formerly were found in most of the upper and lower Colorado River Basin, as well as in many principle tributaries. These alterations, and the competition with non-native introduced species, have contributed to the decline of the above named species as well

as the bonytail chub and the humpback sucker, which have been proposed for addition to the Threatened and Endangered List.<sup>8</sup> It is anticipated that future water development of the upper Yampa, which has been identified as one of the most important rivers for the survival of the species,<sup>9</sup> would have the same deleterious effects as past development elsewhere in the basin.

Thus, if information on a proposed development indicated that it would either adversely affect the critical habitat for the species<sup>10</sup> or would adversely affect the fish themselves, the protective provisions of the Endangered Species Act would preclude the projects or require them to be modified to eliminate the adverse effects, as discussed under water resource impacts. This assumes however, that exemptions to construct the projects would not be granted.

If the Endangered Species Act precludes or causes modification of the projects, the impacts on the water development proposals would be an effect of existing management and statutes, and not of this proposal.

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8. U.S. Fish and Wildlife Service. Colorado Squawfish Recovery Plan. Washington, D.C. (1978) pps 6-8.

9. Holden, P.B., and Stalnaker, C.B. "Distribution of Fishes in the Dolores and Yampa River Systems of the Upper Colorado River Basin," in Southwestern Naturalist 19(4), pp. 403-412, cited on p. 4 of the Recovery Plan.

10. Designation of part of the Yampa as critical habitat for the species has been proposed, but not accomplished; recent amendments to the Endangered Species Act requires that an economic analysis of the effects of such designation be made, so the proposed designation must either await such an analysis before being imposed, or be withdrawn.

If designation occurred, a finding by the Secretary of the Interior on the effects of upstream projects on the values for which the rivers had been designated would have to be made before the projects could receive federal licensing or assistance. If the Secretary did find adverse effects on these values, then precluding the licensing or requiring modification of the projects would be an effect and an impact of this proposal.

Conversely, maintaining the present essentially natural flows of the Yampa and preserving the endangered fish would also be an impact of this proposal.

Several peregrine falcon nests have been found in the study area in recent years. If future peregrine nests are identified, they are most likely to be situated in segments C or D, where the proposal will not result in any increases or significant changes in recreation use. Thus no impacts on peregrine falcon are foreseen. There are expected to be no adverse impacts on either the bald eagle (not considered a resident) or the black footed ferret (presence not established). Designation should aid endangered species, as any additional efforts needed to ensure protection will be covered in the cooperative management plan and carried out by the management agencies.

## SOCIO-ECONOMIC IMPACTS

### Social Impacts

The proposal will preserve the quality and diversity of the recreation experience in the study area. The additional protection and interpretation of cultural resources to be provided in segment B will enhance recreational values. Increased use will diminish

solitude. The improved water quality and sanitary facilities will generate beneficial health effects. Additional signing will improve recreation safety. No other substantial effects on the social environment are expected.

### Economic Impacts

Designation of the Green and Yampa as National Wild and Scenic Rivers will result in increased recreationist expenditures in the region of approximately \$60,000 annually by 1990. This increase represents about 3 percent of total expected recreationist expenditures in 1990 (about \$1,760,000). Recreation developments will cost \$912,650. An increase of \$30,000 for annual administration, operation, and management costs, including a 25-year sinking fund, will be required to accommodate increased recreation use. The increased on-site recreationist expenditures which result from this alternative will contribute \$27,000 annually to the regional economy. This impact will be felt mainly in communities in the general vicinity, particularly Craig, Vernal, and Dutch John. Among those benefitting will be raft and tackle outfitters in the Dutch John area.

Should provisions of the Wild and Scenic Rivers Act be implemented to prevent or modify the development of major upstream water development projects, there would be unknown potential losses to the regional economy probably amounting to as much as several million dollars or more per year on a continuing basis; construction funds not expended might involve \$37 million or more. This loss would occur only if these projects are proved feasible and desirable, which has not yet been determined, and if they are not altered or precluded by the Endangered Species Act. The potential income might be generated through hydropower production,



irrigation, transbasin diversion, increased cropping, and construction of water development facilities.

### Transportation Impacts

Implementation of the proposal will result in approximately a two percent increase in traffic using the Maybell to Rock Springs road (Colorado, Utah, and Wyoming) and, proportionally, a somewhat greater amount of use of several access roads from this route to the river in segments A and B, over that expected without designation. Traffic on the Crouse Canyon road between the upper end of the Browns Park National Wildlife Refuge (at Swinging Bridge) and Vernal will also increase. Increases in traffic on other roads and highways in the region resulting from designation will be insignificant.

As described earlier, Daggett County has proposed to reconstruct, surface, and partially relocate the Utah portion of the Maybell, Colorado to Rock Springs, Wyoming road. Several relocation routes that have been considered would place the road in the visual corridor of the river in the lower part of segment A and the upper part of segment B (Red Creek to Jesse Ewing Canyon). One of these alternatives would place several additional miles of road in the river corridor of the middle part of segment. If this portion of the Green River is designated, further intrusion of the road on the river corridor will probably be prohibited unless no feasible alternative exists. This could increase construction costs and the route distance somewhat.

## Recreation Impacts

The expected two percent increase in recreation use (see Table VIII-1) in segments A and B that would result from implementation of the proposal will cause small increases in crowding, user conflicts, and litter. It also will result in an estimated increase in Forest Service/Bureau of Land Management operation and maintenance costs of about \$12,000 per year, according to agency estimates.

The increased use of the popular segment A could result in the eventual imposition of user limits by the Forest Service. At present it is thought limits will be imposed when boating use reaches about 20,000 recreation days. This in turn will require additional Forest Service seasonal personnel and result in less user freedom and slightly increased use of the Flaming Gorge National Recreation Area reservoir area, but this impact is expected to take place after the planning period for this document. In segments C and D in Dinosaur National Monument, where strict user limits are in effect, use is not expected to increase. However, designation is expected to increase regional (and even national) focus on the Green and Yampa, which will result in an increase in demand for floating both rivers. This will result in a small increase in time and paperwork for National Park Service personnel to respond to and process requests for information and river use permits, and a higher percentage of disappointment for those applying for permits.

## Cultural Resources Impacts

Segment A contains no known significant cultural resources and thus such resources will not be impacted.

of the proposal will cause small increases in crowding, user conflicts, and litter. It also will result in an estimated increase in Forest Service/Bureau of Land Management operation and maintenance costs of about \$12,000 per year, according to agency estimates.

The increased use of the popular segment A could result in the eventual imposition of user limits by the Forest Service. At present it is thought limits will be imposed when boating use reaches about 20,000 recreation days. This in turn will require additional Forest Service seasonal personnel and result in less user freedom and slightly increased use of the Flaming Gorge National Recreation Area reservoir area, but this impact is expected to take place after the planning period for this document. In segments C and D in Dinosaur National Monument, where strict user limits are in effect, use is not expected to increase. However, designation is expected to increase regional (and even national) focus on the Green and Yampa, which will result in an increase in demand for floating both rivers. This will result in a small increase in time and paperwork for National Park Service personnel to respond to and process requests for information and river use permits, and a higher percentage of disappointment for those applying for permits.

### Cultural Resources Impacts

Segment A contains no known significant cultural resources and thus such resources will not be impacted.

Table VIII-1

Present and Projected Recreation Use and Impact of the Proposed Action  
on Projected Use In Recreation Days

<u>River Segment</u>	<u>Activity</u>	<u>Present Use (1976)</u>	<u>Projected Use Existing Management (1990)</u>	<u>Projected Use Wild River Proposal (1990)</u>	<u>Impact of Wild River Proposal (1990)</u>
<u>Segment A -</u>					
(Spillway to Little Hole)					
	Boating	10,100	10,100	10,100	
	Camping	9,300	9,300	9,650	300
	Picnicking	200	200	200	
	Waterfowl Hunting	200	200	200	
	Fishing	4,200	4,200	4,200	
	Walking	2,400	2,400	2,400	
(Little Hole to Indian Crossing)					
	Camping/Shore Fishing	1,650	1,650	2,950	1,300
	Fishing Floaters	800	960	3,060	2,100
TOTAL - SEGMENT A -		28,930	29,010	32,760	3,750
<u>Segment B -</u>					
(Indian Crossing to Gates of Lodore)					
	Boating	280	11,790	11,790	
	Camping	2,540	19,040	19,040	
	Waterfowl Hunting	630	5,400	5,400	
	Shore Fishing	400	500	500	
	Boat Fishing	3,600	4,500	4,500	No
	Deer Hunting	70	600	600	Impact
	Other	30	1,690	1,690	
TOTAL - SEGMENT B -		7,550	43,520	43,520	0
<u>Segment C -</u>					
(Gates of Lodore to Southern Boundary Dinosaur National Monument)					
	Day River Use	24,440	24,440	24,440	No
	Floaters Camping	13,080	13,080	13,080	Impact
	Other Camping	42,620	42,620	42,620	
TOTAL - SEGMENT C -		80,140	80,140	80,140	0
<u>Segment D -</u>					
(Yampa River in Dinosaur National Monument)					
	Day River Use	10,720	10,720	10,720	No
	Floaters Camping	8,370	8,370	8,370	Impact
	Other Camping	2,750	2,750	2,750	
TOTAL - SEGMENT D -		21,840	21,840	21,840	0
GRAND TOTAL - ALL SEGMENTS -		138,460	174,510	178,260	3,750

1. A portion of this increase will actually occur in the upper portion of Segment B.

The Browns Park segment contains a number of old cabins, various ranch structures and implements, and other historical remnants dating from the 1830s and to the 1930s, several of which are on or have been nominated for the National Register of Historic Places. Generally, these sites are either relatively well preserved and protected or are unknown and mostly untouched by the general public (i.e., buried artifacts). However, there are several old, non-register cabin and outbuilding sites that have been deteriorating or damaged due to vandalism, removal of materials for other use, and general weathering and slumping. Protective and stabilizing efforts have mostly been inadequate. The proposal and management agency plans call for increased stabilization, protection and interpretation of these sites. Despite this, an increase in vandalism and theft may take place; this is expected to be proportional to the two percent increase in use caused by the proposal. There may be some detrimental impact to the National Register sites, but it is expected to be very minor.

Designation will result in greater public knowledge of the resources in segment C and D (Dinosaur National Monument), though not in increased use. Greater interest may lead to more frequent visits resulting in a small additional amount of vandalism and removal of archeological materials from some of the sites, which include petroglyphs, rock art, Indian occupancy and storage sites, remnants of Indian artifacts, one Indian-used cave, and several historical sites.

Since implementation of the proposal could affect cultural properties on or eligible for the National Register, those parts of the area not yet adequately investigated will be surveyed to locate all extant cultural resources as a part of the agencies' management planning. Cultural resources located at that time will be evaluated against the criteria for inclusion in the National Register and nominated to the



Register if appropriate. At that time an evaluation of the proposal's effect on included or nominated cultural resources sites will be made, and comments sought from the Advisory Council on Historic Preservation pursuant to the regulations entitled "Protection of Historic and Cultural Properties" (36 CFR Part 800).

#### OTHER IMPACTS

Future powerlines, natural gas pipelines, gas production facilities, and other utility developments may have to be located in existing utility corridors, placed underground, or rerouted and kept completely out of the river corridor. This will be given further consideration during management planning, and decided when new routings are proposed.

## C H A P T E R   I X

### MITIGATING MEASURES IN THE PROPOSED ACTION AND UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

#### MITIGATING MEASURES

In accordance with the Wild and Scenic Rivers Act, a cooperative management plan will be completed after the designation of the Yampa and Green Rivers as components of the National Wild and Scenic Rivers System. This plan will include the following measures to mitigate adverse impacts.

To prevent any degradation of the values for which the Green and Yampa Rivers were designated, the amounts and types of recreational use in the river areas will be restricted to the affected environments' carrying capacity.

To reduce the potential for water and land pollution, vault toilets will be provided at all developed recreation sites that are accessible by automobiles. Any new sanitary facilities needed will be developed only after a careful study has been made to identify locations which have the least potential for soil compaction, erosion, and visual impact.

To minimize aesthetic impacts, all areas disturbed by development work at recreational sites will be restored to their original contours and re-vegetated with native species. The toilets now in use at river campgrounds in Dinosaur National Monument will be replaced by rustic structures that better conform to a wilderness setting.

To reduce the potential for litter problems, a program of "carrying out what you take in" will be stressed. If this program proves ineffective, more restrictive measures will be initiated.

To reduce the threat of fire, protective measures such as requiring firepans, limiting the use of open fires, and designating specific areas where open fires are permissible during periods of high fire risk will be instituted.

To provide for public safety and for the prevention of noise, air, and water pollution, soil and vegetation damage, wildlife harassment, and user conflicts, specific regulations concerning the use of aircraft, snowmobiles, all-terrain vehicles, and other vehicles will be enforced. Four-wheel drive and cycle roads in the vicinity of the river areas either will be closed or improved to reduce the dust and other problems that would result from increases in vehicular traffic.

To protect the scenic qualities of the area, standards for alteration of the existing environment within the study area will be developed. This will be accomplished by the acquisition of scenic easements requiring that all structures be harmonious with the natural setting, frontage setbacks, and permits from the managing agency to cut trees or clear natural vegetation.

All historic and archaeological sites will be surveyed, identified, and protected in compliance with Section 106 of the National Historic Preservation Act and Executive Order 11593, and in accordance with the regulations of the Advisory Council on Historic Preservation (36 CFR, Part 800). A combination of use limitations, protection and structure stabilization measures, and education/interpretation activities will be developed in consultation with the Advisory Council and the Historic Preservation Officers of Colorado and

Utah, in order to mitigate potential adverse effects on cultural and historic resources. In addition, the locations of particularly sensitive sites will be kept confidential.

Measures will be taken to protect the endangered American peregrine falcon, bald eagle, Colorado River squawfish, humpback chub and other significant wildlife species and to preserve their associated habitat. This may include curtailing human activity in areas that may be identified as critical habitat and in areas used by these species for breeding and rearing of their young.

To mitigate damage to vegetation, restrictions on using live trees for firewood will be imposed. Using standing dead trees will also be forbidden, so as to preserve perches for eagles and other birds. Probity will be encouraged and educational signing will also be used where necessary.

#### UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Designation of the Green and Yampa Rivers as components of the National Wild and Scenic Rivers System will cause some minor unavoidable adverse environmental impacts.

The minor increases in erosion, litter, and air, water, and noise pollution associated with development and improvement of recreation sites and increased visitation to the area will not be fully mitigated. However, these will not be significant impacts.

Future water resource development within the Yampa Basin that would unreasonably diminish existing scenic, recreational, and fish and wildlife values within the study area would be foregone. The hydropower, irrigation, municipal and industrial use, and other benefits associated with these projects would be lost.

Entry, sale, or other disposition of public lands within the corridor would be prohibited. However, the impacts of this constraint would be minor or nonexistent since such disposition is not expected by any agency. Where scenic easements are obtained, some future options for residential or commercial development of private lands along the Green will be foregone by owners.

Soils, shrubs and grasses, and associated wildlife habitat would be adversely affected during the construction and improvement of recreation facilities within segments A and B. These impacts should be largely eliminated after reseeding, replanting, and a period of stabilization.

Although soil compaction problems and minor adverse effects on fragile elements of the ecosystem, such as mosses, lichens, and wild flowers, may occur in areas of increased use, these impacts will probably not be significant. Despite more intensive management in segments A and B, a small loss of trees and tree limbs (mostly to firewood gatherers) is expected.

Even though management policies will be implemented to protect endangered wildlife, the potential for adverse impact exists. However, since most human use will occur outside breeding and rearing seasons or at limited locations, any unavoidable adverse impacts would probably be minor. Some small decreases in fishermen success, wildlife viewing opportunities, and waterfowl production within the two special management areas can be expected. Although historic and archeologic sites are already protected under existing federal laws and site protection will be addressed by the river management plan, a limited amount of vandalism, damage or removal of materials at these sites would probably accompany increased recreational use.



The threat of forest fire will increase in proportion to the number of people in the area. This threat cannot be fully mitigated. Assuming a more feasible and prudent realignment alternative exists, designation of the Green and Yampa as components of the Wild and Scenic River System will probably not permit the construction of additional roadway for the proposed Maybell-Dutch John road realignment in the visual corridor of segments A and B. This may result in slightly higher road construction costs; other unavoidable impacts may include increased travel time and costs to motorists.



## C H A P T E R   X

### RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY; AND IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION

#### RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

Existing short-term uses of the environment would remain substantially unaltered since inclusion of the Yampa and Green Rivers in the National Wild and Scenic Rivers System would ensure preservation of their free-flowing conditions and existing scenic, recreational, geologic, fish and wildlife, historic, cultural and other natural values.

Any possible short-term economic gains to be made from the extraction of mineral resources in the corridor will be foregone, partly as a result of adding the Green and Yampa to the Wild and Scenic Rivers System. Designation will also prohibit the removal of any undiscovered mineral resources in the "wild" segments. Since the entire length of the rivers is at present withdrawn from mineral entry, such gains are unlikely anyway. If designation affects upstream mineral development adversely, as discussed in chapters VIII and IX, an unquantifiable but probably limited amount of short-term gain will be lost.

Designation of the Green River in Red Canyon, Browns Park, and Dinosaur National Monument, as well as the Yampa River in the monument, will enhance the areas' long-term productivity for human

enjoyment and ecological diversity. This long-term productivity will be ensured by the maintenance of free-flowing river environments and associated natural values for future generations. Long-term economic productivity would not be affected by inclusion of the rivers in the National System except as it might hinder or halt upstream water resource development in the Yampa Basin, should the Endangered Species Act fail to do so. Since designation can be lifted by Congress if it is in the national interest to do so, such development is deferred rather than precluded by the proposal.

#### IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Since no major changes to the existing environment are planned as part of the proposal, no resources would be irreversibly or irretrievably committed. Congress could modify or reverse this designation at any time if future national priorities dictate the need to do so.

## CHAPTER XI

### ANALYSIS OF ALTERNATIVES AND THEIR IMPACTS

In 1971 the Water Resources Council developed and tested an analytical procedure for the generation and evaluation of alternative plans for water and related land resource uses. The adopted process, "Principles and Standards for Planning Water and Related Land Resources," was published in the Federal Register, Volume 38, Number 174, on September 10, 1973, as an Executive Order. Since wild and scenic rivers are a form of water planning, they must comply with Principles and Standards. This chapter presents the results of the Principles and Standards Analysis for six alternative plans for the Yampa and Green River segments found eligible for inclusion in the National Wild and Scenic Rivers System. For further description of this analysis, see appendix A.

#### PROCEDURE AND PURPOSE

The analysis was conducted to provide a basis for recommendations on including or excluding eligible study segments of the Yampa and Green Rivers in the National Wild and Scenic Rivers System, by comparing the effects of each alternative plan. Comparison of alternative plans is accomplished by analysis and measurement of the advantages and disadvantages of each plan in a system of four accounts. These accounts, or general categories of effects, are national economic development, environmental quality, regional development, and social well-being. The effects in these four accounts are then compared to see how the various plans can be improved to achieve the particular purpose for which each plan is



intended. By comparing these modified plans to each other, and to the No Action Alternative (a projection of what is expected to happen in the area if current management is continued), a recommended plan is prepared to optimize total environmental and economic contributions resulting from a proposal. These comparisons are summarized in tables XI-2 through 5 at the close of this chapter.

The procedure is designed to present to decision makers a range of alternative plans, together with a display of all their significant effects and interrelationships. The planners present facts, analyses of facts, and consequences, while reserving options and decisions for appropriate officials.

## ALTERNATIVES FOR THE FUTURE

Each of the following alternatives, displayed in Table XI-1, is presented by showing the projected future effects of its having been chosen for implementation. Taking "no action," i.e. continuing present management, is also an option which can be chosen after the completion of this study. The effects and impacts of each alternative are those which differ from the effects and impacts of the No Action Alternative; the effects of the No Action Alternative in turn are projected changes from the present state of affairs in the area.

## NO ACTION ALTERNATIVE

The effects of selecting this alternative are presented both as a standard of reference to which alternatives can be compared, and as a future option which can be chosen. The plan portrays the

Table A1-1  
Classification Alternatives, Yampa and Green Rivers

Segment	River	Miles	No Action	NED Alternative <sup>1</sup>	EQ Alternative 1 <sup>2</sup>	EQ Alternative 2 <sup>2</sup>	EQ Alternative 3 <sup>3</sup>	EQ Alternative 4 <sup>4</sup>
A	Flaming Gorge Dam to Green Indian Crossing boat ramp (Red Canyon)	15 (24.6 km)	No classification	No classification	Scenic	Scenic	Scenic	No classification
B	Indian Crossing boat ramp to Gates of Lodore in Dinosaur National Monument (Browns Park)	32 (51.50 km)	No classification	No classification	Recreational	Scenic	Recreational	No classification
C	Gates of Lodore in Dinosaur National Monument to southern boundary of monument, 0.7 miles (1.1 km) south of Split Mtn. Landing (Lodore-Split Mtn. Canyons)	44 (70.8 km)	No classification	No classification	Wild	Wild	Wild	No classification
D	Yampa River Within Dinosaur National Monument (Yampa River Canyons)	47 (75.7 km)	No classification	No classification	Wild	Wild	No classification	Wild

1. National Economic Development option, which is based on increased recreational development and use.
2. EQ (Environmental Quality) Alternatives 1 and 2 reflect differences between the federal agencies and Colorado Department of Natural Resources Findings.
3. This alternative entails designation of the Green River segments only, at the most protective classification level possible based on present conditions.
4. This alternative entails designation of the Yampa River segment only, at the most protective classification level possible based on present conditions.

effects likely to occur in the study area if no action is taken under this study and current management continues; it thus represents the probable future environment in the area.

Upstream from the study area, intensive mineral development would take place, particularly of coal. The population boom now being experienced in western Colorado would continue, in part causing an increase in pressure on the recreational resources of the study area. There would be pressure to build a number of upstream dams on the Yampa River or Yampa tributaries, but some of these, probably the largest ones and those closest to the study area, would probably be precluded or have their operation modified by the implementation of the Endangered Species Act. Water and air quality would continue to be high, due to existing regulations. The study team assumed that current management and public activities in the river area would continue without substantial changes in direction or focus.

Recreation will continue to be a major resource use. In 1976 a total of approximately 139,000 recreation days<sup>1</sup> of use were reported in the 138-mile (222.2 km) visual corridor of river segments A, B, C, and D. Under the No Action Alternative, it is projected that recreational use of the river corridor will be approximately 175,000 recreation days by 1990. Camping, wildfowl hunting, and floating will probably constitute the majority of the increase in participation.

Most future recreation development will take place in the Browns Park National Wildlife Refuge portion of segment B. In the master plan for management of the refuge, the U.S. Fish and Wildlife

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1. A recreation day is defined as an individual's participation in recreation activities for a reasonable portion or all of a 24-hour period. All recreation use and values thereof are given for recreation days in this analysis.

Service proposes to rehabilitate two boat ramps, construct one new boat ramp, construct a mini-interpretation center, relocate the headquarters, rehabilitate two campgrounds, develop a new campground, and develop about 50 miles (80 km) of new access roads. Other developments planned for the refuge include a new Green River bridge and additional riverside dikes for the creation of new marsh areas.

Although they plan no new major developments, the National Park Service and Bureau of Land Management will continue to focus on providing a quality recreation experience as a major management objective for the areas they administer. The Forest Service plans some rehabilitation of the Little Hole boat ramp; and realignment and paving of the Little Hole access road.

Choosing this alternative is expected to have the following impacts:

#### Land Use Impacts

Land uses in the corridor are expected to remain virtually unchanged, with the exception of grazing in Dinosaur National Monument, which will be gradually eliminated. The 160-acre (65 ha) Mantle Ranch on the Yampa will eventually be obtained by the monument, but no prediction of when it will can be made. When it does, plans call for preserving the buildings as exhibits and allowing the fields to revert to natural vegetation. It is expected that the two private properties in the corridor in Segment B will not be subdivided, and will continue to be used for grazing, agriculture and personal residence.

No other impacts on agriculture are foreseen under this alternative.

Paving the Little Hole Access Road in segment A, described above, will impact about 5 acres (2 ha) of land in the corridor (most of the aligning and pavement work is not within the corridor).

Improvements described above for the refuge will alter the use of the land on an unknown acreage, estimated to be less than 40 (16 ha) for the campgrounds, headquarters and boat ramp. Development of about 50 miles (80 km) of new access roads will alter approximately 360 acres (145 ha) of land in the immediate vicinity (assuming a 60-foot or 18 m right of way). Use of the refuge will still be wildlife production, habitat protection, and recreation.

This alternative might allow the siting of the Maybell, Colorado to Rock Springs, Wyoming highway in the river corridor in the lower part of segment A and the upper part of segment B. One alignment would parallel the river for more than 4 miles (6.5 km). The managing agencies do not prefer this alternative alignment, but if selected, it would degrade the scenery and alter land use on about 75 acres (30 ha) of land, with a corridor of influence, due to relatively high speed traffic, extending approximately 0.5 mile (0.8 km) on either side of the road.

### Soils and Vegetation Impacts

Under this alternative, soils and vegetation would be disturbed, altered, compacted, or lost at the development sites cited above, for a total disturbed acreage of about 480 acres (190 ha). Though these sites will concentrate human use at areas prepared to receive it, some compaction of soils and loss of vegetation is to be expected at popular undeveloped stopping points along the rivers, many of which are subject to daily or seasonal flooding. Impacts on these



undeveloped stopping points, which total about 10 acres (4 ha), are not expected to be serious. At the developed sites, regeneration of vegetative species sensitive to trampling will be interfered with and possibly cease, leading to the succession of less sensitive species. Some increases in erosion are also expected at these developed sites, which will peak during and just after construction and diminish as vegetative cover reestablishes itself.

### Mining Impacts

The No Action Alternative would not impact mining in the corridor; it is now prohibited by a variety of reclamation, powersite, and other withdrawals. If these withdrawals are abrogated and are not replaced with others, mining in the corridor would be possible but improbable, due to the apparent lack of minerals in amounts that are economical to mine.

This alternative would impact upstream mining to the extent that expected and current regulations on air and water quality could slightly increase the costs either of mining or of consuming the minerals. Maintenance of flows for endangered fish could also impact mining; see the discussion of the environmental impacts of the proposal in chapter VIII.

Since coal mining is the primary mineral development expected upstream, and the coal is mostly to be stripped, little impact from water pollution at the mines is expected. Class I air designation, discussed below, may impact the burning of coal for power, but the power plants are 50-70 miles (80-110 km) away. In the absence of regional air-flow models it is not possible to predict how much of the pollution might drift to the monument and refuge. It is therefore not possible to predict whether these designations would

preclude the burning of coal, so it is not possible to project increases in the cost of mining necessitated by transporting it to another region where it could be burned.

### Water Resource Impacts

This alternative would tend to preserve water quality, by virtue of existing statutes and regulations. Some minor decreases in water quality due to increased recreation use are expected; these will be partly mitigated by improved sanitation measures called for in management plans by the BLM, Forest Service, and Fish and Wildlife Service.

The Federal Energy Regulatory Commission (FERC) has recently issued a preliminary permit to the Colorado River Water Conservation District to investigate the feasibility of the proposed Juniper-Cross Mountain water project on the Yampa mainstream.<sup>2</sup> Also, a preliminary permit application was submitted to FERC (then the FPC) in November of 1975 by the Vidler Water Tunnel Company and the City of Golden for the Sheephorn Project. It is possible that these projects will be modified or precluded if they conflict with the preservation of endangered fish species in the Yampa and Green Rivers protected under the Endangered Species Act of 1973 (P.L. 93-205). Any significant alteration of existing Yampa and lower Green River flows through Dinosaur National Monument would probably have adverse effects on endangered fish species, as well as the wilderness, and possibly the recreational values of the river corridor. The adverse impacts on the fish could arise from consumptive use of the water, if it were developed for irrigation or exported from the basin; from chemical changes caused by

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2. Preliminary Permit, Project No. 2757 (Juniper-Cross Mountain Project), Federal Power Commission, 1977.

evaporative concentration and the addition of fertilizers to return flows; from altered temperatures resulting from storage in dams; from altered flow patterns caused by fluctuating daily releases or from altered seasonal and daily regime (e.g., fluctuating releases from a hydro-electric plant and reservoir).

Thus, if critical habitat designation is applied as expected, or if adverse effects on the fish would ensue, the restrictive provisions of the Endangered Species Act would be brought into play. Unless exemptions were granted, this would require the projects not to be constructed or to be modified so as to eliminate the adverse effects on the endangered species. If this occurs, impacts on the water resource projects would be an effect of the No Action Alternative.

Other major projects, or combination of minor projects whose impacts on the fish were adverse, could also be affected by this alternative.

The impact of this alternative on modifications of the Flaming Gorge Dam to produce more hydropower cannot be stated; it is dependent on project feasibility, which is still to be studied, and on the Forest Service position, which has not been enunciated.

### Fish and Wildlife Impacts

Under existing management, fish and wildlife would generally be preserved. Fish reproduction should improve due to penstock modifications at Flaming Gorge Dam; these modifications and the release of warmer reservoir waters they permit may have a positive effect on endangered fish below the confluence with the Yampa River, extending their habitat back upstream into traditional areas.

Increased recreation may drive species of birds and wildlife that are sensitive to human disturbance out of the corridor and may cause increases in disturbance to nesting waterfowl, particularly in the Browns Park area. Road construction and recreation improvements will displace species inhabiting the disturbed areas. Use of new roads will increase road kills; the amount of increase would not be great but is not known.

Gradual elimination of grazing in Dinosaur National Monument, and the recent elimination of feral horses, will have a positive effect on wildlife in and near the monument; bighorn sheep, whose diet may overlap with that of the horses, and which are subject to infestation by lungworms from domestic sheep, will be the chief beneficiary.

### Socio-Economic Impacts

Social. The social environment is not expected to change significantly as a result of continued existing management in the river corridor. Life, health, and safety are not expected to be altered by this alternative.

Economic. The expected additional recreation use under the No Action Alternative will yield a net increase of approximately \$379,000 in on-site recreationist expenditures by 1990.<sup>3</sup>

The recreation and wildlife developments described are expected to cost \$4.6 million. Total annual administration, operation, and

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3. On-site recreationist expenditures are used in this analysis to measure the economic value of recreation use for each option. Additional information on recreationist expenditures is detailed in appendix A.



management costs (AO&M), including a 25-year sinking fund, are expected to increase by about \$137,000. On-site recreationist expenditures are expected to contribute about \$101,000 annually to the regional economy.

As discussed above, as a result of the Endangered Species Act, construction of the Juniper-Cross Mountain Project, the Sheephorn Project, and others might not be possible under this alternative. The Juniper-Cross Mountain Project is expected to cost about \$37 million, and to generate \$2.7-4.5 million annually from power production. Information on the cost of the Sheephorn Project was not available; power generation, some of which would be out of the region, is expected to be about 15 percent higher than that from the Juniper-Cross Mountain project. Costs and outputs, either of power or farm production, for other basin projects are not available, so it is not possible to predict the effect of this alternative on them, if their construction is in fact prevented under this alternative.

Transportation. The expected 25 percent increase in recreation under this alternative by 1990 will cause a proportionate increase in traffic on roads serving the river corridor area in segments A and B.

### Air Quality Impacts

The Clean Air Act, as amended in 1977 (P.L. 95-95) made the monument, national recreation area, and refuge "air quality Class II" areas, with the option of reassignment to Class I (least permissible degradation) if maintenance of air quality is an important part of the visitor experience. The refuge has requested reassignment to Class I; a Department of the Interior Task Force



has recommended the monument be a Class I area; the Forest Service has not yet determined whether or not to request Class I status for the recreation area. Since these areas cannot be reassigned to Class III, significant degradation of the air is unlikely under this alternative.

Assignment to Class I may have a greater influence than the present Class II on the siting of area coal burning plants; as stated above, none are planned closer than 50 miles (80 km) from the area, and no information on pollution dispersal is available, so the extent of this impact cannot be qualified.

The No Action Alternative would have two local impacts on air quality. Since, under this alternative, the Maybell to Rock Springs highway could be sited in the corridor, increased auto traffic on the alignment would increase auto emissions and noise in the river corridor. In addition, under this alternative (as well as under several others) the construction of about 50 miles (80 km) of new access roads in Browns Park Wildlife Refuge would be undertaken. Use of these roads would cause increases in emissions and fugitive dust in the corridor. Since the projected increases in visitation with this option are about 36,000 visitor days over present use, these impacts are not expected to be serious.

### Recreation Impacts

The increase of about 36,000 recreation days in segments A and B predicted to occur by 1990 under this alternative will have a number of effects. Solitude will be diminished somewhat, and in consequence the type of recreationist may alter to a more crowd-tolerant type. The possible exodus of human-sensitive

species from the corridor mentioned above may diminish opportunities for wildlife watching and thus lower the quality of the recreation present now. In general, the quality of the recreation experience and the diversity of recreation environments will be preserved by agency policy.

### Cultural Resource Impacts

Particularly in the Browns Park segment there are outstandingly remarkable cultural resources, including sites on or eligible for the National Register. Agency management plans call for increased stabilization and protection of these sites. However, the projected 25 percent increase in recreation use may cause increases in vandalism and theft at these sites; this will be partly counterbalanced by increased efforts for education, interpretation, and site stabilization.

### Other Impacts

This alternative would not require that additional rights of way for utility lines, pipelines, etc., be sited out of the corridor; there is thus a possibility that the scenic quality of the corridor could be degraded by future positioning of such utilities.

## NATIONAL ECONOMIC DEVELOPMENT ALTERNATIVE

This plan, which does not involve wild and scenic river designation, is designed to satisfy one of the two major objectives of a Principles and Standards Analysis--national economic development. The basis of any national economic development option is twofold: increase output of goods and services, and

increased economic efficiency in the production of goods and services. Comparing the effects of a national economic development plan to an environmental quality plan can reveal a portion of the opportunity cost<sup>4</sup> of the environmental quality plan.

There is little that federal or state governments can do to promote rapid or maximum economic growth within the study area beyond that which is already expected, as described in the No Action Alternative. Since the greatest economic resource in the visual corridor is the provision of recreation services, this option increases the output and the efficiency of providing recreation services. It results in diminished environmental values if the environmental values conflict with economically beneficial objectives.

Under this alternative, recreation services will be expanded to provide for a total of approximately 274,000 recreation days<sup>5</sup> by 1990, an increase of about 99,000 recreation days over that shown for the No Action Alternative. The difference between this plan and the No Action Alternative in the amount of use expected by 1990 is well within the unmet demand for recreation services in the region (see appendix A, table 1).

Increases in recreation use are projected in the Bridge Hollow area of segment B and in Dinosaur National Monument. In 1976, the Bureau of Land Management recorded 7,200 recreation days of use on public lands in the visual corridor. This plan proposes the

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4. Opportunity cost is the monetary or other advantage surrendered for producing one commodity at the expense of another commodity.

5. Use figures include all use at vehicle-access campgrounds along the Green and Yampa Rivers, not just boater use.

development of a 10-unit BLM campsite, a 4-unit picnic site, a fish cleaning station, and potable water supply to help provide for an increase of 12,000 recreation days of use by 1990.

River recreation use in Dinosaur National Monument has been limited by the National Park Service to prevent environmental degradation. An increase of 91,000 recreation days of use over the 1976 use of 102,000 recreation days could be accommodated with existing developments, with impacts described below.

### Land Use Impacts

The National Economic Development Alternative will have essentially the same impacts as the No Action Alternative; land uses will remain the same, but the intensity of recreation use will increase. The facilities described above to serve this level of use will impact an estimated 15 additional acres (6 ha) of BLM lands, converting these lands to recreation use from their present use--grazing and small animal habitat.

Land use impacts in the monument, with these levels of use, would still take place at the extant river camps; no new acreage would be disturbed. Impacts on these intensively used campsites are described under soils and vegetation impacts and recreation impacts.

### Soils and Vegetation Impacts

Construction of the additional facilities on BLM lands in segment B would disturb the soils and vegetation on about 15 acres (6 ha); principal species involved would be willow, tamarisk, cottonwood,

sagebrush, and greasewood. There would be minor increases in erosion, particularly during construction, which would mostly end after the site revegetated; soils would be compacted by use. The regeneration of sensitive vegetation would be interfered with, leading to the succession of hardier species.

The large increase in recreation use at river campsites in the monument would have deleterious effect on those sites. Use levels almost double the present amount would largely preclude the regeneration of campsite vegetation; this in combination with unauthorized use of vegetation for firewood would eventually almost denude the camps, leaving hardpacked soils devoid of most shrubs and many trees. Erosion of these soils would increase to an unknown degree. About 500 acres (200 ha) would eventually be affected.

### Mining Impacts

This alternative would have the same impacts as the No Action Alternative on mining.

### Water Resources Impacts

The National Economic Development Alternative would have the same impacts as the No Action Alternative on water resources, except for decreases in water quality caused by greatly increased recreation use. Slight increases in turbidity would be registered during, and to a lesser extent after, construction of the BLM facilities. Similar increases in turbidity would also result from the erosion of damaged campsites in the monument. Exfiltration of fecal pollution from heavily used toilets at the monument sites would occur to an unknown but probably minor degree.



## Air Quality Impacts

This alternative would have impacts of the same type as the No Action Alternative, but the increased use would produce slightly increased amounts.

Overall, the alternative will produce approximately a 65 percent increase in recreation use over the No Action Alternative, with concomitant increases in auto emissions on roads leading to the monument and to the BLM portions of segment B. Increases in fugitive dust and emissions are not predicted for other portions of the study area, since the increased use is not predicted to take place in them.

## Fish and Wildlife Impacts

Disturbance of 15 acres of habitat to construct the BLM facilities will temporarily displace most species from the area, and permanently displace sensitive species. It is expected that most species of wildlife would desert the monument sites under this alternative as they deteriorated; songbird species, some raptors, deer, and bighorn sheep would be most affected. Some highly tolerant species like field mice, chipmunk, and skunk, would likely continue to inhabit the camp areas, subsisting on food scraps, but the impact of this alternative would generally be negative in the approximately 500 acres (200 ha) of monument sites.

Increased recreation use (more than double "no action" amounts for the BLM areas and almost double for the monument) would cause proportionate increases in disturbance of wildlife of all species in the corridor. This might result in disturbance of nesting peregrine falcon, but it is anticipated that recreation use would be curtailed

at nesting time if disturbance occurred. Since fishing is not generally done by river users in the portions of the monument inhabited by the endangered fish, negative impacts on the fish are not expected.

### Socio-Economic Impacts

Social. With the National Economic Development Alternative, these impacts would be the same as those of the No Action Alternative, except that development of a purified water supply in the Bridge Hollow area on BLM lands would be a beneficial impact.

Economic. The increase in recreation use discussed under recreation impacts will result in an increase of about \$1,256,000 (73 percent) in on-site recreationist expenditures over current expectations.

The recreation developments described under recreation impacts will cost \$48,500. An increase of \$294,000 for annual administration, operation, and management costs, including a 25-year sinking fund, is required by this plan to accommodate increased recreation use. The regional development impact of the increased number of on-site recreationists is expected to contribute \$513,000 annually to the regional economy. Otherwise, the economic and regional development impacts expected are those described in the No Action Alternative.

Transportation. The increases in recreation (approximately 65 percent above the no action increases) described above would cause proportionate increases in traffic loads on highways leading to the monument and BLM lands in the corridor. Otherwise the effects are those described for the No Action Alternative.

## Recreation Impacts

The increases in recreation predicted under the National Economic Development Alternative will seriously degrade river camps (up to about 500 acres or 200 ha) in the monument, lowering the quality of the recreation available. Most of the corridor in the monument will not be affected. The solitude of the recreation experience now available in the monument will be largely lost when use essentially doubles; frequent contact between recreators will probably cause wilderness-oriented recreationists to be replaced by socially-oriented boaters. Availability of permits for non-commercial river trips would probably increase under this alternative, lessening competition for them. Otherwise, effects will be similar to those described in the No Action Alternative.

## Cultural Resource Impacts

A 65 percent increase in recreation use will cause proportionate increases in damage to historic and cultural sites, despite protection accorded National Register and National Register-eligible sites. Impacts will be similar to those of the No Action Alternative, but will be concentrated where the use is expected: the upper portion of segment B and in the monument.

## Other Impacts

Like the No Action Alternative, the NED alternative would have no effect on siting utility lines in the river corridor.

## ENVIRONMENTAL QUALITY ALTERNATIVES

All of the following alternatives offer long-term preservation to the outstandingly remarkable river values of the Green and Yampa Rivers in the study area by designation to the National Wild and Scenic River System. Environmental Quality (EQ) Alternative 1 would preserve the four river segments at the level of classification the federal study team agencies find they now qualify for. EQ Alternative 2 would designate three of the segments at the same level as EQ 1, but would classify the Browns Park portion of the Green (segment B) as a scenic river area, which the Colorado Department of Natural Resources finds it qualifies for. EQ Alternative 3, the "Green River only" alternative, would preserve segments A, B, and C at the levels the federal agencies find they classify for; segment D would receive no designation. EQ Alternative 4, the "Yampa River only" alternative, would designate only segment D.

During the planning process, the study team considered two other EQ alternatives which would have involved environmentally enhancing segments A and B, so they could be classified as a more restrictive level. These were discarded due to complications and possible delays in management and development planning, and possibly in designating the rivers to the system. They also posed possible inconsistency with Wild and Scenic Rivers Act requirements. The enhancement measures included burying or relocating powerlines, installing submersible pumps, and screening other intrusions. These measures can be taken by managing agencies whether or not the rivers are designated. If they are taken after designation, the managing agencies could then reclassify the areas by amending the management plan.

ENVIRONMENTAL QUALITY ALTERNATIVE 1

EQ Alternative 1 is the recommended plan; its effects and impacts were described in chapters VI and VIII.

ENVIRONMENTAL QUALITY ALTERNATIVE 2

EQ Alternative 2 will designate study segments A, C, and D at the classification levels agreed upon by the entire study team. Study segment B would be classified at the scenic level, for which the Colorado Department of Natural Resources finds the segment qualifies. The proposed classification for each segment follows:

<u>Study Segment</u>	<u>Classification Level</u>
Segment A, 15 miles (24.6 km)	Scenic
Segment B, 32 miles (51.0 km)	Scenic
Segment C, 44 miles (70.8 km)	Wild
Segment D, 47 miles (75.7 km)	Wild

This alternative would utilize the same facilities called for in the proposal, EQ Alternative 1, and envisions the same level of recreational use (a 2 percent increase over the No Action Alternative, or a total of about 178,500 recreation days); its primary difference from that plan would be in requiring screening and other environmentally protective measures for future developments proposed under the existing master plan for the Browns Park National Wildlife Refuge.

This alternative, like the other EQ alternatives, offer long-term statutory protection to the outstandingly remarkable values of the river areas.





# ENVIRONMENTAL QUALITY ALTERNATIVE 2

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UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
NATIONAL PARK SERVICE  
WSRS 120.060  
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## Land Use Impacts

EQ Alternative 2 would have the same impacts as the proposal, described in chapter VIII, including the acquisition of scenic easements on 108 acres (43.7 ha) in segment B, in order to preserve current land uses and prevent deleterious changes. Its chief difference from the proposal would be in the impact it would have on planned Fish and Wildlife Service improvements under the refuge master plan. While no enhancement of present refuge structures would be necessary, the scenery of the area would have to be preserved by requiring more restrictive measures in constructing future developments. It would be necessary to screen or otherwise esthetically modify some future developments or perhaps construct them out of the river corridor. The latter would mainly apply to proposed refuge roads. It is not known how many miles of the proposed approximately 50 miles (80 km) of new access roads in the refuge are planned for the corridor, so it cannot be predicted how many miles of these roads would have to be located out of the corridor, or, if within it, screened to minimize scenic impacts from the river. This alternative could also preclude the development of an additional bridge over the Green River within the refuge.

## Soils and Vegetation Impacts

Location of some of the access roads outside the corridor would produce less impacts than the proposal on soils and vegetation; compared to the proposal, this would involve up to about 360 acres or 146 ha that would be left undisturbed (assuming no new roads were constructed in the corridor). Impacts from facilities that must be located in the corridor, such as pumps and ponds, would be the same as the proposal. Vegetation screening measures would



Alternative 2 would require screening or submersible units to be installed during the construction of future developments in Browns Park. HCRS

produce an increase in shrubs, brush and trees--most probably, willow, tamarisk, and cottonwood--along an unknown portion of the new roads and around recreational developments. This is estimated to total 100 acres (40 ha) of less.

### Mining Impacts

These impacts would be the same as the proposal--mining is now prevented in the corridor and would continue to be. Upstream impacts are more fully discussed in chapter VIII.

### Water Resource Impacts

Siting some proposed developments out of the corridor and screening others that lie within it would produce some improvements in water quality, as compared with the proposal. Sediment production from construction and use of the facilities would be approximately the same as the proposal, but would take place at a greater distance from the river, so smaller increases in turbidity would take place. Screening would tend to retard and absorb runoff, also abating turbidity. These effects are expected to be slight.

Other impacts on water resources are predicted to be the same as those of the proposal.

### Air Quality Impacts

Compared to the proposal or the No Action Alternative, EQ Alternative 2 would have a small positive effect on air quality.

Location of an unknown amount of new access roads out of the river corridor would decrease vehicular travel in segment B by concentrating it around existing access points. This would have the effect of reducing auto emissions and fugitive dust. This effect is expected to be minor, and impacts on the other three segments are expected to be the same as those of the proposal.

### Fish and Wildlife Impacts

Decreasing the mileage of new access roads in the corridor of segment B will have a generally positive effect on fish and wildlife. As compared to the proposal or the No Action Alternative, there will be less disturbance of wildlife by vehicles, and fewer road kills. The slight beneficial impact on water quality discussed above is not expected to have a noticeable effect on fish.

Screening measures, if implemented, would slightly increase the habitat for brush and tree-dwelling species, i.e., lazuli buntings, warblers, other songbirds, squirrels, and predators such as coopers hawk and prairie falcon. These improvements would take place on an unknown acreage, probably less than 100 (40 ha), so the net effect is expected to be minor.

### Socio-Economic Impacts

These impacts are expected to be substantially the same as those of the proposal.

### Recreation Impacts

Recreation under this alternative would take place in the same amounts and in approximately the same manner as with the



proposal, but there would be slight differences. This alternative would tend to preserve the recreation environment with less change than either the proposal or the No Action Alternative and thus, by maintaining solitude in some portions of the area, retain the widest spectrum of recreation use. In particular, wildlife viewing would probably be improved as compared with the proposal. Hunting would be on the same or better quality, but due to the slightly inhibited access, hunter success might be slightly less. Otherwise, impacts would be similar to the proposal, but slightly more positive.

Cultural Resources Impacts

The impacts of E Q Alternative 2 will be similar to those of the proposal, except that by limiting additional vehicular access in Browns Park by an unknown amount, there should be slightly less damage to National Register-eligible sites.

Other Impacts

This alternative, like the proposal, will probably confine future utility siting to existing utility corridors.

ENVIRONMENTAL QUALITY ALTERNATIVE 3

Alternative 3 will designate study segments A, B, and C at the following classification levels; segment D will not be designated.

<u>Study Segment</u>	<u>Proposed Classification</u>
Segment A, 15 miles (24.6 km)	Scenic
Segment B, 32 miles (51.0 km)	Recreational
Segment C, 44 miles (70.8 km)	Wild
Segment D, 47 miles (75.7 km)	No Designation



Since the only undesignated segment already has its recreation use controlled by Dinosaur National Monument, and there are no plans to increase that use substantially, use under this alternative is the same as that predicted for EQ 1, the proposal, and will be served by the same facilities.

#### Land Use Impacts

These impacts will be the same as those for the proposal.

#### Soils and Vegetation Impacts

These will be the same as the proposal in segments A, B, and C. They will be the same as the No Action Alternative in segment D, i.e., eventual acquisition of the Mantle Ranch, with maintenance of the buildings as exhibits and the fields reverting to natural vegetation. Since nearly all of the corridor in segment D is proposed for wilderness, no impacts are foreseen.

#### Mining Impacts

These would generally be the same as the impacts of the proposal; mining in the corridor in all segments would still be prohibited. Maintenance of flows for endangered fish in segment D might still have an effect on water use for mining upstream, as discussed in the No Action Alternative.



Under Alternative 3, no protection under the Wild and Scenic Rivers Act would be extended to 47 miles of Segment D which qualify for "wild" classification. Earl Perry

## Water Resource Impacts

Impacts on the Green River segments would be as described for the proposal; impacts on the Yampa would be as described under the No Action Alternative: proposed and potential upstream water resource development in the Yampa Basin would not be affected by this proposal, but probably would be by the Endangered Species Act. Under this alternative, water resource developments in the Yampa corridor, (i.e., the Lily Park site), could be re-proposed at any time, but this is unlikely due to effects on Dinosaur National Monument and the endangered fish. Public opinion, as manifested in the Echo Park dam controversy of the 1950s, makes re-activating these proposals very unlikely.

## Air Quality

Air quality impacts of this alternative would be the same as the proposal in the Green River segments. No impact is expected in segment D, since no significant increases in recreation use are planned by the monument for that area.

## Fish and Wildlife Impacts

These impacts would be the same as the proposal's, except in segment D. Although the segment would not receive statutory protection under the Wild and Scenic Rivers Act, expected wilderness designation would preserve habitat for the fish and wildlife in the corridor at present levels.

Endangered fish would continue to receive the protection of the Endangered Species Act.



### Socio-Economic Impacts

The impacts are projected to be the same as those of the proposal.

### Recreation Impacts

The impacts are projected to be the same as those for the proposal.

### Cultural Resources Impacts

The impacts are projected to be the same as those of the proposal.

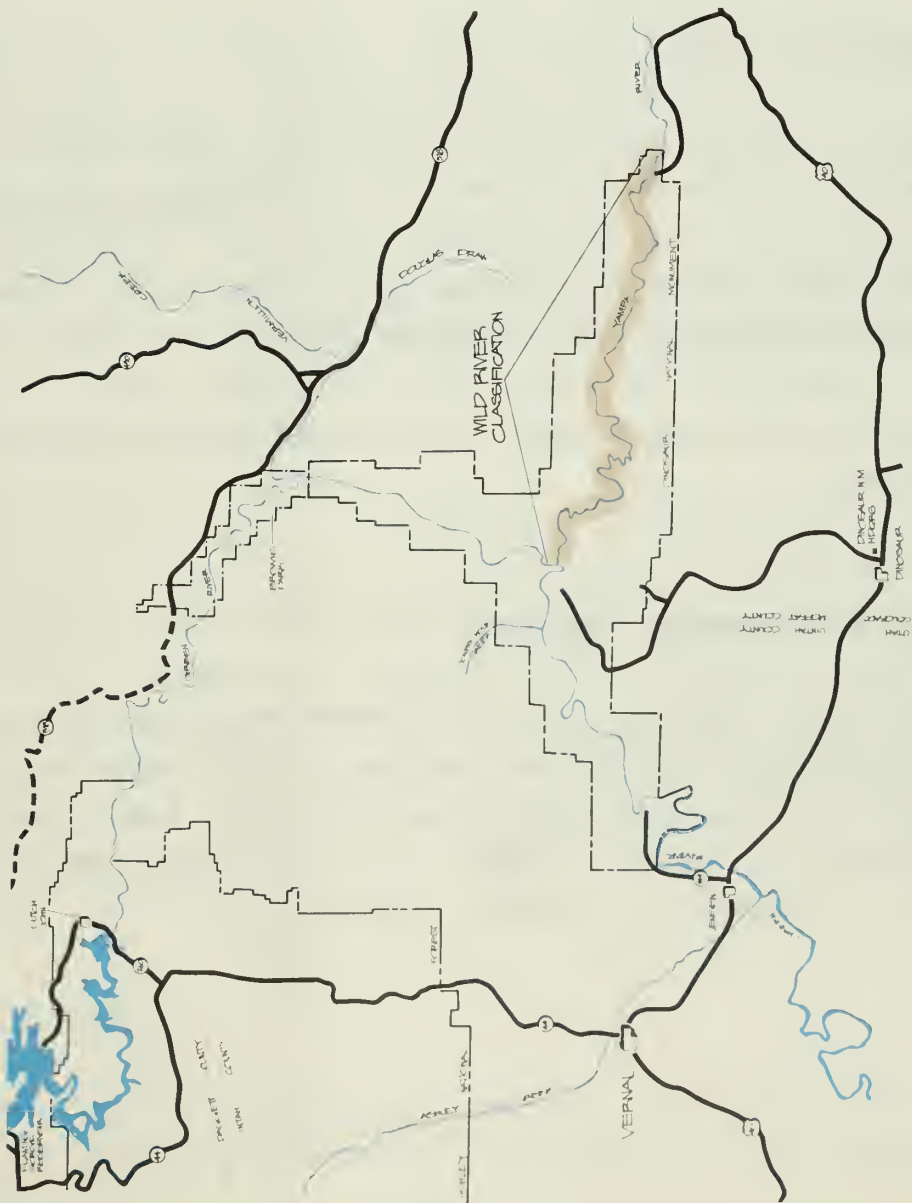
### Other Impacts

This alternative would have the same impacts as the proposal.

## ENVIRONMENTAL QUALITY ALTERNATIVE 4

Alternative 4 will designate the Yampa study segment at the level for which it now qualifies. Segments A, B, and C will not be designated. The proposed classification for each segment is as follows:

<u>Study Segment</u>	<u>Proposed Classification</u>
Segment A, 15 miles (24.6 km)	No designation
Segment B, 32 miles (51.0 km)	No designation
Segment C, 44 miles (70.8 km)	No designation
Segment D, 47 miles (75.7 km)	Wild



# ENVIRONMENTAL QUALITY ALTERNATIVE 4

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With no designation of the Green River segments, there would be no increase in recreation use and no facility development attributable to the proposal on the Green. Use would remain at the level predicted in the No Action Alternative--an estimated 175,000 recreation days in 1990--in all segments, since any increase in use that might be caused by the notoriety consequent on designation in segment D would be controlled to present levels by Dinosaur National Monument. Management of the Green River segments would continue as envisioned in the No Action Alternative.

### Land Use Impacts

Land use impacts would be those of the No Action Alternative along the 91-mile (146.4-km) Green River corridor--scenic easements would not be acquired on the 108 acres (43.7 ha) of private land. This would mean that these parcels could be subdivided or otherwise developed for private or commercial recreation purposes.

Impacts along the Yampa corridor would be the same as for the proposal.

### Soils and Vegetation Impacts

Under this alternative, not designating the Green River segments would produce the soil and vegetation disturbances on a total of about 480 acres (190 ha) which were described under the No Action Alternative. Impacts in the Yampa corridor would be the same as for the proposal and No Action Alternative.

## Mining Impacts

There would be no impacts on mining in the Green River corridor except for those cited under the No Action Alternative, i.e., those possibly caused by a Class I air designation on mining over 50 miles (80 km) east of the Green River area. Designation of the Yampa segment as a wild river area would close the corridor to mineral entry, but existing regulations and withdrawals already preclude mining. In addition, minerals along the Yampa are not present in amounts or concentrations that are economical to mine.

Designation of the Yampa only would have the same effect on upstream mining as the proposal, discussed in chapter VIII.

## Water Resource Impacts

Impacts in the Green River study area are those of the No Action Alternative discussed above. Impacts of designating the Yampa only are essentially those of the proposal, i.e., precluding the development in the corridor of water projects against which there was considerable public outcry in the 1950s; precluding or modifying upstream projects or combinations of projects which the Secretary of the Interior finds will have a direct and adverse effect on the values for which the study segment was designated, if such projects are not prevented or modified by the Endangered Species Act; and in general preserving the present essentially natural flow of the Yampa River. It is predicted that present relatively high water quality will be maintained by existing regulations, rather than as an effect of this proposal.

## Air Quality Impacts

The impacts on the undesignated segments of the Green will be those of the No Action Alternative. Since there are no increases



Red Canyon, Segment A     NPS



Swallow Canyon, Segment B     BLM



Lodore Canyon, Segment C     HCRS

Alternative 4 does not designate any of the Green River study segments.





Designating the rivers to the National Wild and Scenic River System could affect upstream water developments on the Yampa if they had an adverse impact on the values for which the river was designated. Don Bock

predicted in use of the Yampa River under this alternative, no other impacts on air quality are anticipated.

### Fish and Wildlife Impacts

The impacts resulting from designating the Yampa only would be those of the No Action Alternative for the Green, and those of the proposal for the Yampa. Overall (for both rivers), the difference in impacts between this alternative and the proposal would be very minor. As with the proposal, the two endangered fish would receive the added protection of the Wild and Scenic Rivers Act, should the Endangered Species Act be abrogated.

### Socio-Economic Impacts

The impacts of this alternative would be essentially the same as those of the No Action Alternative, since designation of segment D only would not result in increases of recreation use. This alternative would not influence the construction of access roads in Browns Park or the siting of the Maybell to Rock Springs highway.

### Recreational Impacts

Since no increase in recreation is expected in the designated segment, the impacts will be the same as those of the No Action Alternative.

Count	Components	ALTERNATIVES			
		No Action Alternative 3	Alternative 4		
			Scenic	Seg. A — No Designation	
			Recreational	Seg. B — No Designation	
			Wild	Seg. C — No Designation	
			No Designation	Seg. D — Wild	
		Total <sup>2</sup>	Net	Total	Net
	Recreation Use <sup>1</sup>				
	Canoeing	300	300	300	
	Other Water Craft	56,750	750	56,750	
	Cold Water Fishing	4,700	700	4,700	
	Waterfowl Hunting <sup>6</sup>	5,600	600	5,600	
	Picnicking	200	200	200	
	Camping	95,160	510	95,510	
	Walking	2,400	400	2,400	
	Floatboat Fishing	5,460	760	5,460	
	Camping/Shore Fishing	1,650	750	1,650	
	Deer Hunting <sup>6</sup>	600	600	600	
	Other	1,690	690	1,690	
	Total Annual Recreation Days	174,510	260	174,510	
	Annual Recreationist <sup>4</sup> Expenditures	\$1,702,000	\$ 60,000	\$1,702,000	
	Annual Government <sup>5</sup> Expenditures		\$102,000		0
	Water Resource Development	Unknown			
	Preservation of Free-Flowing Stream	None Guaranteed	Wild River Scenic River Recreational River Preserved ( )	47 Miles—Wild River 47 Miles—Preserved (76 km)	
	Preservation of Freedom of Choice	Many options	tion options increase conomic options decrease ated segments.	Preservation options increase and economic options decrease in designated segment.	
	Avoid Irreversible or Irretrievable Effects	Loss of scenic values possible	scenic and recreational undesignated segment Future development postponed in designated s.	Loss of scenic and recreational values in undesignated segments possible. Future development choices postponed in designated segment.	

<sup>1</sup>All recreation use and values are given in recreation days.

<sup>2</sup>The total column under each option represents the total recreation use and values.

<sup>3</sup>The net column under each option is the net change in recreation use and values by the year 1990 by the net amounts shown for the No Action Alternative.

<sup>4</sup>The values used in estimating on-site recreation expenditures are: cold water fishing — \$7.00/RD, waterfowl hunting — \$21.04/RD, camping/shore fishing — \$14.34/RD. Source: Mew, *Economic and Social Impact of Recreation on Wyoming's Hunting and Fishing Resources*, Colorado Division of Game and Parks, *Colorado Big Game Harvest, Colorado Division of Game and Parks, Effects of Dolores Project on Boating*, January 1978.

<sup>5</sup>Annual government expenses for each plan include planning and management costs.

<sup>6</sup>These activities occur in Segments A and B.

TABLE XI-2 – EFFECTS OF ALTERNATIVES FOR THE GREEN AND YAMPA RIVERS – IN 1990

ENVIRONMENTAL QUALITY ALTERNATIVES													
Account	Components	No Action Alternative		National Economic Development Alternative		Alternative 1 Seg. A — Scenic Seg. B — Recreational Seg. C&D — Wild		Alternative 2 Seg. A — Scenic Seg. B — Scenic Seg. C&D — Wild		Alternative 3 Seg. A — Scenic Seg. B — Recreational Seg. C — Wild Seg. D — No Designation		Alternative 4 Seg. A — No Designation Seg. B — No Designation Seg. C — No Designation Seg. D — Wild	
		Total <sup>2</sup>	Net <sup>3</sup>	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net
	<b>Recreation Use<sup>1</sup></b>												
	Canoeing	300		300		300		300		300		300	
	Other Water Craft	56,750	11,510	109,300	52,250	56,750		56,750		56,750		56,750	
	Cold Water Fishing	4,700	100	4,700		4,700		4,700		4,700		4,700	
	Waterfowl Hunting <sup>6</sup>	5,600	4,770	5,600		5,600		5,600		5,600		5,600	
	Picnicking	200		200		200		200		200		200	
	Camping	95,160	16,500	129,800	34,640	95,510	350	95,510	350	95,510	350	95,510	
	Walking	2,400		2,400		2,400		2,400		2,400		2,400	
	Floatboat Fishing	5,460	980	10,100	4,640	6,760	1,300	6,760	1,300	6,760	1,300	5,460	
	Camping/Shore Fishing	1,650		9,400	7,750	3,750	2,100	3,750	2,100	3,750	2,100	1,650	
	Deer Hunting <sup>6</sup>	600	530	600		600		600		600		600	
	Other	1,690	1,660	1,310	380	1,690		1,690		1,690		1,690	
	<b>Total Annual Recreation Days</b>	<b>174,510</b>	<b>36,050</b>	<b>273,710</b>	<b>98,900</b>	<b>178,260</b>	<b>3,750</b>	<b>178,260</b>	<b>3,750</b>	<b>178,260</b>	<b>3,750</b>	<b>174,510</b>	
	<b>Annual Recreationist<sup>4</sup> Expenditures</b>	<b>\$1,702,000</b>	<b>\$379,000</b>	<b>\$2,958,000</b>	<b>\$1,256,000</b>	<b>\$1,762,000</b>	<b>\$ 60,000</b>	<b>\$1,762,000</b>	<b>\$ 60,000</b>	<b>\$1,762,000</b>	<b>\$ 60,000</b>	<b>\$1,702,000</b>	
	<b>Annual Government<sup>5</sup> Expenditures</b>		<b>\$440,000</b>		<b>\$298,000</b>		<b>\$102,000</b>		<b>\$102,000</b>		<b>\$102,000</b>		<b>0</b>
	<b>Water Resource Development</b>	<b>Unknown</b>		<b>No effect</b>		Although there is potential for development, feasibility and benefits of potential developments and conflicts with EQ, Alternatives 1-4 are unknown.							
	<b>Preservation of Free-Flowing Stream</b>	<b>None Guaranteed</b>		<b>None</b>		<b>91 Miles—Wild River 15 Miles—Scenic River 32 Miles—Recreational River</b>		<b>91 Miles—Wild River 47 Miles—Scenic River</b>		<b>44 Miles—Wild River 15 Miles—Scenic River 32 Miles—Recreational River</b>		<b>47 Miles—Wild River</b>	
						<b>138 Miles—Preserved (222 km)</b>		<b>138 Miles—Preserved (222 km)</b>		<b>91 Miles—Preserved (147 km)</b>		<b>47 Miles—Preserved (76 km)</b>	
	<b>Preservation of Freedom of Choice</b>	<b>Many options preserved.</b>		<b>Economically important options increase. Preservation options decrease.</b>		<b>Preservation options increase. Economic options decrease somewhat. Many economic and preservation options preserved.</b>		<b>As level of preservation increases, economic development options decrease. Environmental quality option preserved.</b>		<b>Preservation options increase and economic options decrease in designated segments.</b>		<b>Preservation options increase and economic options decrease in designated segment.</b>	
	<b>Avoid Irreversible or Irretrievable Effects</b>	<b>Loss of scenic and recreational values possible.</b>		<b>Greater loss of scenic and recreational values probable.</b>		<b>Scenic and recreational values preserved. Future development choices postponed.</b>		<b>Scenic and recreational values preserved. Future postponed development choices postponed.</b>		<b>Loss of scenic and recreational values in undesignated segment possible. Future development choices postponed in designated segments.</b>		<b>Loss of scenic and recreational values in undesignated segments possible. Future development choices postponed in designated segment.</b>	

<sup>1</sup>All recreation use and values are given in recreation days.

<sup>2</sup>The total column under each option represents total expected recreation use or expenditures which will occur in the study area under that option by 1990.

<sup>3</sup>The net column under each option is the expected net effect of implementing that option. Under the No Action Alternative, recreation is expected to increase by the year 1990 by the net amounts shown. The net increases represented under alternatives 1-4 are all additional to the net increases shown under the No Action Alternative.

<sup>4</sup>The values used in estimating on-site recreationist expenditures per recreation day (RD) were: canoeing — \$14.04/RD, other water craft — \$14.04/RD, cold water fishing — \$7.00/RD, waterfowl hunting — \$13.28/RD, picnicking — \$3.00/RD, camping — \$7.30/RD, walking — \$2.00/RD, floatboat fishing — \$21.04/RD, camping/shore fishing — \$14.30/RD, deer hunting — \$20.00/RD, and other — \$2.00/RD. Sources used for these values are: Milliken and Mew, *Economic and Social Impact of Recreation at Reclamation Reservoirs*, University of Denver, March 1969; Doll, G. Fred and Clynn Phillips, *Wyoming's Hunting and Fishing Resources 1970*, Division of Business and Economic Research, University of Wyoming, Laramie, August 1972; 1974 *Colorado Big Game Harvest, Colorado Division of Wildlife*, Denver, 1975; John Devine, "White-water Boating on the Dolores River — Final Estimate of Effects of Dolores Project on Boating", January 18, 1977 — Memorandum to File, Bureau of Reclamation

<sup>5</sup>Annual government expenses for each plan include capital costs annualized over a 50-year period, a 25-year sinking fund, annual administration, operation, and management costs.

<sup>6</sup>These activities occur in Segments A and B only.

Components	No Action Alternative	Alternative 4	
<b><u>Regional Income Generated<sup>1</sup></u></b>	<b><u>Net \$</u></b>	<b><u>Total \$</u></b>	<b><u>Net \$</u></b>
Service Stations	7,000	143,000	
Eating & Drinking Places	1,000	26,000	
Other Retail	10,000	316,000	
Lodging	1,000	41,000	
Other Services	1,000	18,000	
Transportation	2,000	44,000	
Rentals and Finance	5,000	105,000	
<b>Total</b>	<b>27,000</b>	<b>693,000</b>	
<b><u>Value Added<sup>2</sup></u></b>			
Service Stations	10,000	197,000	
Eating & Drinking Places	1,000	30,000	
Other Retail	13,000	403,000	
Lodging	2,000	85,000	
Other Services	3,000	42,000	
Transportation	2,000	50,000	
Rentals and Finance	5,000	116,000	
<b>Total</b>	<b>36,000</b>	<b>923,000</b>	
<b><u>Employment—(Man Years)</u></b>	<b><u>Total</u></b>	<b><u>Net</u></b>	<b><u>Total</u></b>
Service Stations	21	1	21
Eating & Drinking Places	7	0	7
Other Retail	31	1	31
Lodging	14	0	14
Other Services	6	0	6
Transportation	1	0	1
Rentals & Finance	2	0	2
<b>Total</b>	<b>82</b>	<b>2</b>	<b>82</b>

Regional income generated is the portion of National

Value added is the gross regional product.

Total \$ under each option is the sum of the total \$ for



TABLE XI-3 – EFFECTS OF ALTERNATIVES FOR THE GREEN AND YAMPA RIVERS

Components	No Action Alternative	ENVIRONMENTAL QUALITY ALTERNATIVES									
		National Economic Development Alternative		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
Regional Income Generated <sup>1</sup>	Net \$	Total \$ <sup>3</sup>	Net \$	Total \$	Net \$	Total \$	Net \$	Total \$	Net \$	Total \$	Net \$
Service Stations	143,000	225,000	82,000	150,000	7,000	150,000	7,000	150,000	7,000	143,000	
Eating & Drinking Places	26,000	54,000	28,000	27,000	1,000	27,000	1,000	27,000	1,000	26,000	
Other Retail	316,000	544,000	228,000	326,000	10,000	326,000	10,000	326,000	10,000	316,000	
Lodging	41,000	84,000	43,000	42,000	1,000	42,000	1,000	42,000	1,000	41,000	
Other Services	18,000	31,000	13,000	19,000	1,000	19,000	1,000	19,000	1,000	18,000	
Transportation	44,000	80,000	36,000	46,000	2,000	46,000	2,000	46,000	2,000	44,000	
Rentals and Finance	105,000	188,000	83,000	110,000	5,000	110,000	5,000	110,000	5,000	105,000	
Total	693,000	1,206,000	513,000	720,000	27,000	720,000	27,000	720,000	27,000	693,000	
Value Added <sup>2</sup>											
Service Stations	197,000	310,000	113,000	207,000	10,000	207,000	10,000	207,000	10,000	197,000	
Eating & Drinking Places	30,000	63,000	33,000	31,000	1,000	31,000	1,000	31,000	1,000	30,000	
Other Retail	403,000	693,000	190,000	426,000	13,000	426,000	13,000	426,000	13,000	403,000	
Lodging	85,000	174,000	89,000	87,000	2,000	87,000	2,000	87,000	2,000	85,000	
Other Services	42,000	72,000	30,000	45,000	3,000	45,000	3,000	45,000	3,000	42,000	
Transportation	50,000	90,000	40,000	52,000	2,000	52,000	2,000	52,000	2,000	50,000	
Rentals and Finance	116,000	207,000	91,000	121,000	5,000	121,000	5,000	121,000	5,000	116,000	
Total	923,000	1,609,000	686,000	969,000	36,000	969,000	36,000	969,000	36,000	923,000	
Employment—(Man Years)	Total	Total	Net	Total	Net	Total	Net	Total	Net	Total	Net
Service Stations	21	33	12	22	1	22	1	22	1	21	
Eating & Drinking Places	7	14	7	7	0	7	0	7	0	7	
Other Retail	31	53	22	32	1	32	1	32	1	31	
Lodging	14	19	15	14	0	14	0	14	0	14	
Other Services	6	10	4	6	0	6	0	6	0	6	
Transportation	1	2	1	1	0	1	0	1	0	1	
Rentals & Finance	2	4	2	2	0	2	0	2	0	2	
Total	82	145	63	84	2	84	2	84	2	82	

<sup>1</sup>Regional income generated is the portion of National Economic Development account expenditures which remain in the region.  
<sup>2</sup>Value added is the gross regional product.  
<sup>3</sup>Total \$ under each option is the sum of the total \$ for the No Action Option and Net \$ for each option.

Q U A L I T Y	Count	Components	No Action Alternative 3	Alternative 4
		Preservation and enhancement of areas of natural beauty.	None guaranteed. Is assured by preservation policy. The proposed Rock Springs road would degrade areas of river corridor along segments A and B.	Natural beauty preserved on about 30,000 acres (12,100 ha). Would not preclude the development of additional road for the proposed Maybell to Rock Springs realignment within the river corridor, which could degrade areas of natural beauty in portions of segments A and B.
		Preservation of historic and cultural resources	Sites protected by laws. Some damage to sites on private lands.	Sites protected by federal and state laws. Some damage could occur to sites on private lands.
		Preservation of air quality	Additional road for the proposed Maybell to Rock Springs realignment could degrade the river corridor along segments A and B and could result in degradation of air quality.	Additional road for the proposed Maybell to Rock Springs road realignment could be established in the river corridor along portions of undesignated segments A and B and could result in degradation of air quality.
		Preservation of water quality	State water quality standards will be met.	State water quality standards will be met.
		Protection of threatened or endangered wildlife species	Species are currently protected.	Species are currently protected.
		Protection of Threatened or endangered vegetative species	None known.	None known.



## Cultural Resources Impacts

These will be essentially the same as the No Action Alternative along the Green--increased attention to stabilization, protection, and interpretation of National Register or National Register-eligible sites, coupled with minor increases in vandalism and theft resulting from increased use. In the designated segment, slight increases in visitor interest may be caused by designation and the resulting publicity, which may in turn cause slight increases in vandalism or inadvertant damage to sites, although use of the river would remain the same as at present. These deleterious impacts cannot be quantified, but are not expected to be large.

## Other Impacts

This alternative would not affect the siting of utility lines and pipelines along the Green River segments; it would probably preclude use of the Yampa River corridor as a route for such utilities. Terrain, however, makes such siting unlikely, as does management policy.

## SUMMARY AND COMPARISON OF ALTERNATIVES

The projected annual recreationist expenditures, an expression of monetary benefit, for the six alternative plans range from \$1,702,000 to \$2,958,000. Among the four environmental quality alternatives, the differences in annual recreationist expenditures are minimal. The national economic development (NED) plan would produce the greatest amount of recreationist expenditures (\$2,958,000) since it is specifically designed to generate the maximum amount of recreation use the rivers could attract and support.

Environmental Quality Alternatives 1 and 2 would preserve 138 miles (222.2 km) of free-flowing river and associated areas of natural beauty within the river corridor. Environmental Quality Alternatives 3 and 4 would preserve 91 miles (146.4 km) and 47 miles (75.7 km) of free-flowing river and associated natural values, respectively.

Except for Alternative EQ 3, which excludes the Yampa River from designation, all environmental quality alternatives could affect the feasibility and development of water resource proposals in the Yampa River Basin upstream from segment D. However, even with Alternative EQ 3, the proposals are still subject to the provisions of the Endangered Species Act. Additional information on how these projects would affect flow regimes and river use is necessary to make other than general determinations of how wild and scenic river designation would affect the Yampa basin water resource proposals, and vice versa. As stated earlier, it is believed that major water resource development in the Yampa River basin above study segment D will modify the existing natural flow regime and decrease both the wilderness character of segment D and the overall diversity of recreation experiences available in the four-segment study area.

Several alternatives for the proposed realignment of the road from Maybell, Colorado, to Rock Springs, Wyoming, closely parallel the Green River through a portion of segments A and B. One alternative route closely parallels a portion of segment B and much of segment A. This alternative, in particular, could degrade the river corridor's natural beauty. Assuming a more feasible and prudent alignment exists, the Environmental Quality alternatives, with the probable exception of Alternative 4, would preserve the natural beauty of segments A and B. Alternative 4 would not provide adequate protection for the natural beauty of segments A



and B as it entails wild and scenic river designation of segment D only.

### Selection of Alternatives

The National Economic Development Plan was not chosen since it does not guarantee preservation of the two free-flowing rivers and associated natural values. It would also allow visitor use levels that would be unacceptable to managing agencies due to probable degradation of outstanding natural resources.

Environmental Quality Alternatives 3 and 4, the "Green only" and "Yampa only" alternatives, when compared to the other three environmental quality options, do not offer full protection of the study area's outstanding natural and recreational values. They also do not offer compensating economic or management advantages in the corridor. Environmental Quality Alternative 3 would permit major water development in the upper Yampa Basin, assuming the Endangered Species Act permits it, but such development would probably degrade the river's values.

The federal study team agencies selected Environmental Quality Alternative 1 as the recommended plan. This alternative guarantees preservation of the outstanding natural and recreational values of the Yampa and Green Rivers at the level for which these agencies found the segments now qualify. It would also be the least disruptive to agency management, recreational uses, and authorized development in the river corridor. Alternative 2 was not selected because the federal agencies did not find segment B (Browns Park) qualified for a scenic classification. The Colorado Department of Natural Resources did find Browns Park qualified as a scenic river area, and selected EQ Alternative 2 because it provides the same economic benefits as EQ 1, with more resource protection for segment B.



Component	Components	No Action Alternative 3	Alternative 4
S D C	Educational, cultural, and recreational opportunities	Opportunities and availability of those at present in designated segment increase. Quality of agency policy. Opportunities is preserved.	Diversity and availability of opportunities in designated segment increase. Quality of opportunities is preserved.
A L	Life, Health, and Safety	This plan is neutral and improved water and facilities improve health. Improves safety.	This plan is neutral for this component.
W E L L	Income Distribution	Insufficient data to service and recreational industries increases.	Income to service and recreational supply industries increases.
B E I N G	Emergency Preparedness	This plan is neutral is neutral for this component.	This plan is neutral for this component.
	Freedom of Travel	Proposed Maybell to Rock Springs road realignment within portions segments A and B, assuming a possible and prudent route exists.	Proposed Maybell to Rock Springs road realignment could occur in river corridor in portions of segments A and B.

<sup>1</sup>Regional income generated is the portion of M

<sup>2</sup>Value added is the gross regional product.

<sup>3</sup>Total \$ under each option is the sum of the t

TABLE XI-5 – EFFECTS OF ALTERNATIVES FOR THE GREEN AND YAMPA RIVERS – IN 1990

Components	No Action Alternative	National Economic Development Alternative	ENVIRONMENTAL QUALITY ALTERNATIVES			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
Educational, cultural, and recreational opportunities	Opportunities remain similar to those at present. However, protection is assured only by present managing agency policy.	If deemed economically valuable, opportunities increase. Otherwise, opportunities and/or quality may decrease.	Diversity and availability of opportunities preserved. Quality of opportunities is preserved.	Diversity and availability of opportunities are preserved. Quality of opportunities is preserved.	Diversity and availability of opportunities in designated segments increase. Quality of opportunities is preserved.	Diversity and availability of opportunities in designated segment increase. Quality of opportunities is preserved.
Life, Health, and Safety	This plan is neutral for this component.	This plan is neutral for this component.	Increased and improved water and sanitary facilities improve health. Signing improves safety.	Increased and improved water and sanitary facilities improve health. Signing improves safety.	Increased and improved water and sanitary facilities improve health. Signing improves safety.	This plan is neutral for this component.
Income Distribution	Insufficient data to assess this plan.	Income to service and recreational supply industries increases.	Income to service and recreational supply industries increases.	Income to service and recreational supply industries increases.	Income to service and recreational supply industries increases.	Income to service and recreational supply industries increases.
Emergency Preparedness	This plan is neutral for this component.	This plan is neutral for this component.	This plan is neutral for this component.	This plan is neutral for this component.	This plan is neutral for this component.	This plan is neutral for this component.
Freedom of Travel	Proposed Maybell to Rock Springs road realignment could occur within the river corridor in portions of segments A and B.	Road placement is assumed to be that which provides the most benefits over costs in economic terms. Road realignment could occur in segments A and B.	Would preclude the development of additional road for the proposed Maybell to Rock Springs road realignment within the river corridor in portions of segments A and B, assuming a more feasible and prudent alternative exists.	Would preclude the development of additional road for the proposed Maybell to Rock Springs road realignment within the river corridor in portions of segments A and B, assuming a more feasible and prudent alternative exists.	Would preclude the development of additional Maybell to Rock Springs road realignment within portions of segments A and B, assuming a more feasible and prudent alternative exists.	Proposed Maybell to Rock Springs road realignment could occur in river corridor in portions of segments A and B.

<sup>1</sup>Regional income generated is the portion of National Economic Development account expenditures which remain in the region.  
<sup>2</sup>Value added is the gross regional product.  
<sup>3</sup>Total \$ under each option is the sum of the total \$ for the No Action Option and Net \$ for each option.

## C H A P T E R   X I I

### CONSULTATION AND COORDINATION IN THE DEVELOPMENT OF THE PROPOSAL AND ENVIRONMENTAL STATEMENT

A joint federal-state study team was organized in January 1976. Leadership responsibilities were shared by the Heritage Conservation and Recreation Service (formerly the Bureau of Outdoor Recreation) and the Colorado Department of Natural Resources (represented by the Colorado Water Conservation Board) and, with the extension of the study boundaries, by the Utah Department of Natural Resources. Other member agencies included the Forest Service, Bureau of Land Management, National Park Service, Fish and Wildlife Service, Bureau of Mines, and the Bureau of Reclamation.

Assisting the study team were representatives of federal and state agencies, water districts, and conservation and other organizations. Public views were solicited through the formal review process and at two series of public meetings held in 1976 in Craig and Denver, Colorado, and in Vernal and Salt Lake City, Utah; the first series of meetings informed the public about the study, while the second presented management alternatives and provided for public input and discussion. In addition, news releases and information on the public meetings were widely distributed.

Basic information used in developing the report and environmental statement was obtained from a variety of sources, including the Colorado and Utah Statewide Outdoor Recreation plans and inputs resulting from public meetings. In some instances information was



supplied by team or work group members with special expertise in the subjects covered. Prior to making the determination of river eligibility and classification presented in chapter IV, field reconnaissance was conducted by the team, accompanied by representatives of interested agencies and organizations and concerned private citizens. This was also accomplished in 1976, although additional limited field inspections were done in 1977 and 1978. In addition, experts in several resource fields advised the team on which natural values (by segment) could be considered "outstandingly remarkable."

In March 1978, responsibility for the study of the Green and Yampa Rivers was transferred from the Heritage Conservation and Recreation Service to the National Park Service. After transfer, the report and environmental impact statement were edited, revised, and completed. The National Park Service also prepared the graphics and printed this document.

## APPENDIX A

## OUTLINE AND APPLICATION OF PRINCIPLES AND STANDARDS PROCEDURES TO ALTERNATIVE ACTIONS

According to Principles and Standards, planning for the use and development of the nation's water and related land resources is undertaken to serve the major objectives of national economic development and preservation or enhancement of environmental quality. In some cases an objective can be served without conflicting with the other objectives and alternative plans need not be developed. If there are conflicts between the objectives, at least two alternative plans must be developed, one which must optimize contributions to the national economic development objective, and one which must optimize contributions to the environmental quality objective. Both objectives are equal in importance and are treated equally in the final analysis. Each alternative is evaluated to determine how well it satisfies the objective for which it was formulated by displaying the measured beneficial and adverse effects of the alternatives in the four-account system (National Economic Development, Environmental Quality, Regional Development, and Social Well Being).

In this analysis, it was assumed that wild and scenic river designation may interfere with proposed water resources projects if these projects are determined to be feasible and are not precluded from being constructed by the Endangered Species Act. It is not known to what degree wild and river designation could affect water resource development in the Yampa River basin, but adverse effects are likely.

## SPECIFICATION OF OBJECTIVES

The first step in the analysis is to identify or specify the components of the two major objectives. These components must be of concern to the nation, be present in or relevant to the resources being studied, be measurable or capable of being qualitatively defined, and be those which can be substantially influenced through management and development alternatives available to planners.

The national economic development objective can be served in two basic ways: (1) by increasing economic values through increasing output or production of goods and services or (2) by increasing economic efficiency in the production of goods and services.

The economy of the Yampa and Green River basin is largely resource oriented. Major goods and services produced in the area, in declining order of economic importance, are minerals, agricultural products, outdoor recreation, and timber. National economic development can be served by increasing production of any of these components, provided that the share of national demand allocated to this area exceeds the current or projected supply (production). Increased efficiency in producing these goods or services will also contribute to the national economic development objective.

The initial components of the national economic development objective identified in the Yampa and Green River basins were increased or more efficient (1) provision of outdoor recreation services, (2) production of agricultural products, (3) production of mineral resources, (4) provision of hunting and fishing opportunities, (5) power production, and (6) water resource development.

The environment of the Yampa-Green study area possesses outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, and other similar values. Preservation or enhancement of these values for the benefit and enjoyment of present and future generations of the nation would serve the environmental quality objective of Principles and Standards.

The initial components of the environmental quality objective identified in the Yampa and Green River basins were the preservation or enhancement of (1) areas of natural beauty and river segments with wild, scenic, or recreation river characteristics, (2) outstandingly remarkable cultural values, (3) endangered or threatened wildlife, fish, or vegetation, (4) air, auditory, and water quality, (5) freedom of choice to future resource users by avoiding irreversible or irretrievable effects, and (6) outstandingly remarkable scenic, recreational, geologic, fish and wildlife, or other similar values.

## SECOND LEVEL SPECIFICATION OF COMPONENTS

A second level specification of components was made to determine which components are relevant to the Yampa and Green Wild and Scenic Rivers Study area and the action available to planners under authority of this study.

Components of the national economic development alternative which were identified in the second level specification were increased or more efficient provision of recreation services for developed camping, picnicking, and canoeing or rafting on streams.

Components of national economic development eliminated in the second level specification were increased or more efficient (1)



production of agricultural products within the corridor, which was eliminated because all available agricultural land in the corridor is presently utilized and expected to continue to be utilized for its maximum economic potential without conflicting with wild and scenic river designation; (2) production of mineral resources, which was dropped as a component because there are no known valuable mineral resources of significance in the study corridor;<sup>1</sup> (3) power production, which was eliminated because the only power site withdrawals within the corridor are being revoked by the project sponsors and wild and scenic river designation is not expected to conflict with fossil or fissionable fuel development; (4) provision of hunting and fishing opportunities, which was eliminated because they are either in conflict with other uses of the area or the increased opportunities are already part of management programs for the area; and (5) water resource development, which was eliminated because of insufficient project data and the fact that the feasibility of proposed projects has not yet been determined.

Components of environmental quality identified in the second level specification were as follows:

- (1) preservation of 91 miles (146.4 km) of wild river values in and along the Yampa River and Green River in the monument,
- (2) preservation of 15 miles (24.6 km) of scenic river values in and along the Green River from just below Flaming Gorge Dam downstream to the BLM boat ramp at Indian Crossing,

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1. There are potentially valuable minerals along the Yampa River upstream from the study segment that may be indirectly affected by designation.

- (3) preservation of 32 miles (51 km) of recreational river values in and along the Green River from the BLM boat ramp at Indian Crossing to the Gates of Lodore in Dinosaur National Monument,
- (4) preservation or enhancement of areas of natural beauty,
- (5) preservation or enhancement of air and auditory quality, and
- (6) preservation of freedom of choice to future resource users by avoiding irreversible and irretrievable effects.

The following components of the environmental quality objective were eliminated in the second level specification:

- (1) protection of endangered species was eliminated because they are already fully protected by the Endangered Species Act of 1973,
- (2) preservation of water quality was eliminated as a component since adequate protection currently exists. Statutes, regulations, and policies will be recognized in management plans for designated segments to provide for protection of water quality and to safeguard against degradation.

#### ASSUMPTIONS FOR COMPONENT NEED SPECIFICATION

The purpose of an alternative plan is to contribute to the objectives of preservation of environmental quality or national economic development. To contribute to either objective, a plan must provide for a demand which is unmet by current or expected supply (need).

The measurement of needs for the increased provision of recreation services in the Colorado portion of the Yampa River basin was derived from the Colorado State Comprehensive Outdoor Recreation

Plan (SCORP).<sup>2</sup> Also, the Utah SCORP was utilized, which shows the need for the increased provision of recreation services. Table 1 displays 1975 needs for increased recreation services in recreation days and projected increases in participation in the Colorado portion of the Yampa River basin.

Assumptions related to derivation of need for components of the environmental objectives are as follows:

- (1) There is a national need for the beneficial esthetic, environmental, and spiritual effects associated with the preservation of free-flowing streams that have outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historical, cultural, and other similar values.

Table 1  
Recreation Needs and Participation  
in the Yampa River Basin in Colorado

<u>Activity</u>	<u>1975 Needs (Unmet Demand)</u>	<u>1975 Participation</u>	<u>Projected 1990 Participation</u>	<u>1990 Projected Percent Increase In Participation</u>
Developed Camping	208,500	966,700	1,445,800	50%
Developed Picnicking	23,800	106,200	155,400	46%
Canoe/Raft on Streams	73,400	21,700	33,300	53%
TOTAL	305,700	1,094,600	1,634,500	49%

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2. Data shown for needs for recreation in Regions 11 and 12 in the Colorado SCORP were adjusted relative to the portion of the total population in Regions 11 and 12 which resides in the Yampa River Basin. Colorado SCORP data were also adjusted to represent recreation days.

- (2) It was assumed that the greatest contribution to the environmental quality objective is made by the inclusion of areas in the National Wild and Scenic River System as wild river areas; the next greatest, by scenic river area inclusion; and the least by recreational river designation, provided in each case that the river segments meet minimum criteria for that classification level.

The following tables display additional information resulting from the Principles and Standards analysis. Table 2 displays differences in effects between the recommended plan (Alternative 1) and each other alternative plan. For a display of the differences in effects between the No Action Alternative and each alternative plan, see table XI-5 in chapter XI and table 2 in this appendix.

Table 3 displays expected government expenses for each alternative and segment. All expenses listed are in addition to existing government expenses in the area of analysis. The on-site recreationist expenditure and government cost data shown in table 3 is summarized in table 4 in both discounted and non-discounted forms.

TABLE 2 – DIFFERENCES IN EFFECTS BETWEEN THE RECOMMENDED AND OTHER ALTERNATIVES – IN 1990

Components	ENVIRONMENTAL DUALITY ALTERNATIVES									
	Recommended Alternative – ED 1		National Economic Development Alternative		Alternative 2		Alternative 3		Alternative 4	
	Seg A – Scenic	Seg B – Recreational	No Designation	Increased Recreation <sup>4</sup>	Seg A – Scenic	Seg B – Scenic	Seg C – Wild	Seg D – Wild	Seg A – No Designation	Seg B – No Designation
	Seg C – Wild	Seg D – Wild			Seg C – Wild	Seg D – Wild	Seg C – Wild	Seg D – No Designation	Seg C – No Designation	Seg D – Wild
	Total <sup>2</sup>	Net <sup>3</sup>	Total	Difference	Total	Difference	Total	Difference	Total	Difference
<b>Recreation Use<sup>1</sup></b>										
Canoeing	300		300		300		300		300	
Other Water Craft	56,750		109,300	52,550	56,750		56,750		56,750	
Cold Water Fishing	4,700		4,700		4,700		4,700		4,700	
Water Fowl Hunting	5,600		5,600		5,600		5,600		5,600	
Picnicking	200		200		200		200		200	
Camping	95,510	350	129,800	34,290	95,510		95,510		95,160	-350
Walking	2,400		2,400		2,400		2,400		2,400	
Floatboat Fishing	6,760	1,300	10,100	3,340	6,760		6,760		5,460	-1,300
Camping/Shore Fishing	3,750	2,100	9,400	5,650	3,350		3,750		1,650	-2,100
Deer Hunting	600		600		600		600		600	
Other	1,690		1,310	-380	1,690		1,690		1,690	
<b>Total Annual Recreation Days</b>	<b>178,260</b>	<b>3,750</b>	<b>273,710</b>	<b>95,450</b>	<b>178,260</b>		<b>178,260</b>		<b>174,510</b>	<b>-3,750</b>
<b>Annual Recreationist Expenditures<sup>5</sup></b>	<b>\$ 1,762,000</b>		<b>\$ 2,958,000</b>		<b>\$ 1,762,000</b>		<b>\$ 1,762,000</b>		<b>\$ 1,702,000</b>	
<b>Annual Government Expenditures<sup>5</sup></b>	<b>\$ 102,000</b>		<b>\$ 298,000</b>		<b>\$ 102,000</b>		<b>\$ 102,000</b>		<b>0</b>	
<b>Water Resource Development</b>	Feasibility and benefits of potential developments and conflicts with this option unknown.		No potential for this plan to conflict with potential development.		Same as recommended plan.		Same as recommended plan.		Same as recommended plan.	
<b>Preservation of Free-flowing Stream</b>	91 Miles (146.4 km) – Wild River 15 Miles (24.2 km) – Scenic River 32 Miles (51.5 km) – Recreational River <b>138 Miles (222.2 km) – Preserved</b>		138 miles (222.2 km) of river with outstandingly remarkable values may not be preserved		91 Miles (146.4 km) – Wild River 47 Miles (75.7 km) – Scenic River <b>138 Miles (222.2 km) – Preserved</b>		44 Miles (70.8 km) – Wild River 15 Miles (24.2 km) – Scenic River 32 Miles (51.5 km) – Recreational River <b>91 Miles (146.5 km) – Preserved</b>		47 Miles (75.7 km) – Wild River <b>47 Miles (75.7 km) – Preserved</b>	
<b>Preservation and Enhancement of Areas of Natural Beauty</b>	Areas of natural beauty preserved on about 58,000 acres. Would preclude the development of additional roadway for the proposed Maybell, Colorado to Rock Springs, Wyoming road realignment in the visual corridors of segments A and B, assuming a more feasible and prudent alternative for realignment exists		All areas with economic potential will be developed. Could allow the development of additional roadway for the proposed Maybell, Colorado to Rock Springs, Wyoming road realignment in the visual corridors of segments A and B, which would degrade areas of natural beauty		Same effects as described for the recommended alternative with the exception that future developments in segment B will be more restricted		Areas of natural beauty preserved on about 58,000 acres. Would preclude the development of additional roadway for the proposed Maybell, Colorado to Rock Springs, Wyoming road realignment in the visual corridors of segments A and B, assuming a more feasible and prudent alternative for realignment exists		Areas of natural beauty preserved on about 30,000 acres. Would allow the development of additional roadway for the proposed Maybell, Colorado to Rock Springs, Wyoming road realignment in the visual corridors of segments A and B, which would degrade areas of natural beauty.	
<b>Preservation of Historic and Cultural Resources</b>	Additional money for site protection will provide a higher level of preservation and offset potential damage from increased recreation use. Interpretation enhances public use values		Will not provide additional money for site protection. Increased recreation use may result in increased damage to cultural resources		Will provide the same level of preservation as that of the recommended alternative. Lessened access may improve preservation. Interpretation enhances public use values		Will have effects similar to those described under the recommended alternative		May result in damage to cultural resources at sites located in undesignated segments, most likely segments A and B	
<b>Preservation of Air and Auditory Qualities</b>	Would generally preserve the air and auditory qualities of all segments, assuming a more feasible and prudent alternative to realigning the Maybell to Rock Springs route within the visual corridors of segments A and B exists.		Could result in degradation of air and auditory qualities, should realignment of the Maybell to Rock Springs route occur in the visual corridors of segments A and B		Same as recommended alternative, but possible changed access in segment B may cause less auto use		Same as recommended alternative		Could result in degradation of air and auditory qualities should realignment of the Maybell to Rock Springs route occur in the visual corridors of segments A and B	
<b>Preservation of Water Quality</b>	Additional and improved sanitary facilities for recreationists would improve water quality		State water quality standards could be lowered if needed for economic reasons		Same as recommended alternative		Same as recommended alternative		Would essentially maintain existing water quality	
<b>Protection of Endangered and Threatened Vegetative Species</b>	None known.		None known.		None known		None known.		None known	
<b>Protection of Endangered and Threatened Species</b>	Species currently protected. No change		Same as recommended alternative		Same as recommended alternative		Same as recommended alternative		Same as recommended alternative	
<b>Preservation of Freedom of Choice</b>	Most options preserved. Preservation options increase and development options decrease somewhat		Economically important options increase and preservation options decrease		Same as recommended alternative. Recreation development options decrease in segment B		Same as recommended alternative		Preservation options increase in the designated segment. Development options decrease there but increase in segments A, B, and C	
<b>Avoid Irreversible or Irrecoverable Effects</b>	Scenic and recreational values preserved. Future development choices postponed		Probable loss of outstandingly remarkable scenic and recreational values		Scenic and recreation values preserved. Future development choices postponed		Scenic and recreational values preserved. Future development choices postponed		No legal preservation of scenic and recreational values in undesignated segments. Future development choices postponed in segment D.	

<sup>1</sup>All recreation use is in recreation days<sup>2</sup>Figures in the Total column are the use projected for the No Action Alternative plus increases, if any, expected under this plan.<sup>3</sup>Figures in the Net column are the amount of use for this plan minus that projected for the No Action Alternative<sup>4</sup>Difference column figures are the difference between use for a plan and use projected for the proposal (ED Alternative 1)<sup>5</sup>See footnotes to Table XI-2 for the derivation of these values<sup>6</sup>Annual administration, operation, and maintenance, plus amortization of present costs and a sinking fund. See table 4 in the appendix



TABLE 3 — ITEMIZED COSTS BY SEGMENT FOR EACH ALTERNATIVE PLAN

Cost Item	National Economic Development Option	ENVIRONMENTAL QUALITY ALTERNATIVES			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
		Seg. A — Scenic Seg. B — Recreational Seg. C&D — Wild	Seg. A — Scenic Seg. B — Scenic Seg. C&D — Wild	Seg. A — Scenic Seg. B — Recreational Seg. C — Wild Seg. D — No Designation	Seg. A — No Designation Seg. B&C — No Designation Seg. D — Wild
<b>Flaming Gorge National Recreation Area</b>					
Rehabilitating and expanding Little Hole Campground		\$370,000	\$370,000	\$370,000	
Hardening Little Hole Campground road, spurs, and paths		219,500	219,500	219,500	
Upgrade Little Hole foot trail		3,500	3,500	3,500	
Upgrade Spillway road, parking lot, toilet; construct foot trail		86,000	86,000	86,000	
Spillway boat ramp rehabilitation		47,800	47,800	47,800	
Upgrade toilets at Red Creek Rapid		5,000	5,000	5,000	
Signing where needed		750	750	750	
Brochure for segment A		600	600	600	
Control noxious weeds		1,000	1,000	1,000	
<b>Subtotal Non-annual Costs</b>	None	<u>\$734,150</u>	<u>\$734,150</u>	<u>\$734,150</u>	None
<b>Annual Additional A, D &amp; M Required<sup>1</sup></b>	None	3,750 RD = \$6,075 per annum	3,750 RD = \$6,075 per annum	3,750 RD = \$6,075 per annum	None
<b>Bridge Hollow Development</b>					
Scenic Easements (108 acres)		\$162,000	\$162,000	\$162,000	
Developed water supply	10,000				
10-unit campsite	30,000	30,000	30,000	30,000	
4-unit picnic site	3,500	3,500	3,500	3,500	
Fish cleaning station	5,000	5,000	5,000	5,000	
<b>Subtotal Non-annual Costs</b>	\$ 48,500	<u>\$200,500</u>	<u>\$200,500</u>	<u>\$200,500</u>	None
<b>Annual Additional A, O &amp; M Required<sup>1</sup></b>	12,398 RD = \$20,085	3,398 RD = \$5,505	3,398 RD = \$5,505	3,398 RD = \$5,505	None
<b>Browns Park National Wildlife Refuge</b>					
Protection of historic sites		60,000	60,000	60,000	
Interpret historic sites		80,000	80,000	80,000	
<b>Subtotal Non-annual Costs</b>	None	<u>\$140,000</u>	<u>\$140,000</u>	<u>\$140,000</u>	None
<b>Annual Additional A, O &amp; M Required<sup>1</sup></b>	None	None	None	None	None
<b>Dinosaur National Monument</b>					
Annual Additional A, D & M Required for Segment C <sup>2</sup>	52,866 RD = \$158,598	None	None	None	None
<b>Annual Additional A, O &amp; M Required for Segment D<sup>2</sup></b>	38,316 RD = \$114,948	None	None	None	None

<sup>1</sup>A, O & M costs are estimated to be \$1.62 per recreation day.

<sup>2</sup>A, O & M costs are estimated to be \$3.00 per recreation day.

TABLE 4 -- SUMMARY OF ON-SITE RECREATIONIST EXPENDITURES AND GOVERNMENT COST DATA

	ENVIRONMENTAL QUALITY ALTERNATIVES							
	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Seg. A -- Scenic Seg. B -- Recreational Seg. C&D -- Wild		Seg. A -- Scenic Seg. B -- Scenic Seg. C -- Wild		Seg. A -- Scenic Seg. B -- Recreational Seg. C -- Wild Seg. D -- No Designation		Seg. A -- No Designation Seg. B -- No Designation Seg. C -- No Designation Seg. D -- Wild	
National Economic Development Alternative								
Present cost (1976 dollars)	\$ 48,500		\$1,074,650		\$1,074,650		0	
Annual Payment of Present Cost for 50-year period at 6-3/8% interest	3,239		71,768		71,768		0	
Sinking Fund (25-year replacement of Recreational Developments)	838		18,568		18,568		0	
Annual Additional Cost for Administration	293,631		11,580		11,580		0	
Total Annual Costs	297,708		101,916		101,916		0	
Total Annual On-Site Recreationist Expenditures	\$1,255,900		\$ 59,578		\$ 59,578		No effect	
Discounted Total Annual Costs	Discounted to 1990 \$125,116	Discounted to 2026 \$13,523	Discounted to 1990 \$42,903	Discounted to 2026 \$4,638	Discounted to 1990 \$42,903	Discounted to 2026 \$4,638	Discounted to 1990 0	Discounted to 2026 0
Discounted Annual On-site Expenditures	528,690	57,145	25,080	2,711	25,080	2,711	0	0



## APPENDIX B



United States Department of the Interior  
OFFICE OF THE SOLICITOR

DENVER REGION  
P.O. BOX 25007  
DENVER FEDERAL CENTER  
DENVER, COLORADO 80225

April 21, 1976

Memorandum

To: Regional Director, Mid-Continent Region,  
Bureau of Outdoor Recreation

From: Regional Solicitor, Denver

Subject: Wild and Scenic Rivers Act: Yampa River;  
Dinosaur National Monument

You have asked us to furnish you an opinion construing Section 7 of the National Wild and Scenic Rivers Act, 82 Stat. 906, 16 U.S.C. 1271, et seq., insofar as it relates to potential water resources projects on the Yampa River upstream from Dinosaur National Monument, that segment having been designated for potential addition to the NWSR System by the 1975 amendment to Section 5(a) of the Act, 88 Stat. 2094, 16 U.S.C.A. § 1276 (1976 Pocket Part). The potential projects you mentioned are Juniper Reservoir and Cross Mountain Reservoir near Maybell, Colorado, upstream from the Yampa for which the Colorado River Water Conservation District, Glenwood Springs, on September 23, 1975, made application to the Federal Power Commission for a preliminary permit, Project 2757. (A preliminary permit allows no construction but gives priority to the applicant on the site and allows certain access to the applicant to conduct studies for a three-year period.) The projects would involve two dams and reservoirs on the main stem of the Yampa. We also address ourselves to an upstream project proposed by the Bureau of Reclamation, U.S. Department of the Interior, known as the Savery-Pot Hook Project, on the Snake River, a tributary to the Yampa.

Juniper - Cross Mountain Project

The Juniper - Cross Mountain Project is covered by the provisions of Section 7(b) of the Act since a segment of



the Yampa is designated in Section 5(a) of the Act as a potential addition to the system.

1. Is the project licensable by the FPC?

Section 7(b), 16 U.S.C. § 1278(b), provides that until October 2, 1978 the FPC shall not license the construction of any dam or reservoir "on or directly affecting" any river which is listed in Section 5(a) of the Act. In our opinion the FPC is not prohibited from granting a license for the construction of the Juniper - Cross Mountain dams and reservoirs simply because the proposed project is "on" the Yampa. If the proposed project were on the segment of the river designed under Section 5(a), as amended, 43 U.S.C. § 1276(a)(51), that is, on that portion of the Yampa within the boundaries of Dinosaur National Monument, the FPC would clearly be prohibited from licensing the project. However, even though the project is not on the listed segment, it is prohibited if it would "directly affect" the proposed Dinosaur segment of the river.

Whether a proposed project will "directly affect" a listed segment must be determined in the light of section 7 of the Act. Section 7(b) contains the following sentence:

Nothing contained in the foregoing sentence [prohibiting projects on or affecting study rivers], however, shall preclude licensing of, or assistance to, developments below or above a potential wild, scenic or recreational river area or on any stream tributary thereto which will not invade the area or diminish the scenic, recreational, and fish and wildlife values present in the potential wild, scenic or recreational river area on the date of approval of this chapter.

Thus, for study rivers protected by section 7(b), the standard is one of nondegradation of existing scenic, recreational, and fish and wildlife values. Any effect on these values of a study river is precluded until Congress had decided whether to include the river in the system. The nondegradation standard is similar to that in effect for proposed wilderness areas. Cf. Parker v. United States, 448 F.2d 793, cert. denied 405 U.S. 989 (1971).

Once a river segment has been added to the System, the standard for determining what projects are prohibited as "directly affecting" the river is somewhat different. Section 7(a), 16 U.S.C. § 1278(a), protects rivers in the system, and states that no projects shall be licensed on or directly affecting a listed river. It also contains a sentence similar to that previously quoted for section 7(b), except that the last dependent clause is different:

. . . which will not invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area on October 2, 1968.

The addition of the word "unreasonably" indicates that, once a river has been added to the system, the nondegradation standard is altered to permit an element of discretion in deciding which projects are precluded. That is, the standard is no longer one of nondegradation, but permits a determination as to whether the effect is "unreasonable."

It is clear from the act that the decision as to whether a project would "directly affect" a listed river segment is not to be made solely by the FPC. The FPC is required by section 7(c) to notify the Secretary of the Interior, or the Secretary of Agriculture, of any project planned for a listed river which may affect the listed segment. Likewise, the FPC is precluded by 7(a) from recommending to Congress any project that would directly and adversely affect the values of a listed river, "as determined by the Secretary charged with its administration," without advising the Secretary. Similar proscriptions apply for study rivers, section 7(b). The obvious purpose of this language is to afford the Secretary charged with administering the river an opportunity to determine if the project would "directly affect" the listed river segment. If the Secretary determines that a proposed project would directly affect a study river, the FPC would be precluded by section 7(b) from licensing the project.

We point out that Solicitor's Opinion M-36777 of February 7, 1969 previously concluded that a determination of whether a proposed project would have a direct effect on a study river is to be made by the Secretary charged with its administration. This does not mean that the FPC is precluded from making such a determination itself, after considering the views of the Secretary charged with administering the river.

If, however, the Secretary and the FPC disagree, review of the initial FPC decision can be pursued through the Commission's hearing procedures and, if necessary, through the courts. See 16 U.S.C. § 825(1).

2. What authority does the Secretary of the Interior have, or what prohibitions are upon him with regard to the proposed project?

As previously indicated, the Secretary must make the "directly affecting" determination respecting the FPC project. In addition, section 7(b) of the Act provides that "no department or agency of the United States shall assist by loan, grant, license, or otherwise in the construction of any water resources project that would have a direct and adverse effect on the values for which such river may be designated, as determined by the Secretary" until October 2, 1978. This prohibition applies to any other action the Secretary may take with respect to the Juniper - Cross Mountain Project.

In the event the Secretary determines that the proposed project does not directly affect the scenic, recreational and fish and wildlife values of the Dinosaur segment of the Yampa, there would then be no prohibition upon assistance by the Department or its agencies or on the FPC to license the project. As previously mentioned, the standard for such a determination is whether the proposed project would cause any degradation of the scenic, recreational, and fish and wildlife values present in the Dinosaur segment of the Yampa. If his determination were that the proposed project would not diminish those values, assistance would be permitted. If his determination were otherwise, assistance would be prohibited.

Therefore, to answer the question in the issue paper appended to your memorandum of March 5, 1976, the Secretary, through the Bureau of Outdoor Recreation, has the authority to make the above determinations regarding the proposed Juniper - Cross Mountain Project, and in our judgment is obligated to make those determinations since the Dinosaur segment of the Yampa has been designated as a potential addition to the system in the January 3, 1975 amendment to the Act.

3. If this segment of the Yampa should be designated by Congress as a wild or scenic river under the Act, then Section 7(a) of the Act would be applicable. Section 7(a) contains somewhat different prohibitions than does 7(b). As previously indicated, the standard under section 7(a) is not



one of absolute nondegradation, but rather one of unreasonable diminishment of the protected values. The determination must be made by the agency charged with administrative responsibilities for the river.

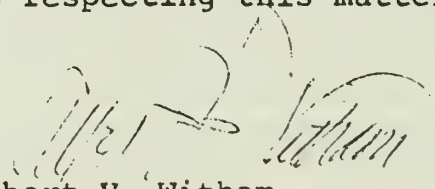
### Savery - Pot Hook Project

The Savery - Pot Hook Project is a proposed unstream project of the Bureau of Reclamation on a tributary to the Yampa. Licensing by the FPC is not applicable. However, other provisions of 7(b) are. While there appears a fine question of law involved in whether a Bureau of Reclamation project falls within the meaning of the term "assist . . . in the construction of any water resources project," there is no question that the phrase "by loan, grant, license, or otherwise" is sufficiently broad to bring a Bureau of Reclamation project within the ambit of the provision.

Again, therefore, the Secretary would be obligated to determine whether the construction of this proposed project would directly affect the Dinosaur segment of the Yampa. If his determination were negative, then the Bureau could proceed.

These prohibitions extend to October 2, 1978. The Secretary does, however, have the additional authority, after a study is made, to determine that the Dinosaur segment of the Yampa should not be included in the NW&SR system. If he makes such a determination, he must notify the Congressional Committees on Interior and Insular Affairs of such in writing, submit a copy of the study to them, and publish the determination in the Federal Register not sooner than 180 days thereafter. Pending action by Congress, however, the section 7(b) proscriptions continue to apply up to the 1978 deadline.

If you have any further questions respecting this matter, please contact the undersigned.

  
Albert V. Witham  
For the Regional Solicitor

cc: Associate Solicitor, Conservation and Wildlife  
Attn: Assistant Solicitor, Parks and Recreation



United States Department of the Interior  
FISH AND WILDLIFE SERVICE

AREA OFFICE COLORADO-UTAH  
1426 FEDERAL BUILDING  
125 SOUTH STATE STREET  
SALT LAKE CITY, UTAH 84138  
December 3, 1976

Reply Refer To (ES)

Memorandum

To: Yampa-Green Study Team Leader  
Bureau of Outdoor Recreation  
Denver, Colorado

From: Area Manager  
Fish and Wildlife Service  
Salt Lake City, Utah

Subject: Endangered Species of the Yampa River, present  
and future protection under PL 93-205

In response to your memorandum regarding the future status of the Colorado River Squawfish and the humpback chub under the Endangered Species Act, we have prepared the following:

(1) What specific level of protection is currently afforded these species of endangered fish under the Endangered Species Act?

Section 7 of the Endangered Species Act provides that:

"All...Federal departments and agencies shall, in consultation with and with the assistance of the Secretary /of the Interior/, utilize their authorities in furtherance of the purposes of this Act...by taking such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of...endangered species and threatened species..." (emphasis supplied).

Given the above mandate, we believe the squawfish and humpback chub in the Yampa River below Craig are fully protected from any Federal action which would result in the reduction of the reproductive ability, numbers, or distribution



of those species to such an extent that the loss would pose a threat to their continued survival or recovery in the wild. However, one of the problems faced by all Federal agencies is the lack of information on the habitat requirements of the species. We, therefore, rely on present range, rather than specific living requirements, when determining critical habitat. Attached is a letter to our central office delineating our recommendation for critical habitat for the Colorado River Squawfish.

(2) What are your current efforts to increase protection for these species?

We believe the habitat for the squawfish and humpback chub is fully protected from Federal actions which would jeopardize their continued existence under the Endangered Species Act. In addition, the fish are also protected under state law in Utah and Colorado.

It is the purpose of our Service to insure through consultation and cooperative assistance that the activities of other federal agencies conform with Section 7 of the Endangered Species Act. The determination of compliance; however, is left to each developing federal agency.

The designation of critical habitat for endangered species should improve our coordination effort and thereby help other agencies conform with Section 7 of the Act, however, it will not afford any additional protection to these species. Our Service supports the actions of other governmental agencies which also protect, the existing habitat of these fish. We view such actions as complimentary to the Endangered Species Act, however, rather than providing additional protection.

(3) Will these species be fully protected under P.L 93-205 by 1990?

We believe the Colorado River Squawfish and humpback chub are fully protected under the Act today and, hopefully, the future. We cannot, however, predict what affects possible amendments to the Act could have on these fish. If future amendments to the Act were to weaken or eliminate protection for squawfish or humpback chubs, then the Wild and Scenic River Act and the administrative protection

afforded these fish by Dinosaur National Monument would both provide additional protection. We do not anticipate any weakening of the Endangered Species Act in the future. In fact, we believe two additional species in the Yampa River, the humpback sucker (Xyrauchen texanus) and the bonytail chub (Gila elegans), will soon be added to the list.

(4) If P.L. 93-205 is not expected to fully protect these species, what additional protection do you believe would be afforded these species by wild and scenic river designation?

As stated earlier, we believe the fish and their habitat are presently protected under the Endangered Species Act. The only additional protection derived from the Wild and Scenic River Act would be as complimentary or back-up protection.

We hope the above answers will help you in your analysis of alternatives under the Principles and Standards for Water Resource Development Planning.

*Robert H. Shiel*



# United States Department of the Interior

## BUREAU OF OUTDOOR RECREATION

### MID-CONTINENT REGION

IN REPLY REFER TO:

D4219 Yampa-Green

MAILING ADDRESS:

Post Office Box 25387  
Denver Federal Center  
Denver, Colorado 80225

STREET LOCATION:

603 Miller Court  
Lakewood, Colorado  
Telephone 234-2634

NOV 18 1976

#### Memorandum

To: James Young, Area Supervisor, Ecological Services,  
U. S. Fish and Wildlife Service, Salt Lake City, Utah  
Attention: Reed Harris, Yampa-Green Wild and Scenic River  
Study Participant

From: Harold Belisle, Study Team Leader

Subject: Projection of Conditions Expected to Exist in the Wild and  
Scenic River Study Area in 1990 Without Wild and Scenic  
River Designation

Pursuant to the Principles and Standards for Planning Water and Related Land Resources, wild and scenic river studies must project conditions expected to occur in the study area should wild and scenic river designation not occur. This enables the study to then determine the expected incremental effects of any plan to designate a river.

The Colorado River squawfish (*Ptychocheilus lucius*) and humpback chub (*Gila cypha*) found in the Yampa-Green Wild and Scenic Rivers study area are afforded protection by the Endangered Species Act of 1973 (P. L. 93-205). These fish are also recognized as an outstandingly remarkable value in the study area by the Yampa and Green Wild and Scenic River Study Team. To determine the incremental amount of protection which could be offered these species with wild and scenic designation, the degree of protection presently afforded these species and the degree of protection expected to exist in 1990 in the absence of wild and scenic river designation must be ascertained. We, therefore, need your response to the following questions:

1. What specific level of protection is currently afforded these species of endangered fish under the Endangered Species Act?
2. What are your current efforts to increase protection for these species?



3. Will these species be fully protected under P.L. 93-205 by 1990?
4. If P.L. 93-205 is not expected to fully protect these species, what additional protection do you believe would be afforded these species by wild and scenic river designation?

Your prompt response to these questions will be appreciated.

*Harold J. Belisle*  
Harold J. Belisle

As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration. NPS 1423





