D-52C
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general management plan
development concept plans
land protection plan
environmental assessment

w/ Land Protection Plan Update 7/88
& 4/91

DINOSAUR

NATIONAL MONUMENT / COLORADO-UTAH

ON MICROFILM

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RECOMMENDED:

Joe L. Kennedy	6/11/86
Superintendent	Date
John W. Bright	6/2/86
Assistant Manager, Denver Service Center	Date

APPROVED:

Lorraine Mintzmyer	8/29/86
Regional Director	Date

BIENNIAL REVIEW

of

Land Protection Plan

Dinosaur National Monument

This addendum updates the Land Protection Plan for Dinosaur National Monument which was approved as a component of the General Management Plan August 29, 1986 with last revision being July 1988.

Plan implementation

Progress in implementing the recommendations in the 1986 plan has been limited to preliminary discussions and negotiations in relation to potential land exchanges. The possibility of energy related development remains a threat but has not increased significantly.

Changes to Plan

No changes are suggested and no interim protection measures are known that would forestall adverse land use or mitigate their impact on park resources.

Clarification of Plan

We have reviewed the plan and conclude that there is no need for clarification in light of GAO comments on land protection plans.

Approved: Dick Huff 4/12/91
Superintendent Date

Concur: Jack Meeker 4/15/91
Acting Regional Director Date

Addendum to
Land Protection Plan For
Dinosaur National Monument
July, 1988

This Addendum updates the Dinosaur National Monument Land Protection Plan which was approved on August 29, 1986.

Plan Implementation

The following progress has been made to date in implementing the land protection plan since plan approval in 1986:

(1) Federal Register notices have been published for the withdrawal of the Deerlodge road, right-of-way, and scenic easement.

(2) A Federal Register notice is in process for the withdrawal of the spur road between the Deerlodge road and the Cross Mountain overlook.

(3) An appraisal has been completed on the Leon Ross properties (tract numbers 07-103, 07-104; 114.79, 200 acres respectively) and negotiations are underway to purchase the properties.

(4) Pursuant to a U.S. District Court Consent Decree, the state of Utah has agreed to exchange parcels 02-103 and 02-108 for lands outside the park.

(5) Solicitor's Opinions dated in 1986, for Grand Teton National Park provide that the NPS may compensate grazing permittees for federal range privileges appurtenant to base lands outside the park. Since Dinosaur's legislation directing termination of grazing is virtually identical to that of Grand Teton N.P., the Solicitor's Office has indicated that the Opinion is also applicable to Dinosaur. We have further requested an Opinion on the compensability of grazing privileges appurtenant to base lands inside the park (inholdings). Initial indications from the Solicitor's Office are that such privileges are indeed compensable. We still await formal notification. The effect of these Opinions could increase the likelihood of purchasing

inholdings and speed the termination of grazing in the monument.

Changes to Plan

No changes are suggested and no interim protection measures are known that would forestall adverse land uses or mitigate their impact on park resources.

Clarification of Plan

We have reviewed the Plan and conclude there is no need to clarify it further in response to GAO's comments on land protection plans.

Approved: Dick K. Huff 7/7/88
Superintendent Date

Concur: Jack Neisler 7/14/88
Regional Director Acting Date

GENERAL MANAGEMENT PLAN
DEVELOPMENT CONCEPT PLANS
LAND PROTECTION PLAN
ENVIRONMENTAL ASSESSMENT

DINOSAUR NATIONAL MONUMENT
Moffat County, Colorado
Uintah County, Utah

U.S. Department of the Interior / National Park Service

SUMMARY

The purpose of this final plan is to guide management of Dinosaur National Monument so its resources will be managed as a total environment, perpetuating the natural, historic, and prehistoric features for which the area was established. The "Land Protection Plan" section of the document is concerned with the future of nonfederally owned lands within the monument and potential adverse effects from lands adjacent to the monument. Five alternatives for managing Dinosaur over the next 15 years are presented in this document. These alternatives provide for varying levels of resources management, development, visitor use, staffing, and monument operations, and they address health and safety standards in slightly different ways.

The main issues considered in this document are: meeting legislative and NPS mandates for endangered species protection, floodplain management, and wetland protection; protection of cultural and paleontological features; inadequate directional signing inside and outside the monument; outdated exhibits and literature; insufficient staffing for interpretation, resource protection, and maintenance; inconvenient intermonument travel; unsafe/undulating/slumping sections of certain roads and roads in need of general repair and maintenance; establishment of new trails; and storage space for vehicles and heavy equipment.

Of the five alternatives, one is the preferred alternative; this proposal contains the actions necessary to meet legislative mandates; protect the monument's natural and cultural resources; upgrade facilities, signing, staffing, and services necessary to support the recreational uses already established; upgrade roads and repair hazardous sections; and improve visitor opportunities to see and learn about the unique resources of the monument.

Alternative 1, the no-action alternative, is a continuation of existing management activities. The resources management actions described in the preferred alternative would be implemented only as funds allowed. Alternative 2 would implement the resources protection recommendations of the preferred and would provide only minimum actions necessary to upgrade facilities and improve visitor use. Alternatives 3 and 4 would implement the preferred alternative as well as expand current visitor use opportunities through greatly improved access.

The environmental consequences of the alternatives vary according to the scale of development or programs proposed. Implementation of the no-action alternative would have adverse effects on soils, vegetation, wildlife, threatened and endangered species, and archeological and historic resources. The preferred alternative and alternative 2 would have the same adverse effects as no action on soils, vegetation, wildlife, and threatened and endangered species; however, the preferred alternative would have beneficial effects on paleontological and historic resources and would enhance visitor enjoyment of the monument. Alternatives 3 and 4 would have greater impacts on soils, vegetation,

threatened and endangered species, and visual quality than any of the other alternatives. However, these two alternatives would benefit visitors to greater extent than the other alternatives. The land protection plan proposal would benefit visitors and the natural and cultural environments, but would limit use and development of nonfederal land within the monument.

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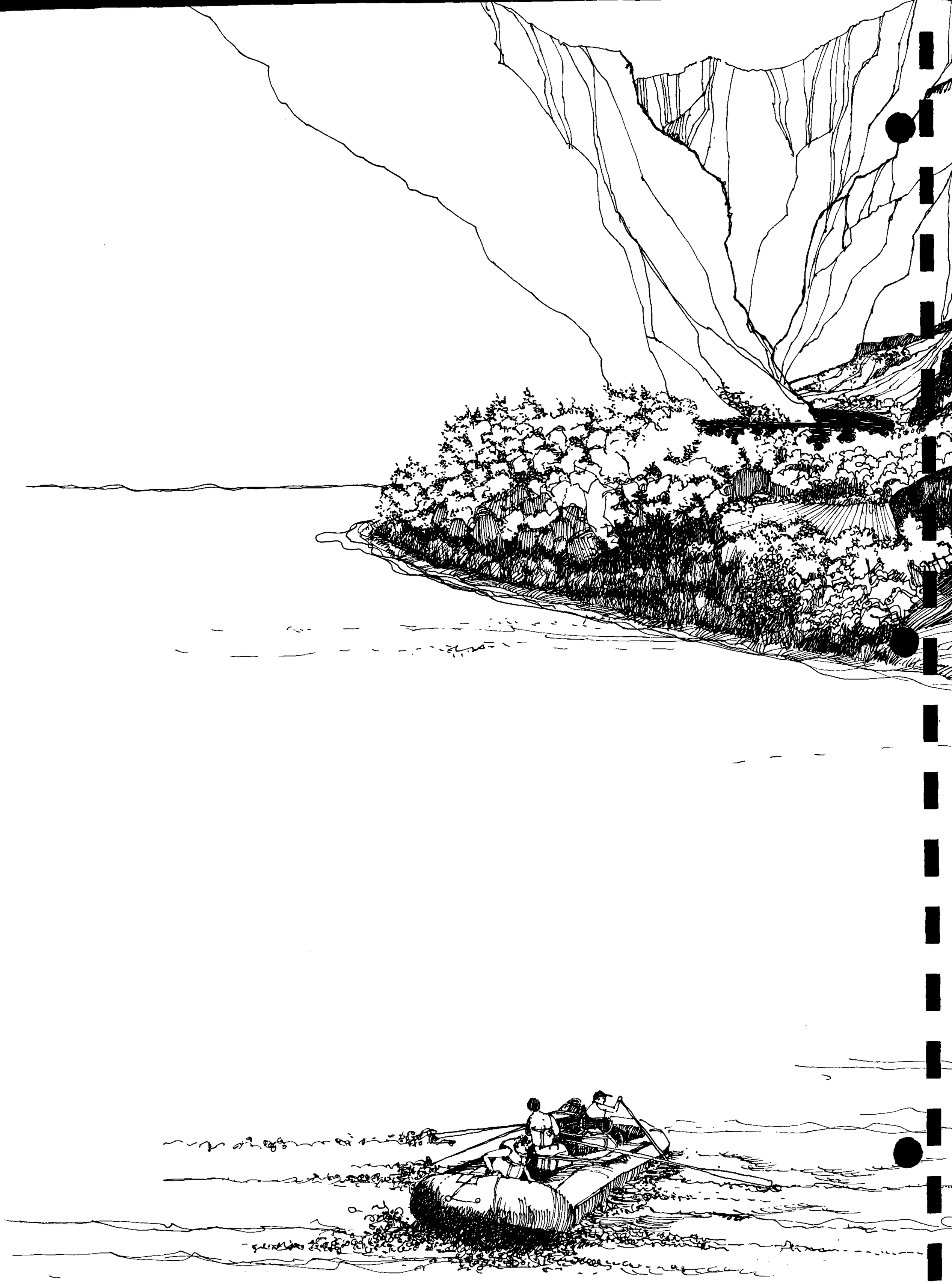


INTRODUCTION

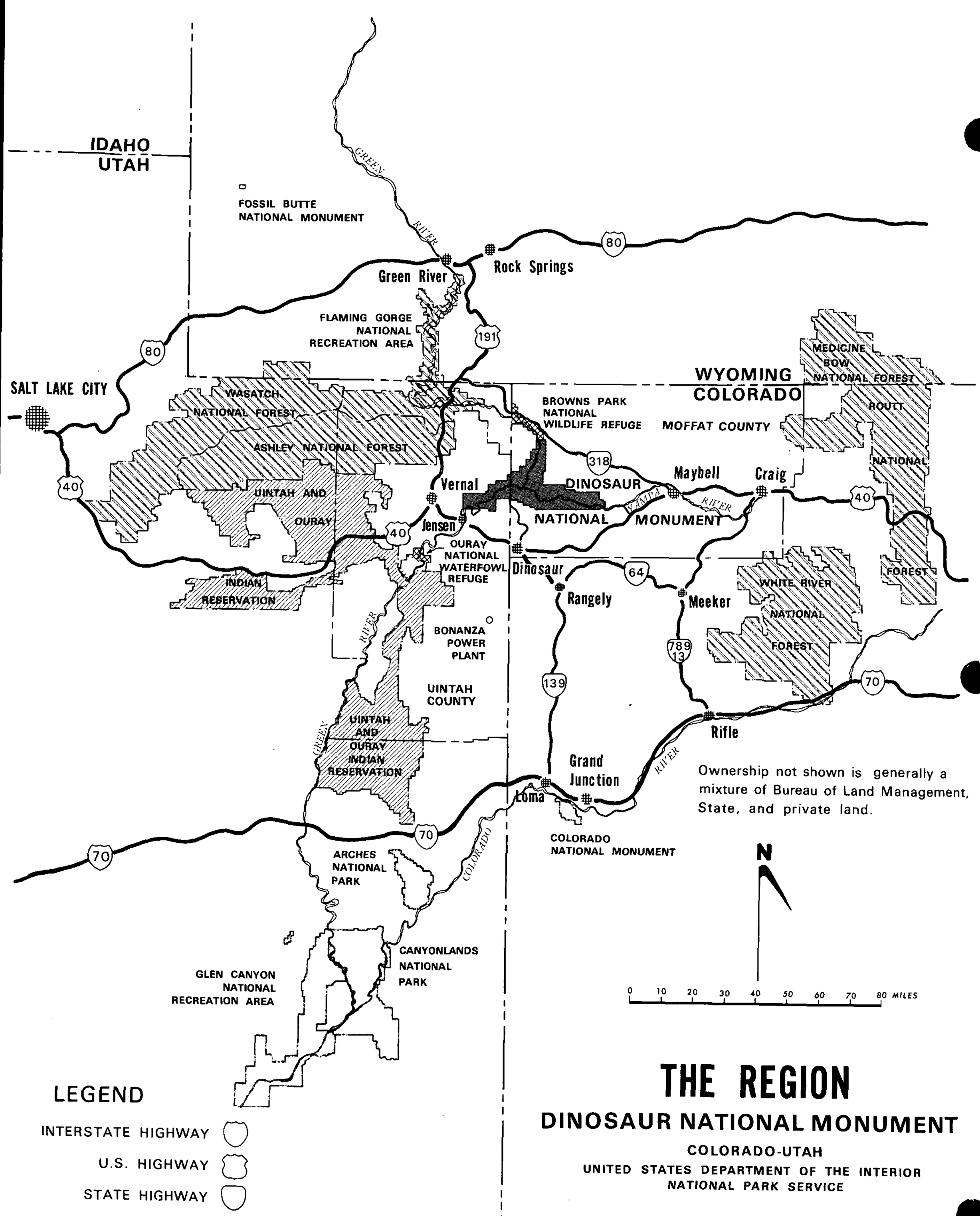
Lying in the high plateau country of Colorado and Utah, Dinosaur National Monument contains paleontological, geological, archeological, historical, scenic, recreational, and educational resources of national significance. The best-known resource is the world-renowned dinosaur quarry. Displaying Jurassic dinosaurs in relief on the rock face, the quarry has been extensively studied and presents an unrivaled demonstration of paleontological techniques. Landscapes in the lesser-known but equally significant plateau/canyon country contain rocks of many other geologic ages spanning 1.1 billion years--a more complete geologic record than that in the Grand Canyon.

Prehistorically, the monument is significant as a transition zone between Desert, Intermontane, and High Plains cultures (8000 B.C. to A.D. 950) and for fine examples of the Fremont culture (A.D. 950-1150). During historic times the area was occupied by Ute and Shoshone Indians and visited by trappers, gold seekers, and scientist/adventurers like John Wesley Powell. Settlement followed exploration, and the monument today retains many remnants of its homesteading, ranching, and outlaw history.

The monument provides unique educational opportunities for visitors, students, and scholars. Recreational opportunities include viewing scenery, hiking, camping, and rafting the Green and Yampa rivers. The Yampa is the only remaining large tributary in the Colorado River system that retains its free-flowing character, giving the river rafter an experience of unusual quality. For more detailed information about the monument's significant geological features, processes, and history; the plant and animal communities; the various scenic resources; the exploration/settlement history; scientific importance; conservation programs/management; and recreational opportunities, see appendix C.

Dinosaur was established by Presidential Proclamation 1313 on October 4, 1915 (39 Stat. 1752), as an 80-acre monument to preserve the outstanding fossil resources at the dinosaur quarry north of Jensen, Utah (see appendix A). After establishment, paleontologic excavations and research by the Carnegie Museum and other institutions were more evident than the presence of the National Park Service. This changed as the Park Service began to formulate plans for construction of a facility to exhibit the remaining fossils in place.

In 1938 the monument was enlarged to 203,885 acres by Presidential Proclamation 2290 (53 Stat. 2454). This proclamation (see appendix A) cited the act of August 25, 1916, that established the Park Service (16 U.S.C. 1a-7), thereby specifically identifying Dinosaur National Monument as an area to be administered for purposes of preservation of natural resources and public use. It also vastly expanded the land base and the administrative responsibilities of the Park Service to include the river corridors and adjacent viewsheds for the major canyons of the Green and Yampa rivers.



Ownership not shown is generally a mixture of Bureau of Land Management, State, and private land.

THE REGION

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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Based on the proclamations of 1915 and 1938, the purpose of Dinosaur National Monument is to provide for protection and visitor enjoyment of the outstanding fossil resources and the scenic canyon areas of the Green and Yampa rivers. Although the monument has many recreational opportunities, there are two primary visitor groups who visit the monument--those who come to see the fossils and those who boat through the canyons.

Following a controversy in the 1950s that culminated in decisions not to construct major dams within the monument, Congress enacted legislation that specified direction for future use and preservation of the monument. This act (Public Law 86-729, September 8, 1960; 74 Stat. 857, see appendix A) made minor revisions in the boundary, enlarging the monument to 211,141.69 acres, authorized acquisition of land for construction of entrance roads and administrative sites, and required that grazing eventually be eliminated from the monument.*

Since the enactment of the 1960 legislation, Dinosaur has not had an approved general management plan. Development has proceeded on a case-by-case basis, responding to the visitor activities that have gradually evolved over the years and taking advantage of the limited available funds. Managers at the monument have become increasingly aware of the need for a detailed parkwide plan. This development has generally included making the quarry and canyon sections of the monument accessible to a public with varied interests (camping, backcountry touring, whitewater boating, and viewing fossils). Management also has fostered research with its limited funds, thereby confirming its responsibility to monitor and protect the natural resources and processes and to emphasize the additional need to study, register, and protect outstanding cultural resources.

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*A detailed account of National Park Service management since 1916 is contained in "An Administrative History of Dinosaur National Monument" (NPS 1967).

PURPOSE OF AND NEED FOR THE PLAN

A general management plan for Dinosaur National Monument is needed to fulfill management objectives, and to guide management, use, and development for the next 15 years. A complete list of the monument's management objectives is in appendix B; the primary objectives are to protect and preserve the natural and cultural environments; to permit biological, geological, and other natural processes to continue with a minimum of human disturbance; and to provide opportunities for enjoyable visitor experiences as well as an understanding of the significance of monument resources.

In planning to meet these management objectives, constraints and problems must be taken into account. These concerns are summarized in this section and the alternative solutions are addressed later in this General Management Plan/Environmental Assessment.

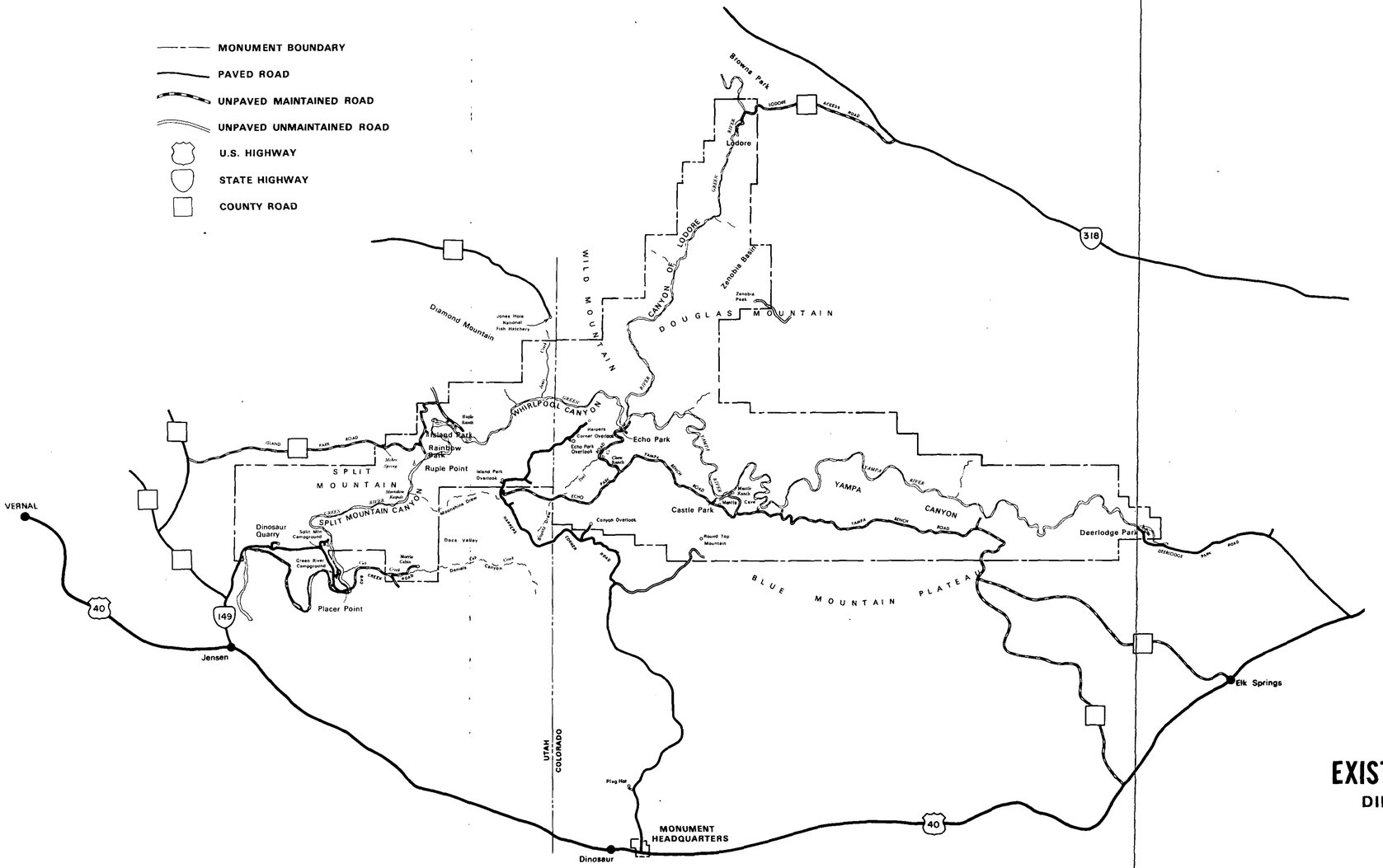
LEGAL, ADMINISTRATIVE, AND ENVIRONMENTAL CONSTRAINTS

Constraints placed on planning and management by the 1960 legislation (see appendix A) include the restriction on acquisition of land for the administrative headquarters to not more than 400 acres and the provision that interest in land for access roads from US 40 consist of fee title to a right-of-way of not more than an average of 25 acres per mile and of scenic easements on lands adjoining the right-of-way not to exceed an average of 100 acres per mile. This legislation also calls for the phaseout of grazing within the monument.

Because of the requirements of Executive Order 11988, "Floodplain Management", (3 CFR 121, Supp. 1977), and Executive Order 11990, "Protection of Wetlands" (3 CFR 121, Supp. 1977), as well as the final NPS procedures for implementing these orders, certain restrictions must be placed on development and use. Mapping of the 100- and 500-year floodplains was performed by the U.S. Army Corps of Engineers for the headquarters area, Quarry area, Placer Point, the Green River and Split Mountain campgrounds, Rainbow Park, Echo Park, and the Ruple ranch area. The Park Service determined floodplains for development at Deerlodge Park, and the Bureau of Reclamation provided floodplain information for Lodore. Based on the results of these surveys, a statement of findings will be prepared for any developments remaining or proposed in the 100-year and 500-year floodplains, as required by NPS final procedures (45 FR 35916 as revised by 47 FR 36718). The potential for flash flooding was evaluated.

A possible requirement for restoring/improving boat ramp facilities is that Army Corps of Engineers 404 permits may be required prior to alterations to riverbanks or riverbeds.

Certain problems concerning the monument involve agencies and interests other than the National Park Service. A number of ongoing governmental



EXISTING CONDITIONS / PLACENAMES

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
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programs relate to these problems, and agreements with other federal/county/state/local groups is sought when needed--for example for fire management and for wildlife management (feral horses, cattle trepassing on monument land from adjacent allotment areas, and Mormon cricket migrations).

The climate in the region affects development planning. Summer temperatures can be uncomfortable in unshaded areas at lower elevations. Snowfall is generally light, but accumulations cover the ground during most of the winter months. Monument roads at higher elevations are generally closed from December through April because of snow drifts.

A wilderness study was completed in January 1973, and a recommendation was submitted to Congress by President Ford on December 4, 1974, for the immediate designation of 165,341 acres as wilderness and 10,274 acres as potential wilderness additions. Modifications have since taken place mainly because of acquisition of land and closure of roads associated with former grazing rights. The current wilderness recommendation is for immediate designation of 186,328 acres as wilderness and 4,215 acres as potential wilderness additions.

VISITOR USE ISSUES

Orientation

For many vehicular visitors, Dinosaur is not a destination park, but rather a rewarding stop on a longer trip. Because of the name of the monument and considerable public interest in dinosaurs, numerous visitors expect to drive into the monument, see the fossils, and leave. There are several entrance roads to the monument, and some people assume the fossils can be seen wherever they choose to enter, not realizing that the park is really a vast scenic area of canyons and rivers with only one developed fossil site. Because of confusing signing at various locations inside and outside of the monument, there is a need to address sign issues to more properly direct visitors.

Information and Interpretation

There are two centers where visitors can get information about the monument--one at monument headquarters east of Dinosaur, Colorado, and the other at the shuttlebus station near the quarry building. At these two centers the National Park Service is not able to distribute information effectively. The number of interpreters is inadequate to keep the centers staffed for 8 hours each day during the main summer season (May through September), the centers are not open or staffed at all times during other seasons, and some of the literature, the exhibits, and the audiovisual program are 20 years old. The shuttlebus station is currently a poorly designed facility for dispensing information and is only used for storage purposes.

A great deal of information about the monument and its resources has been compiled in the past 20 years and it would be helpful in encouraging visitors to stay longer at the monument. The outdated exhibits and literature do not really suggest how additional time could be spent to see the spectacular landscapes, the interesting historic and archeological sites, and other features of the monument. (See appendix C for an inventory of resources.) Information about backcountry car trips is sparse. Maps are available, but many do not interpret specific features along the way.

Besides the lack of effective information and interpretation at the two centers, entry into the monument on certain roads normally precludes visits to the centers (e.g., Island Park, Deerlodge Park, and Lodore roads). First-time visitors have little understanding of the scenic, natural, and cultural resources they are seeing or that exist elsewhere in the monument because interpretation is not available at these sites. These deficiencies are not easily resolved because of an outdated interpretive prospectus and the lack of a parkwide exhibit plan.

Effective interpretation of resources is concentrated in the Quarry area and most interpretation at the quarry itself is specialized toward paleontology. Options for seeing spectacular Split Mountain Gorge or for visiting unusual rock art in the picturesque Cub Creek area are not made clear to most visitors. The colorful landscapes and upturned rock strata between the shuttlebus station and quarry building are not interpreted.

Half of the visitor hours in the monument are spent on river trips where no interpretation other than in a few commercial river guidebooks is provided. River users are not receiving all information needed to ensure an enjoyable visit and to adequately inform visitors about potential hikes, interesting wildlife and features, or ways to protect resources while using the environment. There may not be enough ranger positions to provide this interpretation.

The issues are how to improve visitor orientation to the park, the lack of a current interpretive prospectus and wayside exhibit plan, the lack of interpretation of park resources other than the quarry fossils, and the lack of interpretive personnel.

Circulation

There are two principal areas of day use in the monument--the Quarry area and Harpers Corner road. To get from one principal area to another by passenger car, one must leave the monument and drive several hours through terrain with limited scenic interest. If a visitor at the quarry decided to see the heart of the country canyon, the only way is to drive back to Jensen, east on US 40 to the headquarters, and back into the monument on the Harpers Corner road. This takes two hours. The issue is should distantly separated parts of the monument be connected more directly for visitor convenience and less travel time. Hand-in-hand with this is the question of whether new roads are needed for visitors to

see resources not now accessible, including the colorful landscapes and geological features outside the monument. This concept has been discussed since enactment of the 1960 legislation: joining the Quarry and Harpers Corner areas more directly by road so that larger numbers of visitors can see both areas and enjoy touring through the spectacular terrain between them. The only known option is developing the Point of Pines road between Cub Creek (Quarry area) and Harpers Corner road (canyon area) (see Road Improvements map in "Affected Environment" section). This long-standing idea for a Point of Pines road needs to be examined, its feasibility determined, and its future decided.

Recreation

Facilities at most boat ramp sites are inadequate for large numbers of boating visitors. This is particularly true of parking areas and ramps where uses by boaters, campers, and other visitors often conflict. Some of the ramp facilities are undersized and/or improperly located.

At Split Mountain, the most scenic section of river near the quarry, the number of boaters using the ramps has outgrown the capacity of facilities, and boating use conflicts with other uses. Camping at Split Mountain is traditional and popular, thus this campground fills up before Green Mountain campground, and it is used to capacity most of the summer. Much available space at Split Mountain is covered by campsites, boat ramps, nature trail access, roadways, and parking. Hikers and other day users wanting to enjoy this scenic place concentrate there along with the boaters and campers. These activities center in a 200-yard radius. From May to September dozens of boats come off the river from midday to evening, and there is insufficient room to deflate and load all these boats on one small ramp. There is one pit toilet at the ramp, which is not adequate for the number of boaters. Drivers waiting for boaters have no place to park, nor do general sightseers. Boat trailers further congest the roadways. The issues are the limited size of the boat ramp, the location and design of the ramp, and how the conflict for space between boaters, campers, and day users can best be resolved.

At Deerlodge Park the river channel is shifting westward toward the campground. The boat ramp is eroding away as quickly as it can be reexcavated in the steep, dirt embankment. At Lodore the river channel is moving away from the boat ramp, leaving it high and dry. Because people cannot launch there when the river is low, they use informal launch areas elsewhere along the banks. This results in poorly controlled access and damage to vegetation and soil. At Echo Park boaters midway on their trip must climb a steep bank and walk to the campground to get water and to use toilets, and they must stop again about 3/4 mile down the river to discard trash. There is no one-stop point for these boaters. The boating issues at Deerlodge Park and Lodore are what boat ramp designs and locations would be best, and at Echo Park the issue is how services can be consolidated.

Other recreational issues include no place for groups to camp together in the Quarry area campgrounds (small groups can split up into individual sites where they may be distractive to adjacent individual campers; large groups may be denied), and the absence of a formal picnicking site in the Quarry area (picnicking occasionally competes with camping).

Safety/Sanitation

Some campgrounds that receive heavy use are within the 100-year floodplain. The National Park Service cannot guarantee personal safety or protect personal property from destructive effects of rising floodwaters. If floodwaters rise, even slowly over the matter of a few hours, there is some potential in remote locations for damage to vehicles and camping equipment. Even with low velocity floodwater, small children, and some elderly and handicapped visitors might not have the strength to avoid being injured or drowned. Government facilities as now constructed cannot be protected from damage. Currents could remove or deposit sediment on roads, and water could soak and severely damage ranger stations, residences, and maintenance buildings. At Green River, Deerlodge Park, and Lodore, sewage could enter floodwaters, resulting in contamination. These conditions are contrary to NPS final procedures for implementing executive orders 11988 "Floodplain Management" and 11990 "Protection of Wetlands" (NPS 1982), and compliance is required.

Visitors choosing to walk from the shuttlebus station to the quarry building must do so on the roadway used by the shuttlebus. For the shuttle to travel the steep grade, it must move at an appropriate speed, and pedestrians must be on alert to stand aside a safe distance.

Another safety issue in the monument involves undulating/slumping sections along certain roads. This issue is discussed in detail in the next section under development issues.

DEVELOPMENT ISSUES

Roads

Quarry Area. On the quarry entrance road there is a chronic, long-term, slumping problem about 2/10 mile north of the monument entrance. This ½-mile portion of the road, which closely parallels the river, sinks because it is on saturated expansive clay. As this section of the road has slowly sunk, up to 5 feet of asphalt has been gradually added to the road surface to keep it safe. However, there is potential for this unstable section of road to slump all at once. If a large slump occurred after dark, visitors could drive into the resulting chasm. If massive slumping did occur in the peak travel season, up to 600 visitors could be stranded in the Quarry area until temporary repairs were made. In case of a large displacement, this could be two days or more. Emergency reconstruction might take much longer than planned reconstruction and might not allow for normal traffic to resume as soon.

The Quarry and Cub Creek areas could be closed to visitor traffic for months. A long-term engineering solution for this problem is made more complicated because in the Green River just below this area is a nursery habitat for the endangered Colorado squawfish. A change in the channel configuration or an increase in the sediment load could adversely affect this habitat so reconstruction has the potential to affect the squawfish if not carefully designed.

There is another major problem where the Split Mountain spur road leaves the main Quarry area road. This 2/10-mile section of the main road is unsafe because of undulations caused by the underlying expansive soils. Heavily loaded vehicles or those pulling trailers, traveling only at a moderate speed, could be forced out of control and leave the road.

On the Cub Creek road a 1/10-mile section between steep embankments and a cliff could be suddenly and completely lost because of major flooding in the creek. Such an event could strand up to 20 vehicles for days. When dry, this road is extremely dusty; when wet it is muddy and becomes rutted. Increasing numbers of visitors use the road to see the Cub Creek area, including the rock art and the Morris cabin.

Other than these major problems, the asphalt surface of most of the quarry entrance road is cracked, and in some places it is highly distressed, distorted, and subject to sinking. It is deteriorating more rapidly than it can be maintained.

Harpers Corner Road. There are three major earthslide areas on the Harpers Corner road. The most serious is 6 miles north of monument headquarters where landsliding is natural to the steep slopes and unstable soils. Erosion here is mass slippage, meaning the road here could slip all at once. Someone could be injured or killed if they drove off the resulting embankment.

There are two other slide areas on the Harpers Corner road north of the area mentioned above. They are not as likely to slide suddenly and therefore are not as dangerous. Poor drainage and saturated soils cause most of these problems. These sections of road have had past histories of temporary closure.

The asphalt surface of most of the Harpers Corner road, including spurs and overlooks, is cracked and there are areas of vertical distortion because of underlying expansive soils. The road was never surfaced with a final layer of asphalt. In some areas the asphalt surface is oxidizing and releasing the aggregate as loose gravel.

Echo Park Road. This narrow road provides access to the scenic heart of the monument--the confluence of the Green and Yampa rivers. It has relatively low use, probably averaging 10 vehicles daily in summer. This dirt road is subject to rutting and to closure because of severe washouts. For about 2 miles in Sand Canyon, the streambed crosses the road in several places. Poor drainage and lack of all-weather surfacing (gravel) adds to these problems, and during short or prolonged rain vehicles

become stuck because of the impassible mud surface. People can be stranded for a few hours to two or three days. After major washouts, vehicles could be stranded for a longer period.

Yampa Bench Road. This narrow, winding, dusty road is used by only a few adventuresome visitors--some even in passenger cars. During heavy rain low sections of the road below ground level act as a drainage channel resulting in washouts and severe ruts; on the remainder of the road crossed by drainages, gullies a few inches to 2 feet deep can form quickly, potentially damaging vehicles or causing accidents. Drainage is poor and in some places clay soils turn to mud and vehicles can become mired. Along the eastern portion of the road steep grades (up to 20 percent) with curves increase the risk of vehicles colliding--even considering the light volume of traffic on this road. After a thunderstorm visitors could be stranded a few hours to three days or more because of washouts, gullies, and the steep hills with clay soil that turn to an impassible mud surface.

Island Park/Rainbow Park Road. Floods in the stream channel near McKee Spring sometimes completely remove the road. The rest of the road is poorly drained, and in some places mud causes vehicles to be stuck or to slide off the road. Deep rutting occurs in the clay soils. There are few culverts, and those in place become clogged. Portions of the road are below ground level and become drainage channels during heavy rain. Visitors on the one-day river trips starting at Rainbow Park must travel this road in concession-operated vans. Closure because of heavy rains and flooding sometimes stops these commercial trips, the private one-day trips, and all other visitors traveling to Island Park.

Deerlodge Park Road. The final asphalt surface was never applied to this road and pavement cracking is common. In some areas the road is on expansive soils, resulting in undulations capable of causing drivers of heavily loaded vehicles or those with trailers to loose control and leave the road even when they are driving at a moderate speed. Flooding of localized cross drainages sometimes covers the road with loose rock because culverts are too small and become clogged.

Lodore Road. This graded road, which leads to the heavily used boat ramp at Gates of Lodore, has only a thin gravel base. The main county road north of the monument in Browns Park is paved, and the dusty gravel road leading south into the monument is a noticeable contrast.

A major regional storm could damage several backcountry monument roads simultaneously, likely stranding visitors in more than one area, hampering efforts of rangers and maintenance personnel to reach them, and requiring considerable time for repair and reopening of all the roads. (The monument has only one dump truck and one grader to perform all maintenance on 130 miles of road.)

Trails

There are only three short, self-guiding nature trails in the more popular visitor use areas (Split Mountain, Harpers Corner, and Lodore). The only other formal trails--to Ruple Point (Harpers Corner road), and from Island Park to Jones Hole Creek and along Jones Hole Creek itself--are primitive and unmaintained.

In some places interesting natural and cultural features shown in the literature are within walking distance of major and secondary roads, but these attractions are not easily reached because trails are not maintained or clearly designated. Visitors do not know how to get to these destinations or where the trails start or end, and often they will not attempt the trails at all. The visitors who do try to walk to the features may become confused on poorly defined, interweaving "social" trails, and this use damages the vegetation, compacts soil and causes it to erode, and damages archeological resources in some places. Examples are at Cub Creek and McKee Spring, where unplanned, uninterpreted social trails to the petroglyphs traverse steep rocky slopes. Also in Cub Creek at the Morris Ranch ill-defined social trails lead to adjacent scenic canyons. Other informal trails and hiking routes begin on the rivers and typically follow scenic side canyons; there is no reason to change these primitive paths because they are consistent with the backcountry experience, although there is need for the hiking opportunities to be better identified and interpreted. At Chew Ranch on the Echo Park road the route to Pats Cave is not marked, and this interesting feature is difficult to find.

The old Outlaw Trail is believed to cross the monument between Cub Creek and Lodore; it is not interpreted or marked. Part of the route crosses private and federal land outside the monument boundary, and the general route and its historic significance have not been determined. Although most visitors are unaware of the existence of the Outlaw Trail, inquiries about its existence and use are increasing.

Many large sections of the monument are seldom visited because of the lack of trails. The issue is whether or not, considering the opportunities for trails, the likely volume of use would justify their expense. This includes long-distance and extensive loop trails for use on foot or by horse; currently there are none in the monument. As mentioned before, construction of short trails to interesting features where only informal paths lead now is a separate issue.

Utilities

The overhead utilities at the quarry building and in Split Mountain and Green River campgrounds are noticeable and detract from the visual quality of those places.

In many outlying developments, both in and outside of the 100-year floodplain, pit toilets are usually provided. These facilities do not meet generally accepted sanitation standards for use by large numbers of

people, and those that are in the 100-year floodplain are not floodproofed and therefore they are not in compliance with floodplain regulations.

MANAGEMENT AND OPERATIONS ISSUES

Because there are many remote areas and resources scattered throughout the monument, the limited staff has difficulty protecting and monitoring the environment to comply with legislation/statutes relating to grazing management and protection of endangered species, other wildlife, archeological sites, water quality, and other resources. Major backcountry areas along the rivers (such as Island Park and Echo Park) can be patrolled only sporadically by seasonal staff during the main visitor season. Nearly half the visitor hours spent by visitors in the monument are on river trips, yet the canyon areas are little traveled by rangers, and there is no interpretation by uniformed personnel on the safe and resource-conscious use of the resources. Maintenance staff is limited and the park has relatively little heavy equipment to maintain the roads.

At the quarry building circulation of visitors in exhibit and sales areas is congested and inefficiently used. Offices are poorly designed for staff functions. Because the building is on expansive clay soils its foundations shift, causing many problems--windows that will not open, an overhead hoist that won't function properly, and gaps where the building is separated from the foundation.

At the quarry and headquarters maintenance areas the lack of storage space for vehicles and heavy equipment results in deterioration of property and inordinate warm-up time during winter. Neither location has a vehicle wash area to remove mud and dust which adheres to and damages vehicles. At the quarry maintenance area space for storage and use of maintenance and protection equipment is inadequate. The fire truck fills its storage bay, leaving little space to store hand tools and other equipment essential to fire suppression. The fire management plan cannot be fully implemented in this district until there is space to store more equipment. The two bays used for maintenance work are stacked with various types of equipment and supplies. Diverse work taking place in this area is hampered by conflicts between the different activities and lack of space because of the cramped storage. Two old metal sheds below the quarry building are not being actively used and are not in a convenient location for storage. The issues are the lack of safe and convenient work and storage space, proper storage of emergency and heavy equipment vehicles to ensure their intended use when needed, and decreased managerial efficiency.

No local, state, or federal managers with whom the monument superintendent must work are within convenient driving distance of headquarters. This includes the Bureau of Land Management in Vernal, 30 miles west, or Craig, 90 miles east. The natural resource staff who deal with fire, wildlife, and range management are in the same situation. Certain administrative and interagency functions cannot be carried out as

easily from the present headquarters as they could be from Vernal. Because of the monument's relatively remote location, it is difficult to recruit qualified lower-grade administrative employees from distant communities. Available housing for staff at headquarters is too expensive for these employees to rent. The issue is whether certain staff functions at monument headquarters are located in the most efficient location.

Seasonal quarters in remote areas at Island Park, Lodore, and Echo Park may be in need of rehabilitation or are in unsuitable locations within the development sites.

RESOURCE ISSUES

Several significant natural resource management issues have been identified or clarified in recent years as part of ongoing research and study. The Natural Resource Management Plan and Environmental Assessment (NPS 1983c) and the River Management Plan (NPS 1979b) address several of these important issues, including management of grazing and preservation of the Yampa River ecosystem. A summary of the measures already prescribed to resolve the numerous resource problems (detailed in these two approved plans) and the staffing required to implement those measures are in the proposal section of this general management plan.

The cultural resource component of the Natural Resource Management Plan is in preparation. That document will propose actions necessary to identify the significance of cultural resources and to preserve these diverse resources. However, a few issues related to cultural resources need immediate attention in the general management plan because they involve existing public use or may require new development. Most of this section addresses these issues.

Irreplaceable fossils in the monument's museum collections, or those yet to be catalogued therein, are stored in facilities that are grossly undersized. Laboratory space originally designed for preparation and study of fossils is crowded with temporary racks of specimens. Preservation of these fossils and numerous other museum items cannot be ensured because there is no control of temperature and humidity. The issue is a question of correcting substandard curatorial work areas to allow for proper cataloguing and treatment and secure storage. Acceptable environmental controls and provision for fire detection and suppression and intrusion detection are required by NPS-28, "Cultural Resources Management Guidelines," and other guidelines. Without meeting these established curatorial standards the prospects for deterioration and loss of these valuable resources are high.

Along these same lines the paleontological library at Dinosaur is not housed in an atmospherically controlled environment. This one-of-a-kind library has over 10,000 volumes, some of which date back to the 1830s. Some of these volumes are irreplaceable. None of the volumes have been catalogued. The issue is how to protect this valuable collection from disintegration and loss.

Certain cultural sites at Dinosaur have become better known in the past 20 years, and the popularity of visiting these places is increasing as the public discovers the backcountry. Because public use at Cub Creek, Rainbow Park, and Lodore is impacting cultural resources and because these resources are important to existing use, the general management plan contains interim proposals for their management.

At Cub Creek, east the Quarry area, and at McKee Spring, near Rainbow Park, ancient petroglyphs of exceptional quality are among the most renowned examples of Fremont rock art in the intermountain west. Visitors park and walk up steep slopes in both places to see the petroglyphs, wearing interlacing "social" paths that disturb soil probably containing other archeological resources. Cattle grazing, especially at Cub Creek, results in unsightly accumulation of manure at lower sections of the site nearest the road. There is little patrol or protection of these sites by limited National Park Service staff, and no exhibits or literature are available to advise visitors how to see the rock art without damaging it. People are not informed at the site that touching the rock art can damage it, and there continues to be a threat that vandalism in these remote areas, including using the petroglyphs for target practice, will occur again. The rate and extent of deterioration from human causes and natural weathering is not documented, and protective measures are virtually nonexistent.

The Morris ranch, at road's end in Cub Creek, has deteriorated from both vandalism and natural weathering. The logs and boards in the main cabin are decaying rapidly, and the whole structure is sinking and eventually will collapse unless action is taken to reverse this trend. A temporary wooden roof built over the cabin by the National Park Service is only slowing the deterioration and is not intended to be a long-term solution. Increasing numbers of visitors come to see the cabin and to begin hikes to nearby canyons. The maze of indefinite trails is confusing, and the paths lead visitors through ranch grounds that are scattered with deteriorating fences and outbuildings. The area is unsightly, and random use damages the resource. Ranger patrols are not frequent enough for effective protection and interpretation. The significance of Morris Ranch and of the Cub Creek area as a whole, including a portion of the Outlaw Trail, has not been determined by qualified cultural specialists, so there is inadequate basis for prescribing long-term protection of the resources there.

At Chew Ranch on the Echo Park road, there is a frame house, outbuildings, corrals, and grounds including shade trees. Travel is light in this remote area. However, the road passes through the middle of this site and the few visitors show considerable interest in it. Pats Cave, not far from the ranch up Pool Creek canyon, is little visited because there is no marked trail. Chew Ranch has deteriorated. Its structures are in disrepair, and the National Park Service has provided only minimal maintenance, pending evaluation of significance and future treatment by qualified cultural specialists.

The Douglass office, a one-room rock structure out of public sight behind the quarry building, is on unstable ground. Movement on steep slopes behind the structure is slowly forcing it from its foundation, and cracks are developing between the stones in its walls.

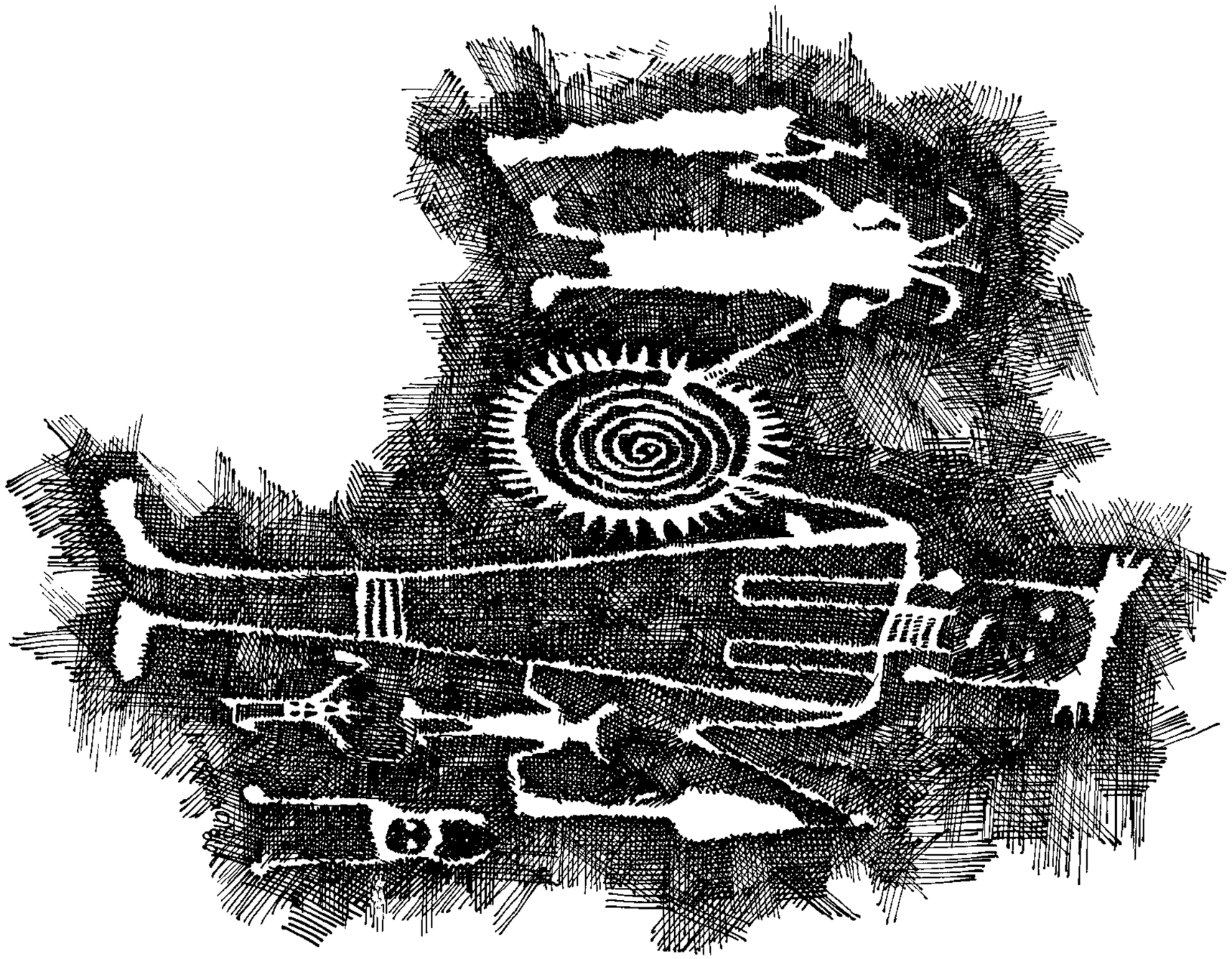
The oldest structure at Lodore, a one-room log cabin, is used occasionally to quarter seasonal rangers and maintenance workers. The chinking between the logs and the earth covering its roof are disintegrating, and a 100-year flood could severely damage or destroy the cabin. The cabin contributes to the setting at Lodore and it is needed for management purposes. Until its significance is determined, however, long-term plans for protecting it cannot be fully formulated.

The issue, then, is similar for these several historic and archeological sites which are in various locations and used to varying degrees by visitors and managers. The question is how these sites will be used without damaging them or allowing them to deteriorate further until long-term significance and protection studies can be completed.

Numerous other cultural resources such as cabins and archeological sites are scattered throughout the monument. Few of these sites are visited or known by the general public, yet several may be culturally significant. Although 404 individual archeological sites are recorded only an estimated 40 to 50 percent of the monument has received a reconnaissance-level survey for archeological resources. Vandalism and illegal collection of artifacts are evident at a few of these sites. Strategies to identify, inventory, document, evaluate, and monitor the condition of existing and yet-to-be discovered sites are not yet formulated. Without information and plans appropriate protection and interpretation cannot be prescribed, and significant cultural resources may deteriorate or be destroyed.

LAND PROTECTION ISSUES

The "Land Protection Plan," a later section of this document, addresses the uses of nonfederal land within the monument, how these uses affect the resources, and solutions where these problems exist. Land protection issues are discussed separately in that section.



THE PROPOSED ACTION AND ALTERNATIVES

INTRODUCTION

Five alternatives are presented here. These include the preferred alternative, which is the final general management plan of the National Park Service. These alternatives would provide for varying levels of visitor use and park operations, and they address health and safety standards in different ways. Land protection proposals are the same under all of the alternatives where action is recommended (i.e., all alternatives except "no action"). Management zoning establishes the overall strategies for management of lands within the boundary; zoning is based largely on resource values, with provision made for retention of existing development, and would be the same under all of the alternatives. Plans for managing natural resources have already been approved in the 1983 Natural Resources Management Plan and Environmental Assessment (NPS 1983c); these detailed actions are summarized under the preferred alternative. Specific proposals for managing cultural resources are now being formulated by the monument staff and, when approved, will become part of an overall resources management plan for the monument; however, the broad direction for cultural resource management is summarized under the preferred alternative.

Land protection proposals for Dinosaur are set forth for the first time in the "Land Protection Plan" section in this document; they include those actions proposed for nonfederal lands within the boundaries to ensure perpetuation of resource values and to support visitor use. The adverse effects of influences from outside the monument are also identified.

Alternatives for visitor use, development, and park operations range from no action (continuation of present management) to the establishment of new use patterns, and they describe the facilities that would be necessary to support these concepts. These concepts, along with the staffing needed to implement these alternatives, are identified in the visitor use sections. These alternatives are also evaluated in the "Environmental Consequences" section.

PREFERRED ALTERNATIVE (PROPOSED ACTION)

The preferred alternative, or proposed action, constitutes the National Park Service's final general management plan for Dinosaur National Monument. It describes the zoning and resources management considered necessary to protect and preserve monument resources, and it presents proposals for visitor use, staffing, and development. The primary goal of the preferred alternative is to upgrade the facilities and services necessary to support the recreational uses already established and to improve visitor opportunities to see and learn about monument resources.

LAND USE AND MANAGEMENT

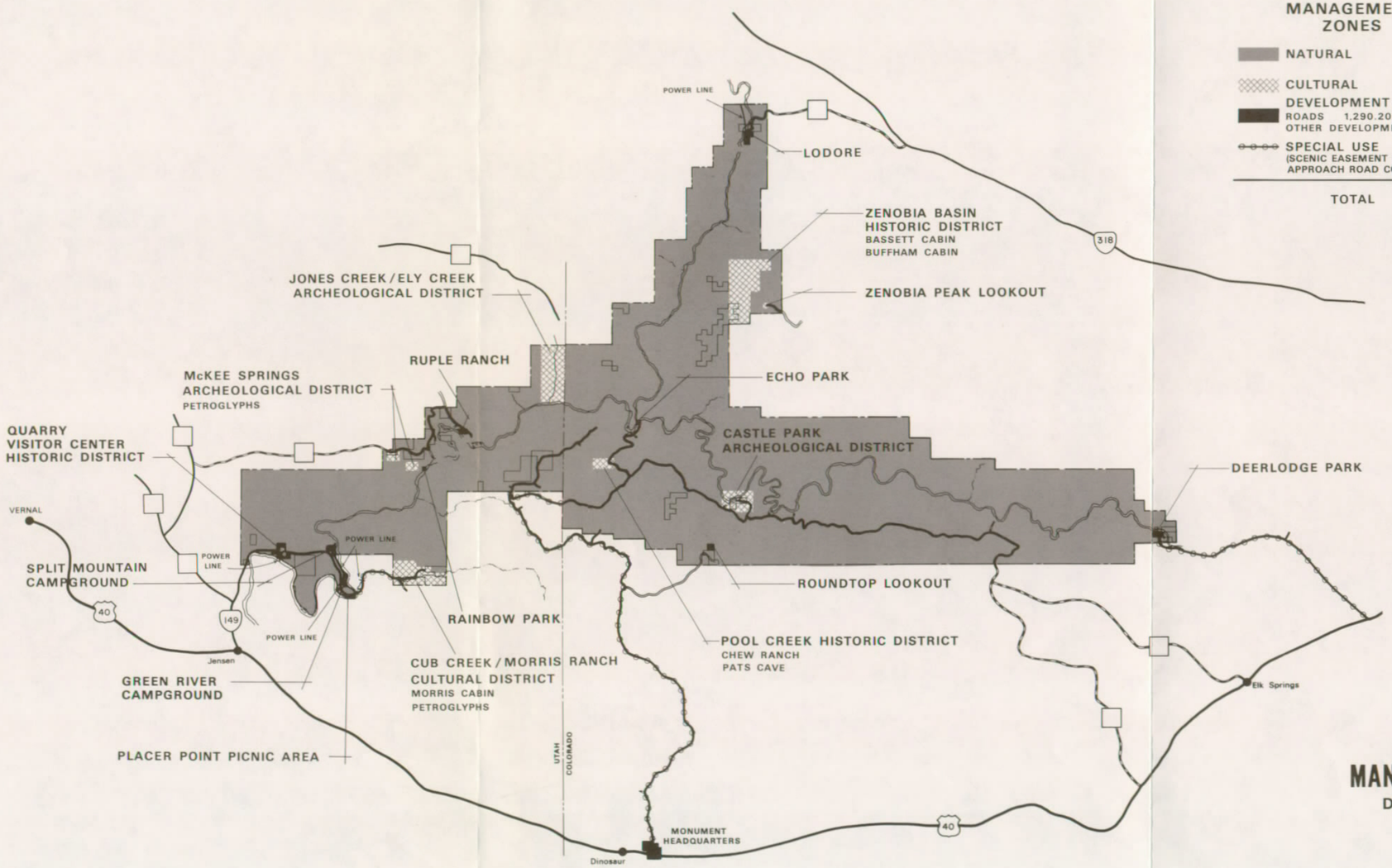
For NPS management purposes, and under all of the alternatives, the monument is divided into four zones--natural, cultural, development, and special use (see the Management Zoning Proposal map). The natural zone (196,821.12 acres) is managed to maintain the primitive character and natural processes of the monument while temporarily allowing domestic livestock grazing activities to continue in accord with legislation for the monument.

Management strategies in the cultural zone (7,509.00 acres) would focus on protection, interpretation, and selective restoration of historic and archeological resources. The development zone (2,368.40 acres) would provide the necessary space for visitor and management facilities and utilities. The special use zone (4,758.17 acres), consisting of scenic easements along approach roads, would be subject to agricultural and recreational uses that are compatible with protection of scenic values.

Table 1 summarizes this information and contains examples of permitted activities and development in each of the zones. Nonfederal lands (in the monument) are zoned to indicate the management strategy that would be used when necessary interests in these properties are eventually acquired by the National Park Service (see the "Land Protection Plan" section). Until that happened the preferred zoning would not apply.

There are 211,141.69 gross acres currently within the national monument boundary. Proposed management zoning acreage totals 211,456.69 acres. The extra 315 acres are for a proposed 1,000-foot-wide corridor for the Echo Park access road (described in the "Land Protection Plan" section).

The proposed cultural zones as shown on the Management Zoning Proposal map are tentative. These areas would be modified as necessary after a determination of significance by qualified professional historians and archeologists. Significant sites and districts would be nominated to the National Register of Historic Places.



MANAGEMENT ZONES	ACREAGE	% OF NATIONAL MONUMENT
NATURAL	196,821.12	93.0
CULTURAL	7,509.00	3.6
DEVELOPMENT ROADS 1,290.20 OTHER DEVELOPMENT 1,078.20	2,368.40	1.1
SPECIAL USE (SCENIC EASEMENT PORTION OF APPROACH ROAD CORRIDORS)	4,758.17	2.3
TOTAL	211,456.69	100

The 1,000-foot-wide road corridors outside the main boundary for the Deerlodge, Harpers Corner, Cub Creek, and Echo Park roads consist of a 200-foot-wide development zone, which includes the road and a 400-foot-wide special use zone on each side of the Development zone.

For roads inside the boundary, those that are paved or proposed for paving center on a 100-foot-wide development zone, and those that are not paved and power lines center on a 50-foot-wide development zone.

There are 211,141.69 gross acres within the national monument. The proposed management zoning totals 211,456.69. The extra 315 acres are for the proposed 1,000-foot-wide corridor outside the boundary for the access road leading to Echo Park.

OWNERSHIP

NONFEDERAL

All other is federally owned. Proposed zoning is shown for these nonfederal lands to indicate the management philosophy that would be used if ever acquired by the National Park Service. Until that happens this zoning would not apply. See later graphics to distinguish between surface and subsurface ownership.

N

0 1 2 4 6 8 10 MILES

MANAGEMENT ZONING PROPOSAL

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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AUG 85	DSC

ON MICROFILM

Table 1: Management Zones

	Natural Zone	Cultural Zone	Development Zone	Special Use Zone*
Permitted Activities**				
Recreational	Interpretation of natural features, hiking, camping, picnicking, backpacking, river rafting, canoeing, kayaking, fishing, horseback riding	Interpretation of historical, and archeological features	Scenic touring, hiking, picnicking, horseback riding, fishing, interpretive programs, camping	Hunting, hiking, horseback riding
Nonrecreational	Research and grazing	Research and grazing	Grazing and maintenance of utilities	Grazing
Comments	Grazing and ranching would eventually be eliminated	Grazing and ranching would eventually be eliminated	Grazing and ranching would eventually be eliminated	The above scenic easement activities could continue indefinitely. Scenic easements lie on each side of access roads to Deerlodge Park, Harpers Corner, and Cub Creek and are proposed along the upper part of the Echo Park corridor. Their width is 400 feet on each side for a total of 800 feet.
Permitted Development	Minimal facilities necessary for the preservation and enjoyment of natural values	Access to cultural resources, trails for confining and containing use, protective enclosures, interpretive facilities	Permanent structures to support visitor and management activities	Practices permitted by the terms of the scenic easements
Management Strategy	Perpetuation of natural processes and primitive character, use of resources subject to protection of natural values	Preservation, restoration where deemed appropriate by professional analysis, interpretation	Maintenance of the facilities, provision of visitor services	Consumption of renewable resources subject to protection of scenic values
Acreage	196,821.12	7,509.0	2,368.4	4,758.17
Percentage of Monument	93.0	3.6	1.1	2.3

TOTALS
211,456.69
100.0

*Scenic easements only
**Examples are not all-inclusive

RESOURCES MANAGEMENT

Natural Resources

The policies and regulations established by the National Park Service would be followed in the administration and management of natural resources. The protection and preservation of the natural environment to ensure ecosystem integrity while providing for visitor enjoyment would be the principal consideration. Biological, geological, and other natural processes would be permitted to continue with a minimum of human disturbance. However, because the monument is not free from man-made influences affecting ecosystems and their processes, some active manipulation (e.g., prescribed fires, reintroduction of extirpated species, and peregrine hack site management) would be necessary to meet the resource management objectives (see appendix B). Additional research is needed to establish a baseline against which human impacts on resources may be measured. When these data needs have been met and programs implemented to restore the natural systems of the monument (based on research), resource management programs would shift emphasis to monitoring resources and processes.

Programs for the study and protection of natural resources at Dinosaur have already been developed and assessed in the Natural Resources Management Plan and Environmental Assessment (NPS 1983c) and implementation is underway. Additional funding may be needed for implementation of these programs. Following is a brief description of the issues and actions proposed in the Natural Resource Management Plan; more detailed information can be found in that plan.

The management objectives for Dinosaur direct that grazing be managed to mitigate its adverse effects on natural ecosystems and to provide for a return to natural conditions. Grazing has an adverse effect on resources of the monument and will continue to affect land use decisions until it is eventually phased out as required by the 1960 legislation. Livestock consume vegetation and alter its natural composition and compete with wildlife for forage. Almost half of the grazing use terminated in 1985, but the remainder (80,160 acres, 2,556 AUMs) will continue temporarily for the lifetime of the original permittees and their heirs and/or until the NPS purchase of inholding base lands (see Grazing Allotments map in "Land Protection Plan" section). The proposal in the Natural Resource Management Plan includes construction of a boundary fence, development of allotment management plans, gradual acquisition of grazing base lands within the monument, and the initiation of range surveys and grazing impact studies. The surveys and studies will provide a baseline against which future changes can be measured.

The objectives also call for the protection of pristine air quality within legislative constraints. Dinosaur National Monument is currently a class II air quality area under the Prevention of Significant Deterioration provisions of the Clean Air Act, as amended (42 USC 7401 et seq.) and a category 1 under Colorado air quality standards. Two energy projects currently approved or under construction may soon approach or exceed

the allowable class II increment--the coal-fired Moon Lake power plant and the White River Oil Shale project. Both are within 20 miles of monument headquarters. Other proposed mineral-related developments within or near the monument that could affect the monument's air quality include oil, gas, coal, tar sand, and sand and gravel extraction, phosphate mining, and oil shale projects. Acid deposition is also occurring. There are no baseline studies regarding the monument's air quality and acid deposition so that potential impacts from these developments can be measured. The Natural Resource Management Plan proposal includes operating meteorological and air quality monitoring stations, reviewing energy development proposals to assess potential air quality impacts, and initiating studies of air quality values and acid deposition. Without this baseline data no appropriate protection measures can be determined.

There are currently more than 20 proposals to impound or utilize water from the Yampa River and/or its tributaries; these are the greatest long-term threats to the monument's natural resources. The flows in the Green River have already been greatly modified by the construction and operation of the Flaming Gorge Dam, which resulted in changes in channel configuration, sediment transport, water quality, riparian and aquatic communities and habitat, and recreational and aesthetic values. Because the Yampa River is now the only remaining major tributary on the Colorado River system without a major mainstream impoundment, its natural and scientific values are unique. At this time the National Park Service has no water rights for instream flows at Dinosaur; to preserve the free-flowing natural character of the Yampa these rights are a necessity. The quantification of the claim for reserved water rights was filed with the Colorado District Water Court No. 6 on June 15, 1984, and it defines the minimum quantities of water necessary to carry out the established purposes for Dinosaur National Monument. The Park Service has been denied federal reserved water rights for these needs by the court. This is currently under appeal in the Colorado Supreme Court. A water resources management plan will be prepared when reserved water rights issues for nonconsumptive instream flows have been resolved. The interim proposal is to monitor this undammed river for its valuable baseline data to compare with altered flows on other dammed river systems.

The threats to the Yampa ecosystem have led to the NPS recommendation of intensified monitoring, increased support for non-NPS research programs, and new or continued research within the monument on river-related scenic values, sediment transport, riparian vegetation, and endangered fish to further assess the individual and cumulative impacts of proposed water developments.

All proposals are consistent with the findings of the Final Wild and Scenic River Study (NPS 1980a) for the Green and Yampa rivers, which was released to the public in November 1983. Both rivers were found eligible for the national wild and scenic river system, and no actions have been proposed in any of the GMP alternatives that would adversely affect the values for which the rivers might someday be designated.

All management activities related to river recreation are based on the approved River Management Plan (NPS 1979b), and no proposals in this general management plan modify that plan.

Surveys of fossils outside the quarry building have not yet been conducted. This includes geographic and geologic distribution, scientific significance, and threats to sites/specimens. Protection options cannot be formulated without this information.

Dinosaur National Monument contains the northernmost remnant of the endangered peregrine falcon population (Falco peregrinus anatum) in the Rocky Mountains. The monument population is critical as a nucleus for expansion into previously occupied areas. The proposal includes conducting aerie searches; protecting, augmenting, and monitoring known aeries; operating hack sites; evaluating habitats; monitoring prey species; and conducting interpretive/informational programs. Further details are in the Natural Resources Management Plan.

The monument also provides important winter habitat for endangered bald eagles (Haliaeetus leucocephalus). Concentrations of these endangered birds use mature cottonwood stands along the Green and Yampa rivers. These habitats along the Green River are declining because of insufficient natural replacement of cottonwoods; this may be caused by reduction in flooding because of the construction of the Flaming Gorge Dam. The proposal includes monitoring the numbers of wintering bald eagles and planting cottonwoods if research indicates that natural regeneration is insufficient.

Two species of endangered fish, the Colorado squawfish (Ptychocheilus lucius) and the humpback chub (Gila cypha), inhabit the monument. The endangered bonytail chub (Gila elegans) is believed to be extirpated. Another rare species, the razorback sucker (Xyrauchen texanus), is listed on the Colorado endangered species list. These species once had a widespread range throughout the monument; now their ranges are extremely restricted and populations have been severaly reduced. Flow modifications in the Yampa could seriously jeopardize the continued existence of these fish species within the monument as well as in their entire remaining range. The proposal includes intensified monitoring of potential threats to the endangered fish and continued research, with particular emphasis on the interrelationships of natural flows and various life stage requirements.

The fire management program at the monument is conducted according to the "Fire Management Plan" (NPS 1980b). Fire management activities in interagency fire management zones include prevention, detection, monitoring, and suppression. The recommended course of action includes continuing the current management program, following recommendations of an intra-agency team which could allow man-caused fires to burn if they meet resource management objectives, and intensifying post-fire monitoring.

Mormon crickets are endemic to the monument and are an irregularly recurring pest throughout most of the intermountain West. When population levels are high, this wingless grasshopper bands and migrates. High population levels were noted adjacent to Dinosaur in 1981 through 1984 (although relatively low densities were observed in the monument). Limited chemical controls were applied by surrounding landowners and government agencies in 1982 and 1983. The recommended course of action in the monument is to monitor populations and to treat the crickets with natural control agents if populations exceed or are expected to exceed predetermined threshold levels.

Nearly 700 feral horses were removed from the monument and adjacent BLM lands on Douglas Mountain from 1977 through 1979. At that time both agencies agreed to permit no further range use by horses and to regard any horses ranging in the area as feral. Because feral horses are not native to the monument, NPS policy calls for their continued removal.

The bighorn sheep herd at Dinosaur was extirpated in the 1930s. A new population was introduced in 1952. Although the introduced population expanded its range to most of Lodore Canyon by 1959, the range has declined since then. Grazing by domestic livestock and the bighorn's lack of pioneering tendencies are probably the primary reasons for their failure to occupy larger historical habitats. The NPS proposal is to introduce more bighorn sheep from a genetically distinct population into previously used habitats adjacent to the current range. An initial reintroduction of 19 sheep occurred on April 13, 1984 in the Whirlpool Canyon area. The results of this reintroduction are not yet known.

Pronghorn antelope currently use small portions of the monument. The proposed action is to monitor the success of the 1982 introduction of nearly 100 pronghorn into suitable habitats on the Yampa Bench.

Mule deer occupy four winter ranges in the monument, and summer ranges include most higher elevation areas. In-season hunting occurs adjacent to the entire boundary. Illegal hunting and poaching at other times are problems along the boundary and rights-of-way. The proposal is to expand protection and monitoring activities.

Although elk were seldom observed in the monument before the mid-1970s, populations have grown significantly in recent years because of increased reproduction in the resident herd, establishment of grasslands as a result of natural fire, removal of feral horses, and migration from nearby areas subject to hunting. The proposal includes monitoring activities for continued protection in cooperation with state wildlife agencies.

Densities of skunks sometimes reach unnatural levels in certain campgrounds in the monument, primarily because of the concentrations of visitors and their food scraps. Complaints concerning depredations by skunks and the potential for rabies outbreaks have led to past reduction in skunk densities by shooting. Efforts are being made to educate boaters about ways to make their camps less attractive to skunks and thus reduce conflicts. No additional action is needed unless populations

exceed predetermined threshold levels, at which time reduction by relocation or other means may be considered.

Canada geese utilize Dinosaur's river canyons as nesting and wintering habitat. An unusual nesting behavior is exhibited in Lodore Canyon--geese nest on ledges at heights of up to 50 feet above river level. Boating in Lodore Canyon has been restricted to one launch per day prior to May 10 to minimize disturbances to incubating and brooding geese. The proposal is to continue current management and monitoring programs.

River otters, classified by the state of Colorado as endangered, were once endemic to the rivers of the monument but are now believed to be extirpated. The proposed action is to reintroduce this species through a cooperative program with the Colorado Division of Wildlife and to study the dispersal, movements, habitat selection, and reproductive success of the introduced otters.

The following table indicates some of the required research activities in priority order based on the issues and concerns identified in the Natural Resources Management Plan. The management activities are ranked only in high, moderate, or low priority.

Table 2: Research and Management Activities

Research Activities

Grazing impact study
Paleontological surveys
Range surveys
Air quality related value program
Air quality impact study
Acid rain deposition study
River human waste disposal study (pit toilets vs. carryout)
Bighorn sheep study
Soils survey
Sensitive plant surveys
Fire effects studies

Management Activities

High

Endangered plant survey
Evaluation of exotic species
Construction of boundary fence
Monitoring of grazing
Program administration
Increased river monitoring

Removal of significant fossil specimens
Hiring of preparator trainees
Mapping of fossil locations
Protection of sensitive fossil locations
Operation of autoteleradiometer
Operation of autometeorological station
Establishment and operation of a site under the national atmospheric deposition program
Acid deposition monitoring
Curatorial activities
Management of wild peregrine aeries
Operation of peregrine hack sites
Monitoring of river camps
Continuation of current fire program
Monitoring of effects of fire
Monitoring of Mormon cricket populations
Monitoring of bald eagles
Addition of air quality monitoring equipment

Moderate

Continuation of quarry scientific activities
Monitoring and management of exotic species
Increase in logistical support for river management activities
Analysis of photographic record on river
Monitoring of fossil locations
Monitoring the effects of human waste reduction by chemical or bacterial action
Reintroduction of bighorn sheep
Monitoring of bighorn sheep population
Monitoring of pronghorn antelope population
Monitoring of skunk population
Monitoring of erosion at Echo Park
Expansion of protection activities for elk, mule deer, and bighorn sheep
Increase in mule deer and elk population monitoring

Low

Develop allotment management plans
Remove stockponds

The visitor use and development proposals described later in this section are consistent with the objectives and recommendations of the Natural Resources Management Plan. Areas with fragile or sensitive resources, including known threatened or endangered species, have been avoided; actions with potential for significant environmental degradation have been eliminated from consideration; and new visitor and management facilities have been confined to previously disturbed areas. Proposed actions are intended to improve visitor use while ensuring perpetuation of the monument's significant resource values.

Cultural Resources

The National Park Service is charged with locating, evaluating, preserving, protecting, and interpreting significant cultural resources so that they remain unimpaired for future generations. To meet these responsibilities, the staff of Dinosaur National Monument will prepare the cultural resources component of the resources management plan (the companion document to the 1983 Natural Resources Management Plan). The cultural component will contain an inventory and evaluation of resources, descriptions of specific problems, and alternative actions and proposals for solving those problems. It will include proposals for acquisition of fossils or artifacts or return of same to the monument from other collections.

In agreement with a May 31, 1985, memorandum from the Advisory Council on Historic Preservation, it will be the cultural component of the Natural Resources Management Plan and not the general management plan that will be developed in accordance with the amended programmatic memorandum of agreement, as ratified by the chairman of the Advisory Council on September 11, 1981. Pending completion of the cultural component, the National Park Service will continue to use the Section 106 regulations (36 CFR part 800) for interim compliance. The general management plan is prescribing protection of only those few cultural resources that are important to present visitor use and are seriously deteriorating. Most cultural resource proposals are being deferred until the cultural resources component of the Natural Resources Management Plan is approved.

In 1985 Dr. Steven F. Mehls of Western Historic Studies, Inc., completed studies for the National Park Service to determine the historic properties in Dinosaur that are likely to qualify for the National Register of Historic Places. These include the Chew ranch complex, the Josie Morris ranch complex, the Denis Julien inscription, the Earl Douglass workshop and laboratory (Douglass office), and the quarry visitor center. The Rocky Mountain Regional Office of the National Park Service is currently preparing the National Register nomination forms. Although no determination of eligibility for listing on the National Register of Historic Places has been made for archeological resources, those areas more likely to be proposed for inclusion, as well as certain sites of historic significance, have been tentatively placed in the cultural zone (see Management Zoning Proposal map). Significant historic and prehistoric sites in other zones would be preserved and protected on an individual basis. All actions taken as a result of this plan would conform to applicable legislation, implementing regulations, executive orders, NPS policies, and the procedures identified in NPS-28, "Cultural Resources Management Guidelines." All subsequent planning and activities affecting cultural resources would be conducted with the active participation of professional specialists in history, archeology, and historic architecture or curatorship in accordance with NPS "Management Policies" and NPS-28. Actions in which the alteration or loss of cultural resources are necessary to achieve management goals would be mitigated. These measures would include professional salvage of cultural remains, preparation of field records and reports, proper curatorial care of excavated material, and preservation of data and artifacts in the museum collection.

One of the major problems in planning for cultural resources is the lack of information. Baseline data on these resources should be obtained to determine future management actions; this includes geographic and geologic distribution, significance, and threats to sites with options for protection. The following lists and inventories are required:

an inventory and catalog of the paleontological library

a complete documentation of rock art with proposals for preservation

a complete parkwide archeological survey

an updated administrative history for the monument

Several studies and guides should be prepared to assist in the management of cultural resources. The first phase of a monument-wide historic resource study and an updated List of Classified Structures were completed by Dr. Steven F. Mehls in 1985; this survey identified all cultural resources except archeological features and determined their significance. Other studies and guides needed include a cultural resources maintenance guide, resource evaluation and significance determinations for archeological resources, historic structure reports for buildings determined to be significant, historic preservation guides, and a study of Outlaw Trail with an evaluation of its significance to the monument. The proposed program of recording through photography and scale drawings of the monument's pictographs and petroglyphs would help monitor deterioration and preserve the images for study.

The cultural component of the resources management plan will satisfy the detailed requirements for future documentation by specifying all studies necessary to evaluate resources and determine their significance.

All of the visitor use and development proposals described later in this section have been designed during general management planning to reduce existing impacts on cultural resources. Areas of known concentrations of cultural resources have been avoided, and the impacts of existing development on the known resource mitigated. To reduce the impacts of visitor use in some areas of the monument the general management plan proposes increasing the on-site patrols and interpretation by rangers (Cub Creek), upgrading trails near rock art to reduce impacts on adjacent archeological sites (Cub Creek and McKee Springs), providing programs to educate the public about the value of these resources and ways to avoid inadvertent destruction, and monitoring archeological resources to record vandalism, illegal collection, and other deterioration.

The accompanying "Land Protection Plan" proposes solutions to certain problems related to ownership and use of nonfederal land in the monument. For example, grazing activities or mineral exploitation on these lands could damage or destroy cultural resources. Therefore, high priorities for land acquisition have been given to areas of greatest resource significance (Cub Creek, McKee Springs, and the Mantle ranch).

Certain actions are proposed to ensure adequate protection of the monument's museum collection. The quarry building does not have the constant temperature and humidity controls needed to keep the irreplaceable fossil and paleontological library collections from disintegrating. The laboratory is poorly equipped for curatorial work and study. The museum collections far exceed the available storage space in the quarry building. Provision of an adequate heating/ventilation/ air-conditioning system at the quarry to allow protection of the paleontological library and improve working conditions, and a new collections storage building would allow secure storage and proper access to large volumes of fossils that are overcrowding the laboratory space inside the quarry building. The new storage building would have fire suppression and intrusion detection systems as well as the necessary environmental controls to ensure proper long-term preservation of specimens.

Action would be taken to prevent further deterioration to the historic ranger cabin at Lodore because it is needed for seasonal use by park employees. Because it is in the 100-year floodplain and because it is not feasible to floodproof this log structure on site, relocation was considered; it was rejected because of cost and the alteration of the historic setting. No action would be taken to protect the cabin from flooding, and unless future evaluation of historic significance shows that moving it is the most suitable solution, it is possible that a flood may severely damage or destroy it.

Stabilization and/or maintenance are proposed to prevent further deterioration of the Morris cabin, the Chew ranch, and Douglass office until there is a determination of their significance and long-term measures are prescribed.

VISITOR USE

Recreation and Interpretation

Of the many recreational and interpretive opportunities at Dinosaur, the most popular are seeing the dinosaur fossils in the quarry area, boating on the rivers, and driving along the scenic Harpers Corner road (see Existing Conditions/Placenames map). Visitors also camp, picnic, and hike in the Split Mountain/Green River, Cub Creek, and Echo Park areas. River users and people seeking more primitive camping and backcountry experiences within the monument frequent the Island Park, Rainbow Park, Deerlodge Park, and Lodore areas. Roads beyond the Quarry and Harpers Corner areas, because of their unimproved and in many cases deteriorated condition, are used far less frequently for scenic driving.

The preferred alternative proposes specific actions to support well-established recreational uses and patterns, with emphasis on improvement of existing facilities and services. Actions would focus on

new signing, both inside and outside the park, to aid access and circulation

improvement of several roads to allow more reliable passage

relocation of certain existing campgrounds, including limited provision for group camping, to enhance overnight use and ensure visitor safety relative to flooding

upgrading or addition of trails in areas of highest demand

improvement of river takeouts and parking in existing trouble spots

an expanded interpretive program

To improve orientation, information, and interpretation at Dinosaur National Monument, two plans are proposed:

A new interpretive prospectus is proposed for Dinosaur to expand visitor understanding of the monument's many natural and cultural resources and to respond to demands for river use. The monument backcountry trails and outlying districts such as Jones Hole, Island Park, Lodore, Deerlodge, Echo Park, and the Yampa Bench would receive major attention in the new interpretive prospectus. The interpretive themes and goals for each of the outlying districts would be decided. This prospectus would be followed by specific media planning as needed to allow the park to implement new programs as soon as possible. Prior to preparation of the new prospectus the interpretive proposals described in this section would amend the 1977 "Interpretive Prospectus."

A parkwide wayside exhibit plan also would be prepared. This plan would detail the themes for visitor use areas (e.g., Morris Ranch, Cub Creek road, Rainbow Park, Island Park, Jones Hole trail, Harpers Corner road, Echo Park, Yampa Bench road, Deerlodge Park, and Lodore). It would coordinate the themes parkwide and describe the wayside exhibits needed for each area.

Also, visitors currently have difficulty finding the quarry because of inadequate and confusing signing on US 40, the quarry entrance road, and inside the monument. As part of a parkwide sign analysis, these and other signing needs would be assessed.

A loop trail would be constructed from the lower parking area at the shuttlebus station up to the quarry building--one part along the ridge, the other part alongside the road and stream--to allow safe pedestrian access for those who prefer to see the colorful geologic formations or who desire an alternative to riding the shuttle.

The functions of the existing shuttlebus station and the quarry building would be redefined by the interpretive prospectus. Space limitations and the significance and complexity of the monument-wide interpretive story preclude handling all orientation at the quarry building. Therefore, it is

proposed that summertime orientation and other traditional visitor center functions be handled at the shuttlebus station and that the quarry building retain its specialized role as an interpretive resource and museum related to the fossil story. The shuttlebus station would be altered to improve the building's information and orientation function. A uniformed interpreter would be available in summer to answer questions about the quarry shuttlebus and alternative trails, disseminate informational literature, and encourage visitors to experience other areas of the monument. Plans are already underway to install audio equipment on the shuttles to better prepare people for their visit to the quarry.

The relief map currently on the second floor of the quarry building would be moved to the shuttlebus station area if it could be adequately protected from temperature changes and moisture. During the winter season, when the shuttlebus station is closed and the shuttle does not operate, the relief map would be covered or otherwise secured, and parkwide orientation would be handled by interpreters at the quarry building.

The quarry building would be remodeled to modernize exhibits. Designs for updating and replacing exhibits at the quarry building are already in progess at Harpers Ferry Center. The intent of the exhibits and personal services would be to provide visitors with the knowledge needed to understand and appreciate the quarry resources. This knowledge would be built on three themes: the uniqueness of the quarry's fossil collection, Douglass' discovery and the comparison of scientific operations then and now, and the environment and biology of the dinosaur species at the quarry.

Designers at Harpers Ferry Center have also made recommendations for interior modifications to the quarry building to solve visitor/management problems identified by monument staff: awkward visitor flow through exhibit areas, inefficient design of publications sales and display areas, lack of a defined visitor information area, and staff traffic through visitor areas.

At the nearby Split Mountain/Green River campgrounds, several improvements would be made to facilitate existing uses. Because existing demands for group camping are met ineffectively by splitting up groups between individual sites, a portion of the Green River campground would be converted to accommodate this use. Options for relocating boat ramp facilities to sites other than Split Mountain, such as at Green River campground, were examined during planning. Because of boating distance to alternative sites and investment in the existing ramp facilities, Split Mountain would be retained as the ramp area. Parking for boaters at Split Mountain would be expanded and redesigned where it conflicts with campground and day use. The adjacent unloading area for boats would be redesigned with a second ramp and a comfort station to accommodate the large number of boaters. The picnic area at Placer Point, the only picnic area in the entire Quarry area, would also be improved.

Currently, most visitors come to see the quarry, spend a few hours there, and leave unaware of the other opportunities in the monument. The nearby Cub Creek area is a microcosm of the monument's attractions and could provide visitors with a sampling of what is available monument-wide. An improved road to Cub Creek and formal opportunities for hiking and interpretation would draw more visitors to this area who might then choose to extend their stays in order to visit more remote places in the monument. The trail to the Cub Creek petroglyphs would be upgraded to improve safety and resource protection, and hiking routes leading into interesting nearby box canyons would be marked to allow visitors to see outstanding scenic resources.

Interpretation in the Cub Creek/Morris ranch area would center around human history and prehistory; the Morris cabin would be stabilized and it would be interpreted according to its significance. Ranger patrols would be increased to improve protection and interpretation of all the sensitive resources in the Cub Creek area.

The 30-mile-long Harpers Corner road is the only paved scenic drive into the heart of Dinosaur's river/canyon country. It extends north from monument headquarters past Plug Hat onto Blue Mountain, terminating at a trailhead 1½ miles from Harpers Corner. This trail offers spectacular views of some of the monument's most scenic features--Whirlpool Canyon, Steamboat Rock, Echo Park, Yampa Canyon, and Lodore Canyon. The Harpers Corner road and its attractions is the second most popular area in Dinosaur.

Interpretation for the headquarters/visitor center and Harpers Corner road would be planned and designed to emphasize the geology of the monument. The intent could be to enable visitors to understand the origins of the major geologic formations and the evolution of flora and fauna through each period. Also along the road wayside exhibits could follow this theme. The existing road guide could be expanded to provide additional, in-depth information for visitors who are especially interested in geology.

The headquarters/visitor center would also serve a parkwide orientation function and retain its role as a publication sales outlet. The present space for park orientation exhibits is insufficient. The audiovisual room is much larger than needed. During planning for the new interpretive prospectus, ways to increase exhibit space, replace outdated exhibits, and update the audiovisual program would be evaluated for replacement by the Harpers Ferry Center.

Both the Echo Park and Yampa Bench roads, which extend east from the Harpers Corner road, offer opportunities for backcountry driving. The Echo Park road provides access to the scenic confluence of the Green and Yampa rivers; the Yampa Bench road offers a long (26-mile) but rewarding tour of the high plateau country that parallels the canyons. Because these roads are unpaved and rough, few visitors travel to these places. The existing and anticipated visitor demand for camping in proximity to the Yampa Bench road is recognized, and management options

to deal with this use will be considered. New signs might be placed along these roads to better inform people of attractions. Parking pullouts would be established at the Chew ranch, Whispering Cave, and the Pool Creek petroglyphs, and a trail would be marked to Pats Cave. The Echo Park campground would be redesigned to relocate portions that are being eroded by the river, the ranger station would be moved, vault toilets would be provided, and a small campfire meeting spot would be provided. Trash disposal, water, and toilets proposed for lower Echo Park would be consolidated in one location to better serve boaters. A short trail would be marked between the Yampa Bench road and Mantle Cave.

The Rainbow Park/Island Park areas would have improved interpretation to help visitors enjoy the riparian environment, wildlife, rock art, and colorful rock formations. Overlooks on the Island Park road and west of Whirlpool Canyon are key scenic points and would be interpreted. The nearby Jones Hole area, reached either from trailheads at the fish hatchery or at the Ruple ranch in Island Park, would continue to provide excellent fishing and hiking opportunities. Directional signs would be provided. A primitive drive-in campground would be established in the Ruple ranch area of Island Park, where informal camping currently takes place. This new campground would place overnight use in a designated area outside the 100-year floodplain and would provide for an existing demand that is not met outside the monument because of the area's remote location. If visitation increases and there is a desire for interpretive activities, a campfire meeting place would be developed and sited at the campground. The informal trail along the McKee Spring petroglyphs would be upgraded to improve safety, and interpretation and ranger patrols would be increased to interpret and protect resources in the Rainbow Park/Island Park area. The cabin at the Ruple ranch would be converted to a seasonal residence, and the ranger would manage use of the area.

Cub Creek/Morris ranch, the Harpers Corner road, the Echo Park and Yampa Bench roads, and Jones Hole/Island Park all contain resources of prime significance with potential for making visits more interesting. Two general media alternatives have been considered to expand interpretation in these areas. One is to develop a series of traditional wayside exhibits in each of these areas (per a future parkwide exhibit plan), and the other is to develop a series of guide booklets that would be available as handouts or sales publications at the quarry shuttlebus center and the headquarters visitor center. The booklets would serve as "trip planners" to let visitors know what areas in the park are accessible, how to get there, and the approximate time required. The booklets would also interpret archeology, history, natural history, or whatever subjects are relevant to the particular area. Visitors could select tour booklets depending on what kinds of experiences interest them. Some examples might include a two- to three-hour archeology/history trip to Cub Creek, including the petroglyphs and the Morris ranch; a day's history/biology trip to Echo Park; or a day's archeology/biology trip to McKee Spring and Island Park. In the most popular areas additional booklets might be appropriate, each dealing with a separate topic of interest. This approach would allow flexibility, avoid on-site exhibits in locations where

they might be intrusive, and also serve as an orientation device to make visitors more aware of the scope of travel and recreation possibilities in the monument. A decision to use wayside exhibits, guide booklets, or both would be made on an area-by-area basis during the interpretive prospectus process.

Deerlodge Park and Lodore are the main launching areas on the Yampa and Green rivers and are used primarily by boaters and other backcountry enthusiasts. Appropriate signing on US 40 could be provided to make visitors aware of camping at Deerlodge Park. Campgrounds and boat ramps would be upgraded at both Deerlodge Park and Lodore. Recreation at the Lodore campground would be improved by upgrading the nature trail leading to the Gates of Lodore.

Park management has identified a need for increased interpretive and informational services for commercial and individual river users. Because some river users are unfamiliar with regulations and the reasons behind them they do not understand their role in preserving the fragile river and canyon environments. The potential for river interpretation through personal services has been evaluated by the monument staff and is described in appendix E.

A guide to the Green and Yampa river canyons, more comprehensive than the guidebooks commercially available, could be produced. The book is envisioned as an introduction to canyon and river ecology, including guidance on backcountry ethics, that would be broad enough to serve most backcountry users. Hiking routes into the numerous side canyons might also be described. Special sections would address concerns of river users (e.g., river gear and safety). However, regulations concerning river permits would not be included because of the potential for change; these are available in a separate handout.

The staff will consider producing a video program, available for loan, to acquaint prospective river travelers and others with the specifics of a monument river trip.

The opportunities for horse trails were also considered during planning. Most public demand for horse use during the summer travel season is already satisfied in other areas, such as the Uinta Mountains of nearby Ashley National Forest. There is potential for spring and fall riding in the monument where most riders would follow portions of the Outlaw Trail. Until future historic studies show the route and significance of this feature, the National Park Service cannot plan for its use and cooperative management. Also, where the trail probably crosses the mouth of the Yampa River in Echo Park, there appears to be no feasible way to provide safe passage, making a traverse of the entire monument impracticable.

Trails are proposed in this general management plan are in areas of high use where demand has been demonstrated; constructing trails elsewhere would not be cost-effective considering expense and expected low volume of use. In remote locations, however, hiking routes could be marked

inexpensively and could attract larger numbers of backcountry enthusiasts. The standards of all trails and hiking routes in the monument would be commensurate with expected volumes of use. See the discussion of facility analysis in the "Affected Environment."

Safety and Sanitation

Visitor safety would continue to be emphasized on signs, in brochures, and through personal contacts and other interpretive messages. Visitor and employee facilities also need to meet improved standards. To meet this objective the following development proposals would reduce hazards and improve sanitation (see Comparative Development Costs table 4 for more detailed information):

Upgrade/gravel/resurface roads to prevent visitors being stranded during wet weather and to make the roads safer to drive on. (See specific proposals for Quarry area, Cub Creek, Rainbow Park, Harpers Corner, Echo Park, Yampa Bench and Deerlodge Park roads.)

Convert pit toilets to flush or vault toilets in all developed areas, thus improving sanitation and making them floodproof as required.

Modify the sewer/water systems in most developed areas for better sanitation.

Relocate campsites out of the 100-year floodplain for improved visitor safety.

Upgrade the trails at the Cub Creek and McKee Spring petroglyphs (to provide safer walking along steep slopes).

An emergency flood response and evacuation plan would be developed by the monument staff for dealing with all flood-prone areas of the monument. Warning signs would be posted in flood hazard areas, and facilities and structures in the 100-year floodplain would be marked with flood heights. Evacuation strategies would be developed, and provisions made for emergency water and sewer service.

Many structures and facilities at Dinosaur are in and will be retained in the 100-year floodplain. See discussions of floodplains and wetlands in both the "Affected Environment" and "Environmental Consequences" sections for specific locations and explanations. No structures or facilities exist or are proposed in any high hazard area that is subject to flooding events so unexpected, violent, or otherwise devastating that human lives would be placed in immediate or grave danger.

Boating safety and sanitation are fully addressed in the River Management Plan, and no changes to those guidelines are proposed here. That document also supports a study proposed in the Natural Resources Management Plan to find the best method of disposing of human waste and, if necessary, for phasing in a carryout system for river runners.

Special Populations

NPS "Management Policies" state, "to the greatest extent possible, commensurate with physical limitations, the handicapped should be able to enjoy the park using the same facilities as the nonhandicapped visitor. Special interpretive facilities and programs for handicapped people are encouraged where good potential for participation is indicated." Much work has already been done to make the Quarry area facilities and headquarters building at Dinosaur accessible to handicapped visitors, and under the proposal this commitment would be expanded to include other facilities and resources.

Minor accessibility improvements would be made in the course of maintenance--better signing, curb cuts, parking space striping, ramps, restroom alterations, and other actions. Specific recommendations for handicap use of facilities throughout the monument are detailed in the "Accessibility Survey" (NPS 1983a). These recommendations would be considered on a case-by-case basis.

Any new visitor or employee facilities proposed and any alteration to existing facilities would comply with all appropriate laws and regulations, including the Architectural Barriers Act of 1968 (42 U.S.C. 4151 et seq.) and the Rehabilitation Act of 1973 (26 U.S.C. 701 et seq. as amended by 88 Stat. 1617).

Many interpretive activities can and would be made suitable for most special populations, including campfire programs, scenic drives, cassette quarry tours, and stops at historic sites at Cub Creek.

GENERAL DEVELOPMENT

The facilities at Dinosaur have been serving the public for many years, and most are in need of repair or improvement. The primary developments proposed under the preferred alternative would (1) meet statutory requirements by protecting life and property from flooding; (2) meet curatorial standards by protecting and providing secure storage for irreplaceable fossils and other museums objects; (3) fulfill health and sanitation standards by replacing pit toilets at most developed areas with either vault or flush toilets (type depends on amount of use versus cost) and improving the water and sewer systems in some areas; and (4) ensure accessibility and reduce unnecessary emergency repair costs by upgrading and/or repairing some roads. Secondarily, improvements to campgrounds, picnic areas, launch facilities, trails, and administration and maintenance facilities would make support services and overall park management more efficient. These actions are not, however, intended to effect major changes in capacity or to alter the basic recreational experience.

In 1982 Congress passed the Surface Transportation Assistance Act (1982 96 Stat. 2097, 15 U.S.C. 713c-3 et al.) which, among other things, provided additional funding under the Federal Lands Highway Program for

the rehabilitation of roads in National Park Service areas. Dinosaur National Monument was one area selected for study because of the poor condition of its roads. The "Road System Evaluation Study" for Dinosaur was completed in September 1985. It complements road improvement proposals in this general management plan but goes into more detail and prescribes the engineering studies necessary for design of the improved roads.

The proposed facilities and improvements under the preferred alternative are shown on the following development concept plan maps. These proposals and their associated costs and priorities are listed in "Plan Implementation" later in this section. The development concept plan map for road improvements is in the "Facility Analysis" section.

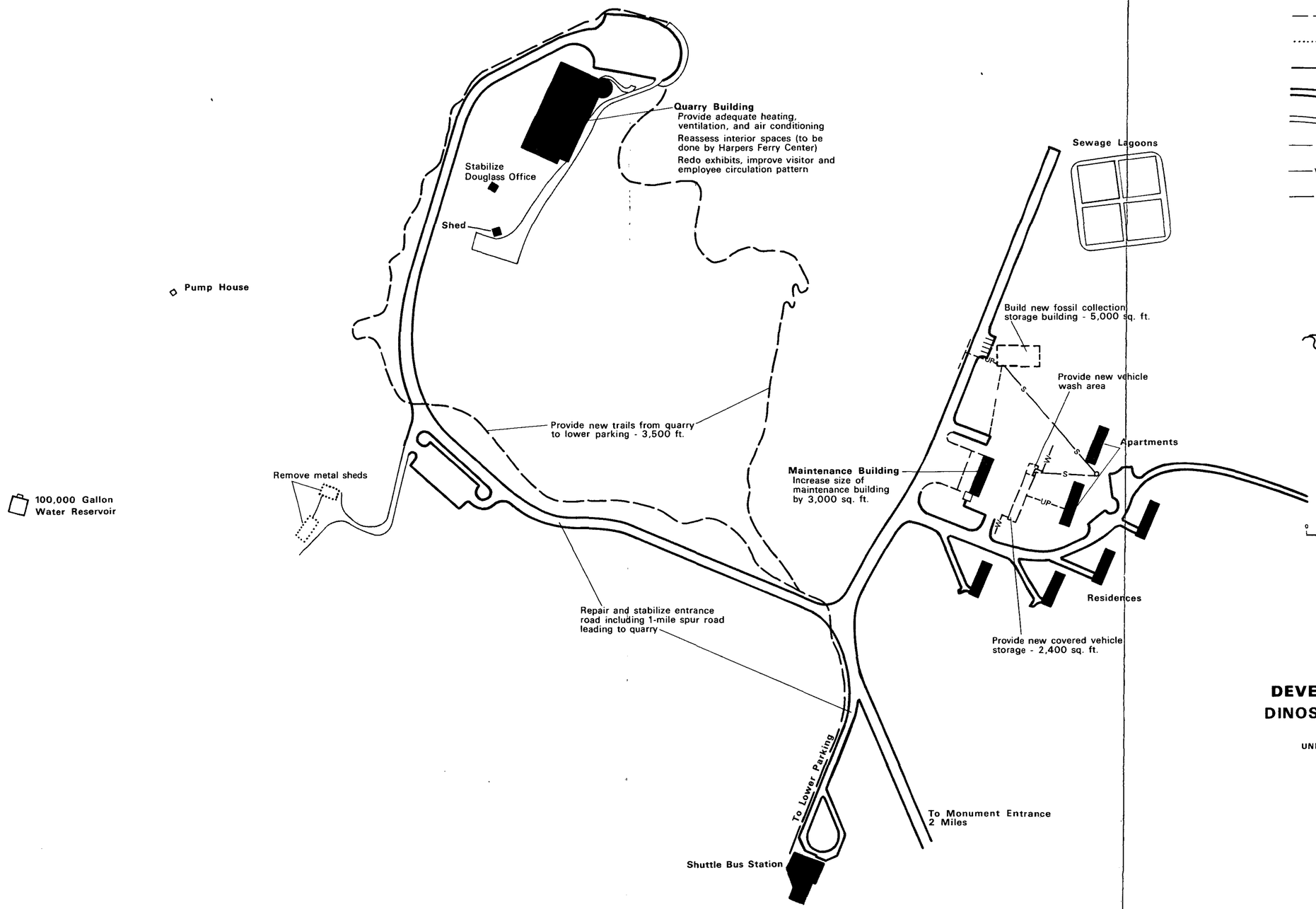
PARK OPERATIONS

Under the preferred alternative, the present level of housing matches proposed staffing requirements and would be maintained without addition of more units. The need for seasonal ranger quarters at outlying areas was also considered during planning. Because the season of use is short at Deerlodge Park, Echo Park, and Island Park, the architectural theme of existing development is rustic and would remain so. Because most ranger activities are patrol and field-oriented, there is no need for new visitor contact stations in these locations. The improvements planned at Lodore, especially the lift station, which requires a rigid preventative maintenance schedule and technical repairs, will require additional maintenance.

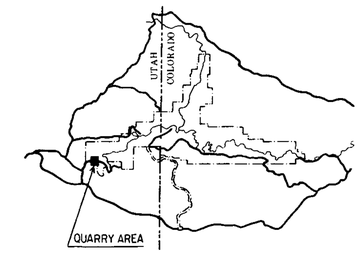
Fire lookout staffing is funded sporadically as part of the fire management program. The two existing towers at Round Top Mountain and Zenobia Peak would be retained and are adequate for the lifetime of the plan.

At both the quarry and headquarters vehicles and heavy equipment needed year-round are parked outside, where they cannot be operated dependably in winter because of lack of power for engine block heating and snow protection. At the Quarry area, maintenance work areas are crowded with equipment, and protection activities such as fire suppression and law enforcement compete for work and storage space. This results in conflicts during work hours and awkward and mixed storage of equipment vital to emergency response. Therefore, the quarry maintenance building would be expanded, and covered vehicle and boat storage would be added at this facility and the headquarters maintenance area.

A professional engineering study of the Quarry building is needed to determine the soundness of this structure. Frequent major maintenance is necessary because the foundation is on expansive soils and there is considerable movement of walls and warping of architectural elements. A comprehensive maintenance/problem-solving manual would be prepared to help maintain the integrity of this architecturally significant building.



PROPOSED DEVELOPMENT
OBLITERATED DEVELOPMENT
EXISTING DEVELOPMENT
PAVED ROAD
UNPAVED ROAD
S SEWER LINE
W WATER LINE
UP UNDERGROUND POWER



SITE LOCATION

N

0 100 200 300 400 500 FEET

QUARRY AREA

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

122	20,012A
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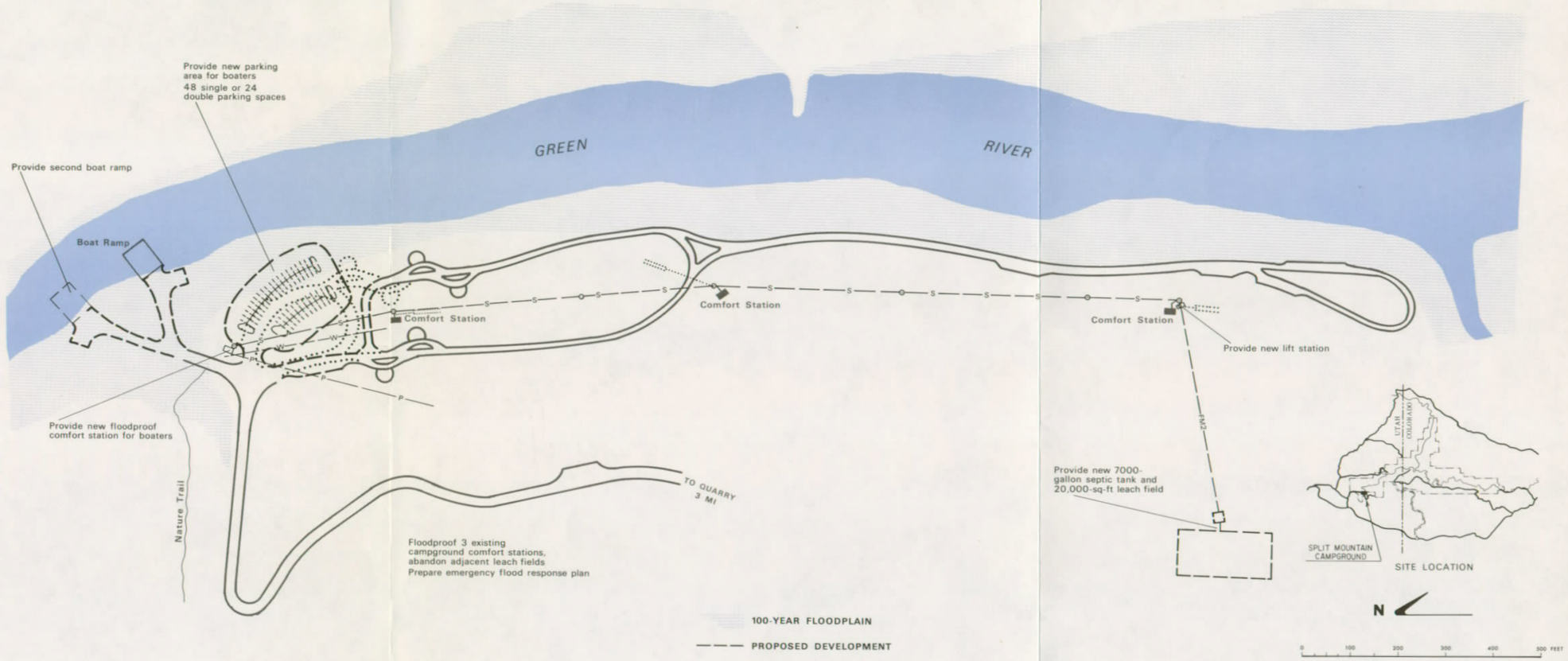
ON MICROFILM



100-YEAR FLOODPLAIN

PROPOSED DEVELOPMENT

OBLITERATED DEVELOPMENT

EXISTING DEVELOPMENT

PAVED ROAD

TRAIL

SEWER LINE, MANHOLE, FORCE MAIN AND LIFT STATION

WATER LINE

POWER LINE

SPLIT MOUNTAIN CAMPGROUND

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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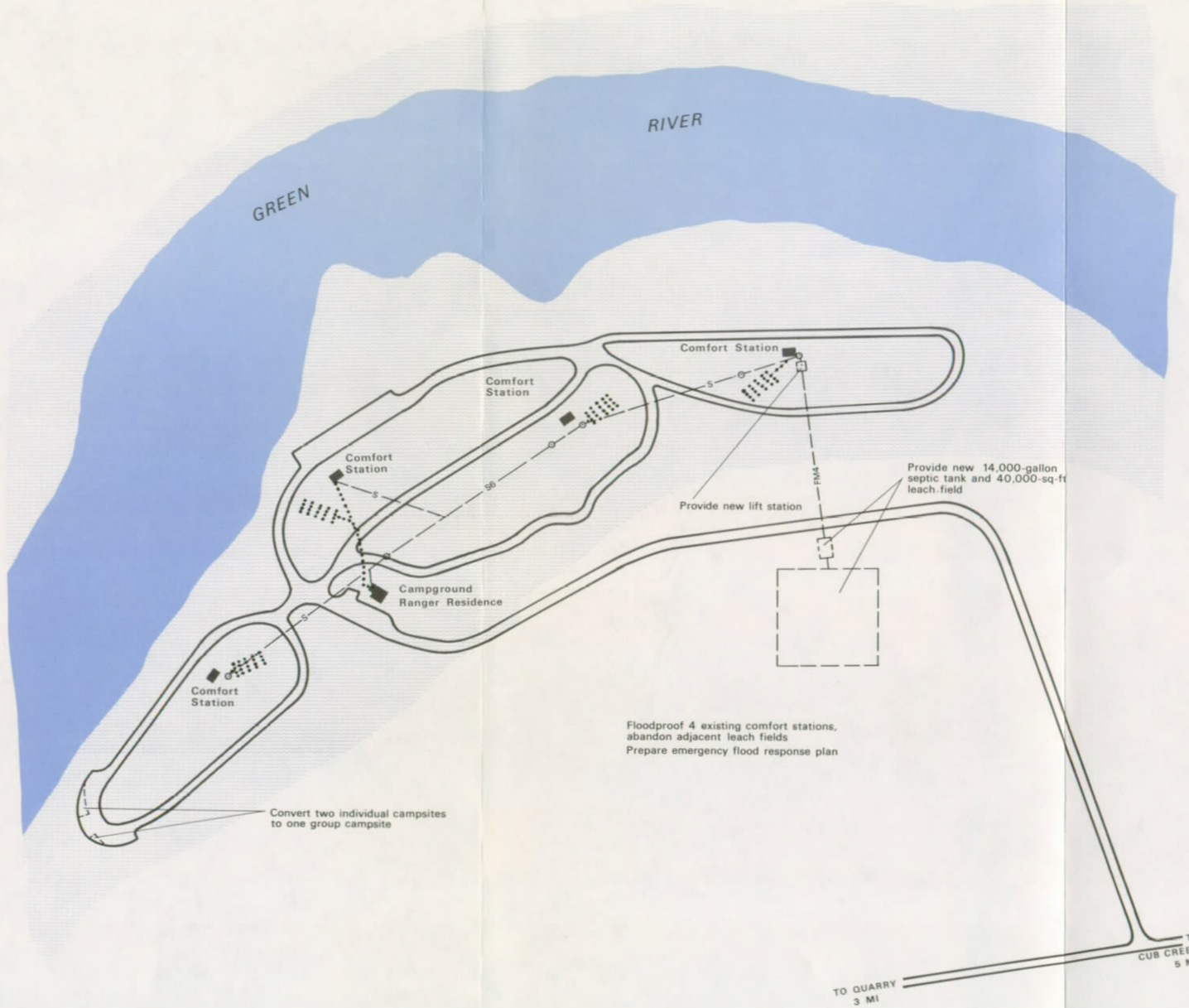
ON MICROFILM



100-YEAR FLOODPLAIN

PROPOSED DEVELOPMENT

OBLITERATED DEVELOPMENT

EXISTING DEVELOPMENT

PAVED ROAD

SEWER LINE, MANHOLE, FORCE MAIN AND LIFT STATION

SITE LOCATION

N

0 100 200 300 400 500 FEET

GREEN RIVER CAMPGROUND

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

122	20,014A
NOV 85	DSC

ON MICROFILM

PLACER POINT PICNIC AREA

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

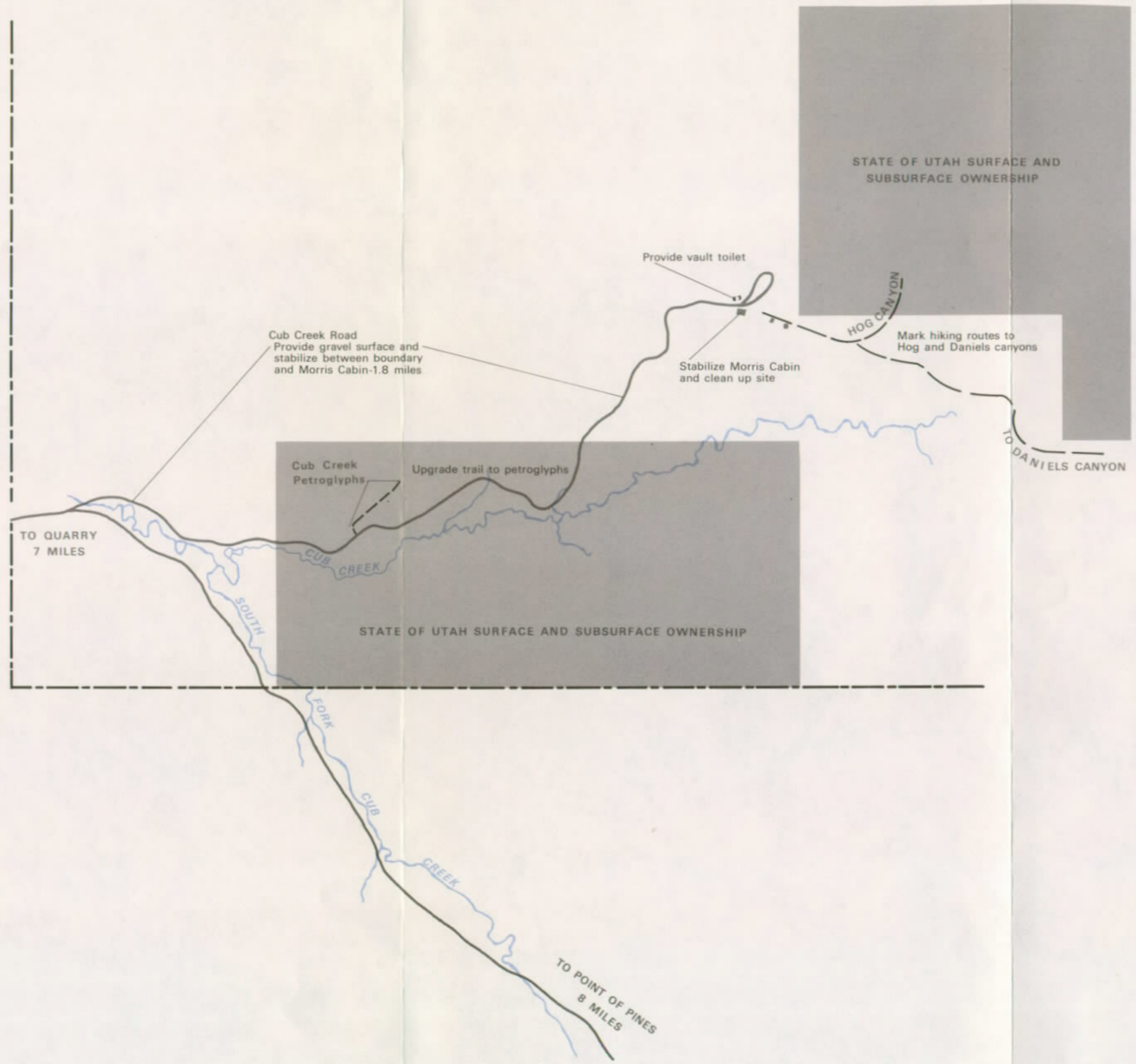
COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

122	20,015A
NOV 85	DSC

ON MICROFILM

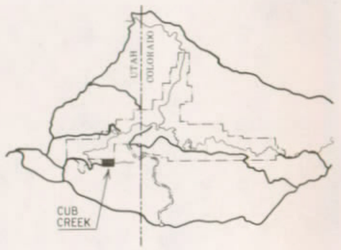


PROPOSED DEVELOPMENT

EXISTING DEVELOPMENT

MONUMENT BOUNDARY

DIRT ROAD



SITE LOCATION

0 500 1000 1500 2000 FEET

CUB CREEK

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

122|20,016A
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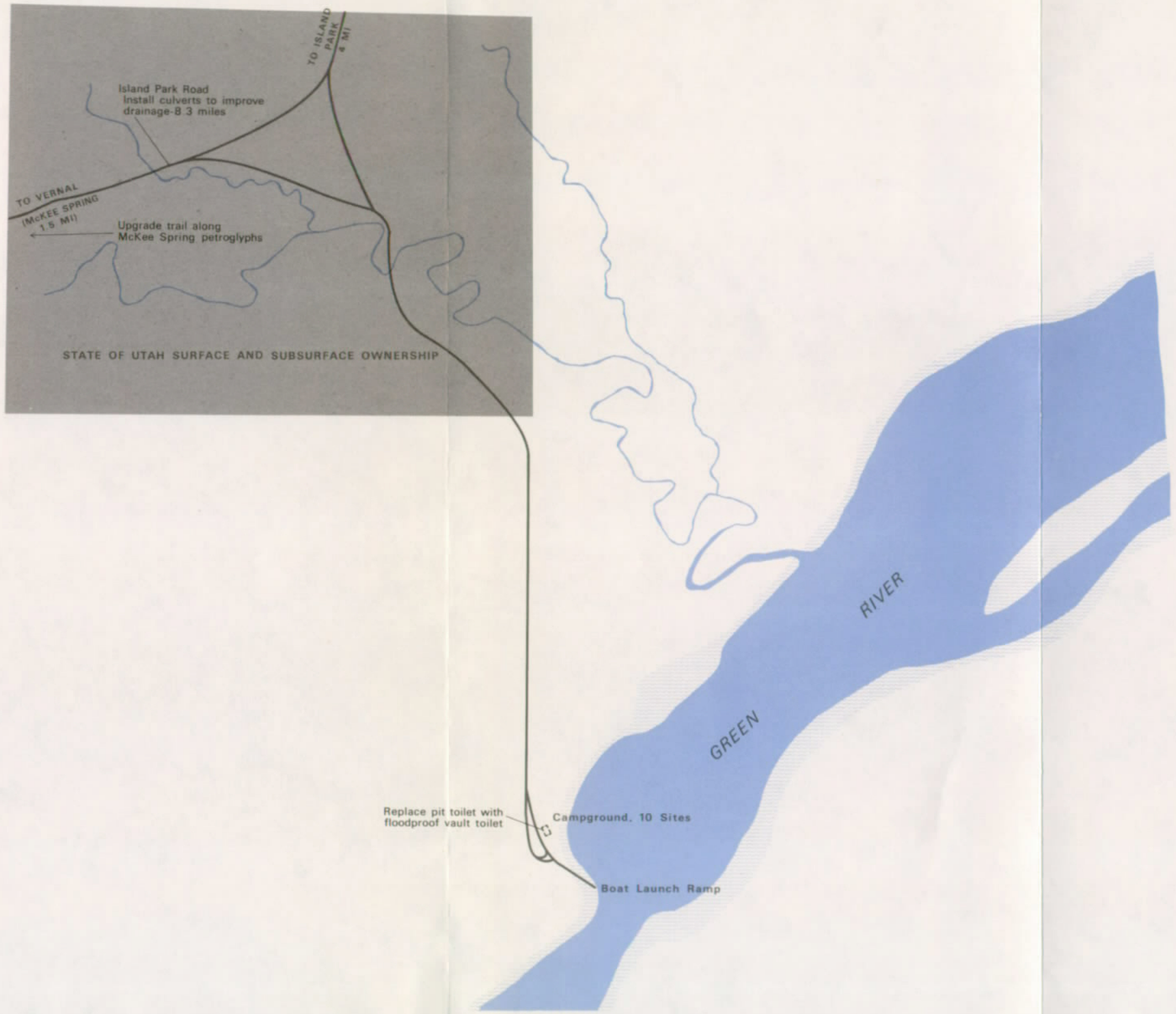

100-YEAR FLOODPLAIN

PROPOSED DEVELOPMENT

EXISTING DEVELOPMENT

DIRT ROAD

SITE LOCATION

N

200 0 200 400 600 FEET

RAINBOW PARK

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

122 | 20,022A
NOV 85 | DSC

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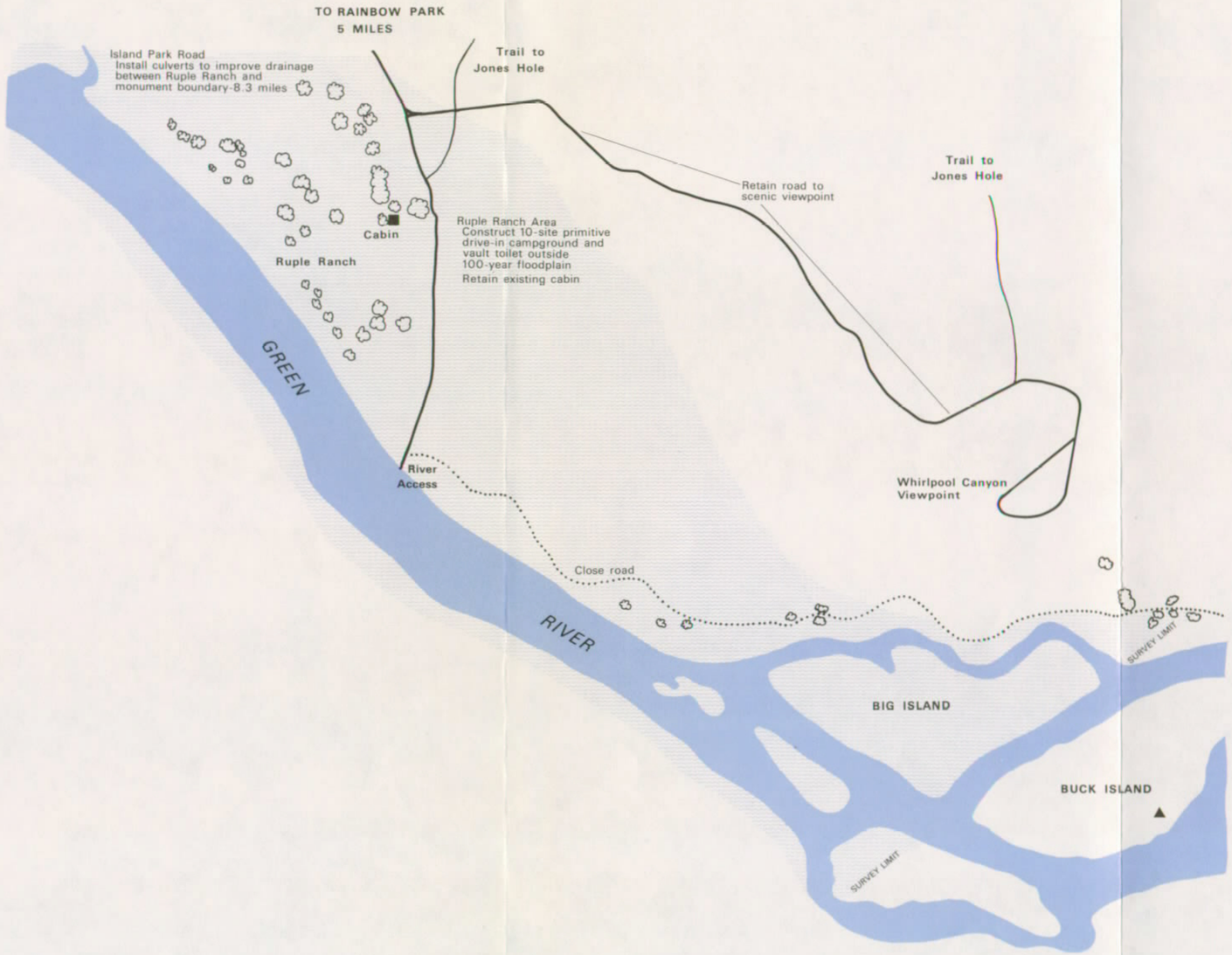


100–YEAR FLOODPLAIN

COTTONWOOD TREE

EXISTING DEVELOPMENT

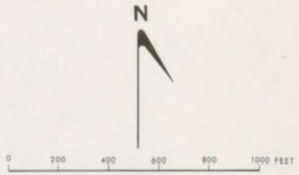
OBLITERATED DEVELOPMENT

DIRT ROAD

TRAIL

RIVER CAMP

SITE LOCATION



ISLAND PARK

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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NOV 85|DSC

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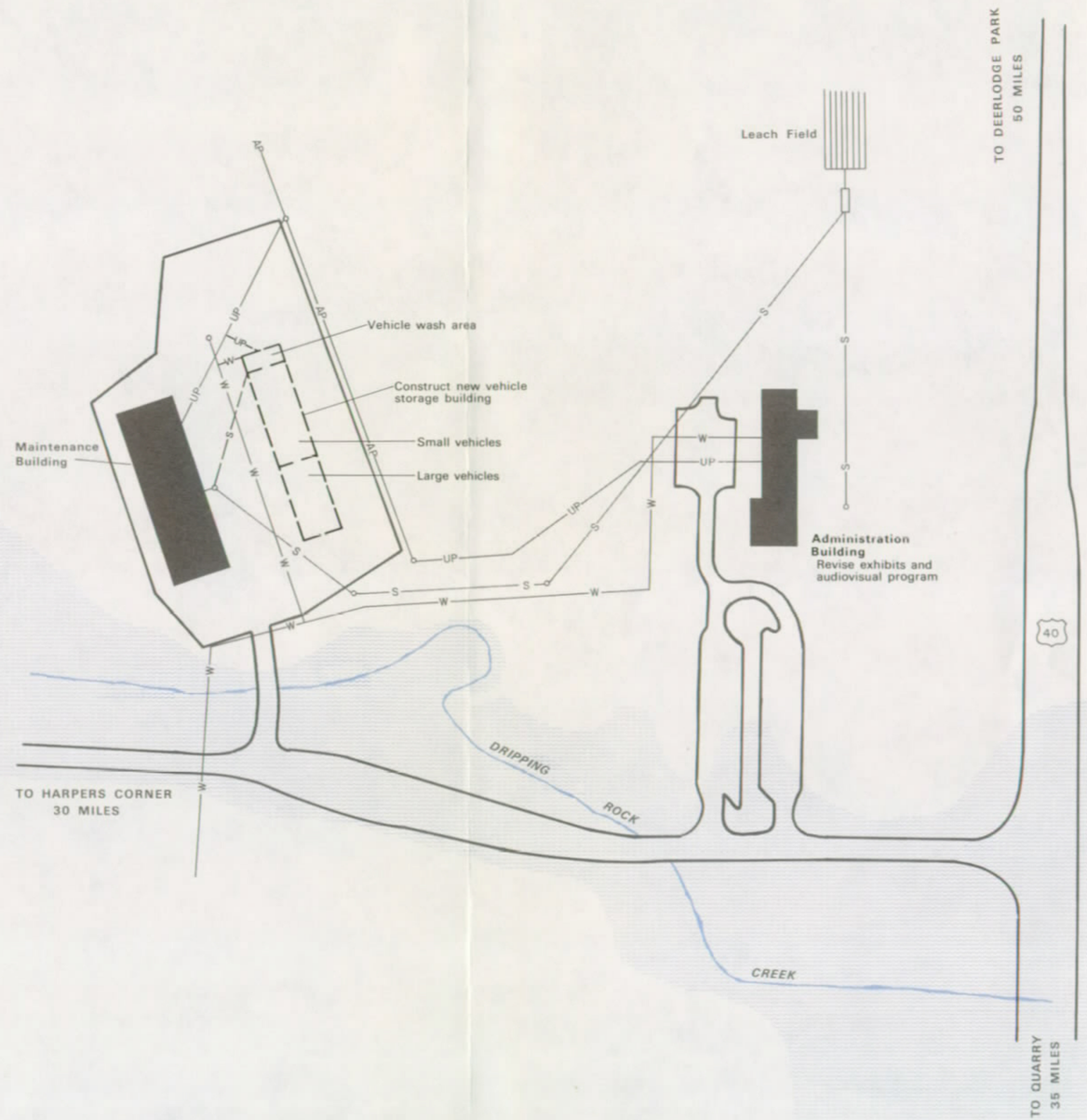
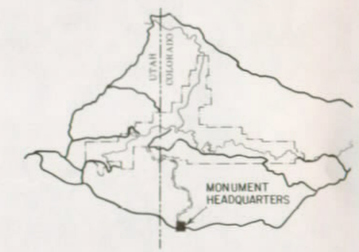


100-YEAR FLOODPLAIN
PROPOSED DEVELOPMENT
EXISTING DEVELOPMENT
PAVED ROAD
S SEWER LINE
W WATER LINE
UP UNDERGROUND POWER LINE
AP AERIAL POWER LINE



SITE LOCATION

N

0 40 80 120 240 360 FEET

HEADQUARTERS

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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NOV 85	DSC

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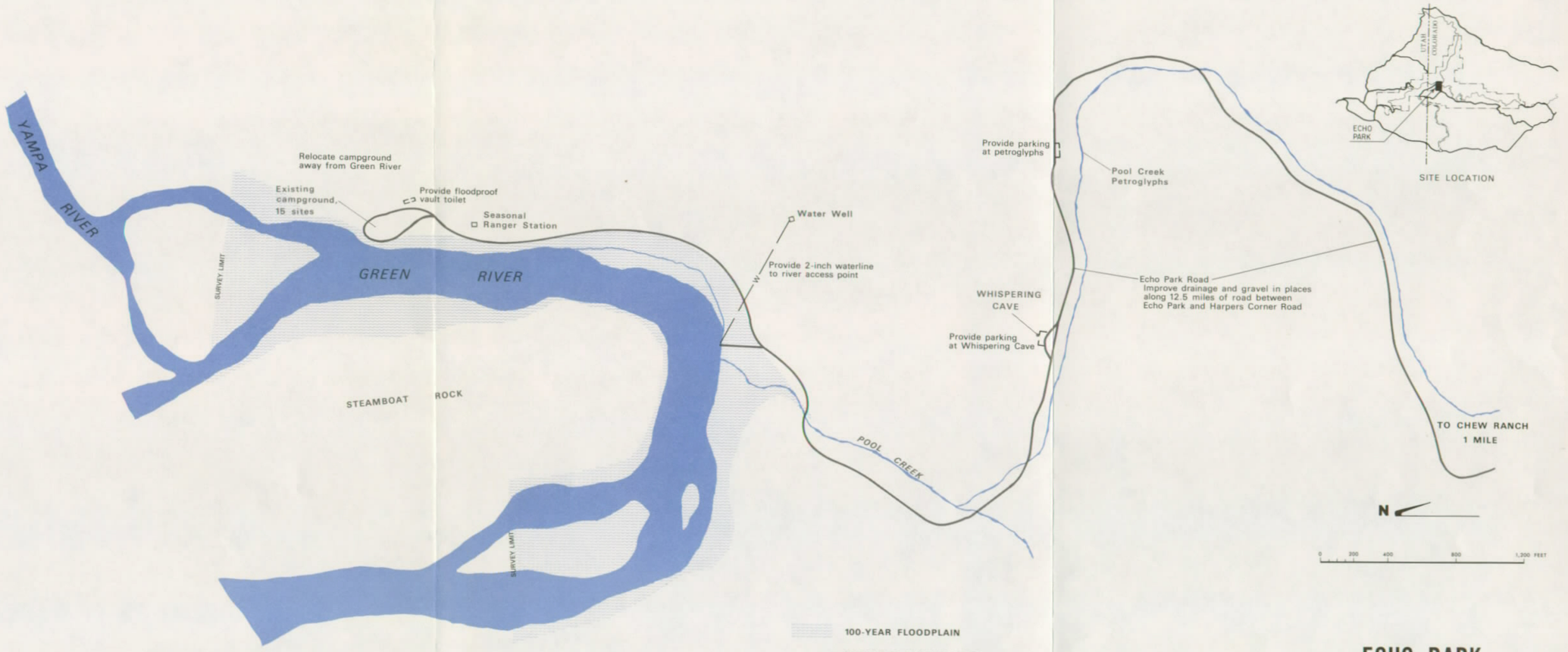


100-YEAR FLOODPLAIN

PROPOSED DEVELOPMENT

EXISTING DEVELOPMENT

DIRT ROAD

ECHO PARK

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

122	20.019A
NOV 85	DSC

ON MICROFILM

PROPOSED DEVELOPMENT

EXISTING DEVELOPMENT

UNPAVED ROAD

TO ECHO PARK 2.5 MI

TRAIL DRAW

CREEK

POOL

Maintain structures in existing condition

Shed

House

Barn

Shed

Livestock Corral

Provide parking

TO HARPERS CORNER ROAD 10 MI

Old Hay Field

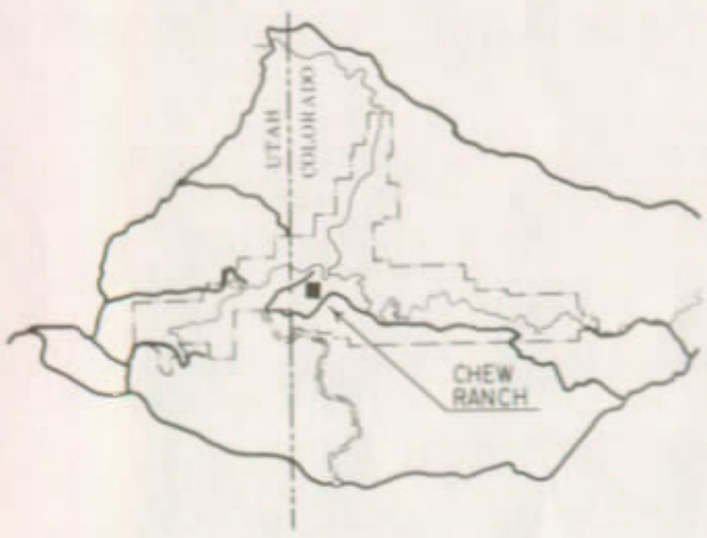
Mark trail to Pats Cave

Pats Cave

Improve drainage and apply gravel in places along 12.5 miles of road between Harpers Corner Road and Echo Park

N

0 300 600 900 1,200 FEET



SITE LOCATION

CHEW RANCH

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

122	20,031A
NOV 85	DSC

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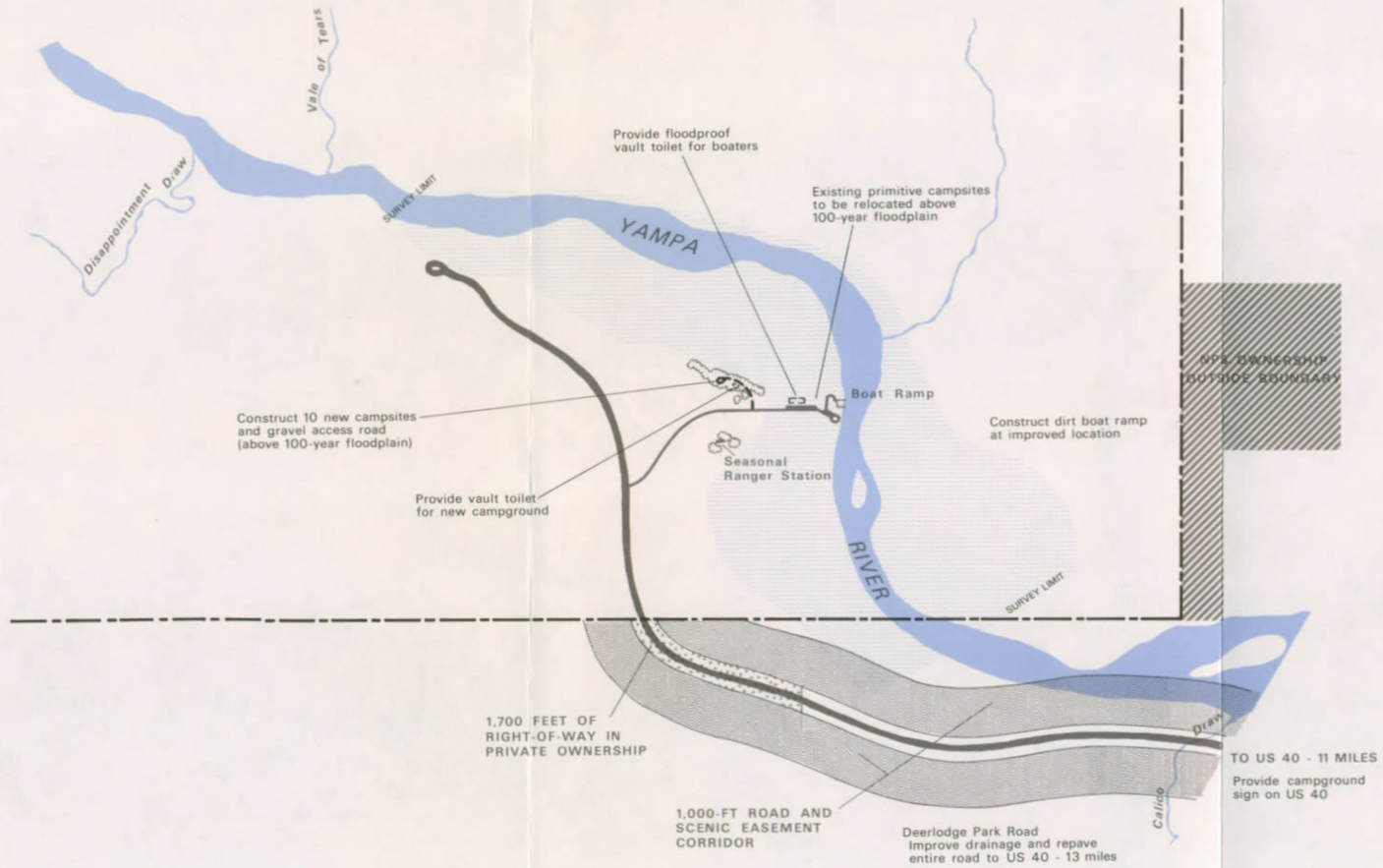
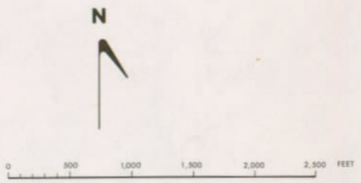


MONUMENT BOUNDARY
100-YEAR FLOODPLAIN
PROPOSED DEVELOPMENT
EXISTING DEVELOPMENT
PAVED ROAD
DIRT ROAD

SITE LOCATION



DEERLODGE PARK

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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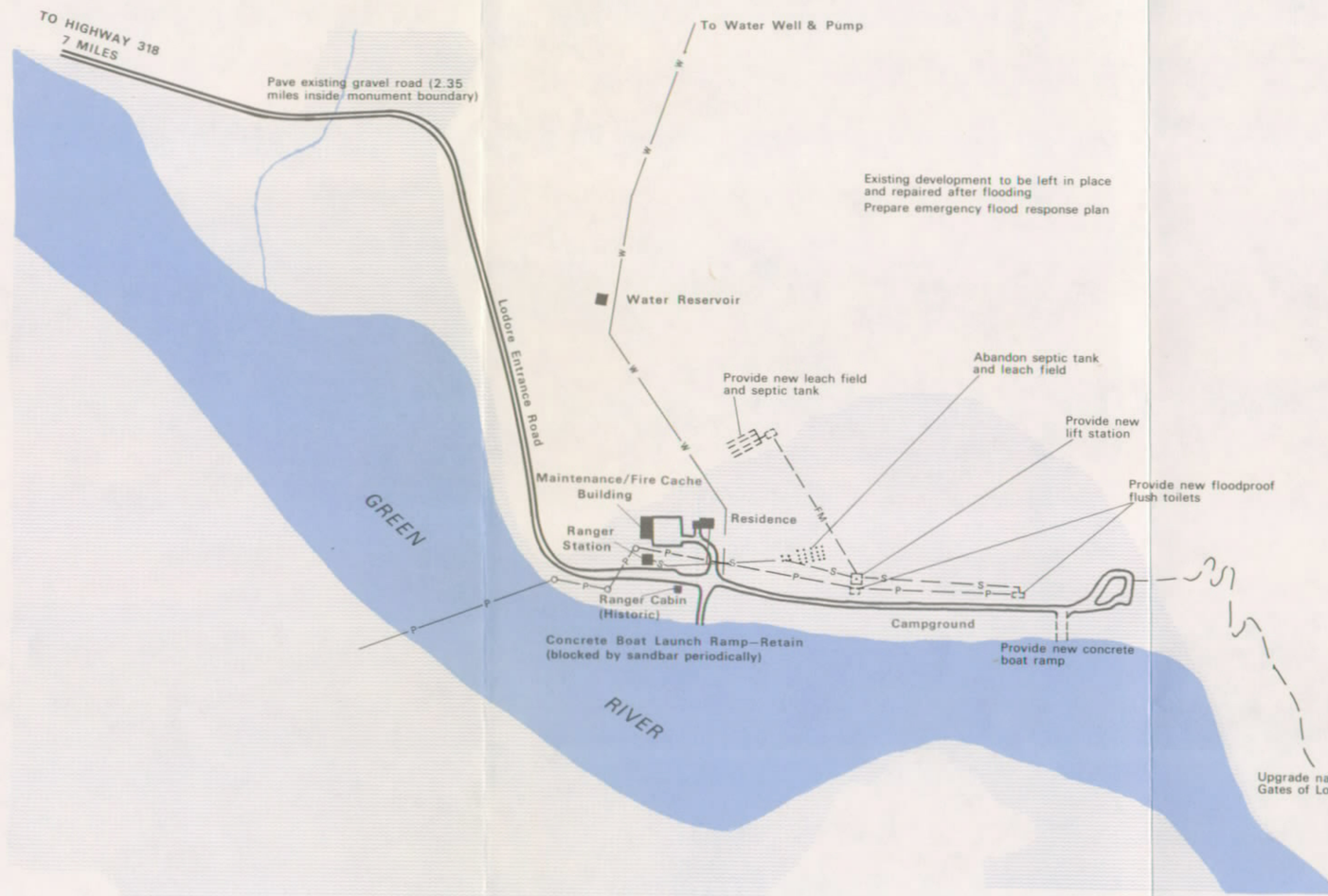
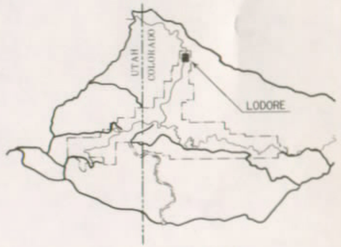


100-YEAR FLOODPLAIN
PROPOSED DEVELOPMENT
OBLITERATED DEVELOPMENT
EXISTING DEVELOPMENT
GRAVEL ROAD
TRAIL
SEWER LINE, MANHOLE, FORCE MAIN AND LIFT STATION
WATER LINE
POWER LINE



SITE LOCATION

N

0 100 200 300 400 500 600 700 FEET

LODORE

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

122	20,021A
NOV 85	DSC

ON MICROFILM

Options for year-round use of the quarry shuttlebus center were examined during planning. The shuttlebus center might be used for storage or office space, and during the summer months the building would also serve as an information center.

Also under the preferred alternative monument headquarters would remain in its present location at Dinosaur, Colorado. The "Alternatives Evaluation" section contains more detail on the rationale for this decision.

The 11.3 additional FTEs (full-time equivalents) required to improve maintenance standards, resource protection, visitor services, and interpretation in the backcountry are described in appendixes D and E. The Annual Operations and Maintenance Costs table (table 5) in the "Alternatives Evaluation" section indicates the projected total annual operating expenditures.

PLAN IMPLEMENTATION

The actions proposed in this alternative would be implemented over the next 15 years. The actions have been prioritized into seven groups to guide the implementation as funds are made available.

Table 3: Priority Action Groups and Costs

1. Life, Health, and Safety Issues*

The strongest emphasis should be given to actions required by floodplain regulations because of needs to ensure protection of life and property. Several of these actions ensure that sewage will not enter floodwaters. Other actions, independent of floodplain considerations, are measures to improve sanitation (principally the treatment of human waste). The two primary access roads leading to the Quarry and Harpers Corners areas have five unstable sections that are susceptible to landsliding and sudden development of extremely hazardous conditions. These must receive priority attention for stabilization and reconstruction (see priority group 3).

Prepare emergency flood response plans for Split Mountain and Green River campgrounds, Placer Point, Echo Park, Rainbow Park, Ruple ranch, headquarters, Deerlodge Park, and Lodore*	$ 40,000
Modify sewer system and construct new flush toilets at Split Mountain, and modify sewer system at Green River*	1,258,000
Provide vault toilets at Cub Creek** and Placer Point*	97,000
Convert pit toilets to vault toilets along Harpers Corner road**	97,000
Convert pit toilets to vault toilets at Echo Park*	48,000
Convert pit toilets to vault toilets at Rainbow Park*	48,000
Relocate Deerlodge Park campsites out of 100-year floodplain with gravel campground roads and sites*	114,000
Provide vault toilets at Deerlodge Park*	97,000
Provide floodproof flush toilets and modify water and sewer systems at Lodore*	481,000
Total	$2,280,000

*Actions required by floodplain regulations.
**Improvements in sanitation only, independent of flooding.

2. Paleontological and Curatorial Needs

Irreplaceable fossil and library collections of international significance and other museum objects are stored in facilities that are grossly undersized and that have no method of controlling humidity or temperature. The prospects for deterioration and loss are high without solutions for these problems. Minimum needs of this plan address only protection and storage and do not include options such as expanding research activities.

Provide adequate heating, ventilation, and air-conditioning at quarry building	$ 40,000
Build new quarry collection storage building	725,000
Total	$ 765,000

3. Road Improvements

Other important proposals are for improving sections of road that are eroding, cracking, or that are underlain by expansive clays and have already required closure and extensive repair road closure, thereby precluding visitor, concessioner, and management access.

Replace/upgrade all park signing	$ 40,000
Reconstruct Quarry area entrance road***	4,693,000
Realign and stabilize portions of Harpers Corner road to solve slumping problems; repave entire road***	6,554,000
Gravel and stabilize Cub Creek road	580,000
Improve drainage on Echo Park road, gravel in places, and provide pullouts at Chew ranch, Whispering Cave, and petroglyphs	966,000
Improve drainage and repave Deerlodge Park entrance road	3,140,000
Install culverts to improve drainage on Island Park and Rainbow Park roads	121,000
Total	$16,094,000+

***Two slump areas on Quarry area entrance road and three on Harpers Corner road will be reconstructed for life, health, and safety reasons before or at the same time that both entire roads are improved.

+$14,387,000 of the total will be funded, as possible, through other than general management plan sources, such as the Federal Land Highway Program (see table 4 in "Alternatives Evaluation" section).

4. Visitor Facilities to Meet Existing Needs

Types of use in some areas have grown to the extent that the size of the facility is inadequate (resulting in congestion) or there are conflicts with other recreational uses. Actions in this category are proposed to make facilities with well-established volumes of use more efficient and/or minimally functional--for example where river erosion or sedimentation has rendered launching facilities virtually nonfunctional.

Provide loop trail between lower parking lot and quarry	$ 97,000
Expand Split Mountain parking for boaters	73,000
Improve secondary takeout ramp at Split Mountain and provide flush toilets for boaters	177,000
Convert a portion of existing Green River campground to accommodate one group campsite	3,000
Improve picnic area at Placer Point	5,000
Mark hiking routes at Cub Creek	2,000
Relocate Echo Park campground, move site away from zone of river erosion; relocate ranger station	84,000
Provide water at Echo Park river access	29,000
Construct trail from Chew Ranch to Pats Cave	23,000
Construct dirt launch ramp at Deerlodge Park in improved location	24,000
Provide launch ramp at Lodore in dependable location	56,000
Improve Lodore nature trail	27,000
Total	$600,000

5. Historical and Archeological Resources

A few decisions relating to protection of cultural resources have been made in this alternative in advance of preparation of the cultural resources component of the resources management plan. These involve stabilization of selected buildings with historical or interpretive significance and protection of rock art sites where undirected foot traffic results in erosion of soil and loss of site integrity. Deterioration is not yet believed to be irreversible in most cases, but needs to be corrected in the near future.

Stabilize Douglass office	$ 8,000
Upgrade trail to petroglyphs at Cub Creek	56,000
Stabilize Morris cabin and clean up site	30,000
Upgrade trail to petroglyphs at McKee Spring	11,000
Fence petroglyph site along Harpers Corner road (pending agreement with the Bureau of Land Management)	2,000
Restore Lodore ranger cabin exterior	8,000
Total	$115,000

6. Park Administration

Space for storage and use of maintenance and protection equipment is inadequate. Lack of protection for vehicles and heavy equipment during winter weather results in deterioration of property and inordinate time required for warm-up prior to operation. These actions, while not critical to life and safety, would improve managerial efficiency.

Increase size of maintenance building and increase covered vehicle storage at quarry	$580,000
Remove metal sheds below quarry	64,000
Construct additional vehicle storage at headquarters maintenance area	$322,000
Total	$966,000

7. Other

Many of the proposed actions are in areas of the monument that have no major facilities but are likely to experience low to moderate increases in public use. The actions would provide the final steps in upgrading roads and other activities for more dependable access and use.

Improve drainage along Yampa Bench road, gravel in places	$1,700,000
Construct primitive drive-in campground at Ruple ranch and provide vault toilets	163,000
Remodel existing Ruple ranch cabin for seasonal employee	13,000
Pave portion of Lodore access road in monument	1,127,000
Pave Lodore campground road and establish shade trees	267,000
Total	$3,270,000

ALTERNATIVE 1 - NO ACTION

Under the no-action alternative, existing management activities would continue. The management zoning and natural resources management plans as described in the preferred alternative would be implemented, as funds allowed.

Existing visitor facilities would be maintained to support current activities, but no new facilities would be built. Roads would be repaired on an emergency basis only, and no new signing would be installed. Only minimal improvements for safety, sanitation, and handicap access would be made.

The dinosaur fossils in the quarry building would continue to be the principal attraction for most visitors. Other recreational opportunities in this area would include camping at the Split Mountain and Green River campgrounds, hiking on the Red Rock nature trail (at Split Mountain), picnicking at Placer Point, viewing the Green River, and driving to and hiking on unimproved routes in the Cub Creek area. No new storage building with adequate curatorial controls and space for the overflow of fossils would be built. There would be no attempt to stabilize the Morris cabin or the Douglass office.

The Harpers Corner road would continue to be the primary route to the interior of the park and would provide opportunities for picnicking at Plug Hat and other sites, viewing the scenery along the way and at the end of the road, and hiking the Harpers Corner trail.

Campgrounds would remain concentrated in developed areas and consist only of individual sites (no group camping). Split Mountain and Green River campgrounds would offer the greatest number of sites and most of the developed facilities easily accessible by car. The Lodore, Deerlodge Park, Echo Park, and Rainbow Park campgrounds would remain minimally developed, serving principally river users and backcountry motorists.

Under no action there would be only one developed trail in the Quarry area--at Split Mountain campground. Trails starting from the rivers and from most roads (e.g., Chew Ranch and Yampa Bench) would remain primitive and largely unmarked. Most of the park would remain inaccessible to the general public. Backcountry use would remain limited. River use would be unaffected.

Interpretation would continue at present levels (see "Affected Environment" section). Exhibits would be replaced and updated, and interior modifications would be made at the quarry building as described in the preferred alternative.

Staff levels and functions would continue as at present (24 full-time and two part-time permanents and 18 summer seasonals--see appendix D for a detailed breakdown). No improvements would be made for administrative or maintenance purposes.

ALTERNATIVE 2

Under alternative 2, all management zoning and resources management proposals as described in the preferred alternative would be implemented, and only the minimum actions necessary to upgrade facilities and improve current visitor opportunities would be undertaken.

This alternative would involve essentially the same proposals for recreation and interpretation as the preferred alternative, with the following exceptions. At the Quarry area only the road/stream trail from the shuttlebus center parking area to the quarry building would be developed; at Island Park a campground would not be developed at the Ruple ranch; the Yampa Bench road would not be improved; and at Lodore the entrance and campground roads would not be paved, a launch ramp would not be built, and the water and sewer system would not be upgraded. Proposals to improve visitor safety, sanitation, and handicap access would be similar to those of the preferred alternative, although less extensive.

Maintenance facilities to support park operations would not be as extensive as under the preferred alternative. No covered vehicle storage would be provided in the maintenance areas at either the quarry or headquarters. Staffing requirements would be slightly less than those of the preferred alternative, with an addition of 7.5 FTEs (full-time equivalents).

ALTERNATIVE 3

Alternative 3 would involve the implementation of all approved management zoning and resources management recommendations as well as most of the proposals for visitor use and development described under the preferred alternative. In addition, this alternative would provide more day use opportunities at areas that have unimproved access and little public use at present.

The major proposal would be the construction of a gravel road past Point of Pines, connecting the Harpers Corner road with Cub Creek. This road would significantly expand the scenic driving opportunities between the quarry and the Harpers Corner area and allow visitors an alternative to driving US 40. It would wind up a major ridge east of Cub Creek (south of the monument boundary) and then follow a high plateau to Point of Pines. Here, in an unusual pine/manzanita environment, spectacular views would be afforded of a vast, multicolored, geologically fascinating region. The proposed interpretive prospectus would specify plans for wayside exhibits or a road guide for scenic overlooks along the road. Visitor orientation and information for the new road would be provided at the quarry contact center and the headquarters/visitor center. A picnic area and short trails would also be built at Point of Pines.

In the Quarry area a trail would be constructed from the quarry building to the Racetrack, a colorful valley north of the quarry with upturned rock strata, striking views, and excellent prospects for short side hikes. The trail, which would extend to the top of the Navajo formation, would offer panoramic views of Split Mountain and would then loop back to the shuttlebus center. The loop trail between the shuttlebus center and the quarry building would connect with the Racetrack trail to complete an extensive trail system. The Douglass office would be stabilized and its exterior interpreted.

The proposals for Placer Point, the Split Mountain and Green River campgrounds, and Cub Creek would be similar to those of the preferred alternative, except that the Cub Creek road (leading to Morris cabin) would be paved rather than graveled, an unimproved road to the Douglass property (tract 01-102) would be used as an interpretive foot trail, the Morris cabin would be restored rather than stabilized, and an additional 25-space gravel parking area would be provided for boaters using the Split Mountain launching area.

On the Harpers Corner road the Plug Hat picnic area would be converted to a primitive campground to expand camping opportunities in conjunction with the new Point of Pines road. The Ruple Point trail would be upgraded and expanded to include more canyon overlooks.

The Echo Park experience would remain unchanged except that the campground would be relocated, and vault toilets and a new water system would be included. A picnic area would be added at the Chew ranch, the ranch buildings would be removed, and the natural environment would be

restored. A few new river overlook trails would be built along the Yampa Bench road.

Proposals for the Rainbow Park/Island Park area include substantial upgrading of the access road (high-quality gravel), rerouting of a section of the road away from McKee Spring to provide additional protection to the petroglyphs, converting Rainbow Park to day use (closing the campground and designating it a picnic area), and constructing and signing the trail leading to Jones Hole.

Proposals for Deerlodge Park and Lodore would be the same as those described under alternative 2.

Proposals for safety, sanitation, and handicap access would be the same as those of the preferred alternative.

In addition to the administrative facility improvements proposed in the preferred alternative, this alternative would provide more seasonal quarters at the quarry and an entirely new ranger station/residence at the Ruple ranch in conjunction with the new campground. The maintenance, protection, and interpretive staffs would be increased by 11.5 FTEs to serve visitors at new and upgraded developments.

ALTERNATIVE 4

This alternative would greatly increase recreational and interpretive opportunities in the monument. In addition to the management zoning and resources management recommendations described in the preferred alternative, it would involve proposals for extensive visitor use and development. In-park driving opportunities would be expanded through the construction of new roads and the upgrading of others to high-quality gravel or asphalt. Three new campgrounds would be developed, and numerous hiking trails would be built. The net result would be to open entirely new sections of the monument and adjacent areas to the general public.

Although the Quarry area would no longer be a single focus for many visitors, its recreational offerings would be expanded. Trails would be constructed from the quarry to the Douglass property and the trail proposed to the Racetrack under alternative 3 would be connected to Split Mountain campground with an additional trail. The Douglass office would be restored and interpreted as it was when Earl Douglass was using it. At Green River campground five group sites (also suitable for individual use) and a 50-space boater parking area would be established. The launch ramp at Split Mountain would be relocated to Green River; in its place would be a 10-site picnic area adjacent to the nature trail.

The Point of Pines road, proposed as gravel under atlernative 3, would be paved under this alternative. A paved Cub Creek road would be connected with the paved Point of Pines road, thus making Cub Creek a greater focus of recreational activity. New day use trails would be constructed at Cub Creek, including not only the petroglyphs and various side canyons, but also extending to high viewpoints. The Morris cabin would be restored and interpreted. Cub Creek would serve as a backcountry trailhead area for the Outlaw Trail, which would be marked and signed from this point.

The Point of Pines road, connecting the Quarry/Cub Creek area to the Harpers Corner road, would be a high-quality paved road, opening the high plateau area to many more visitors. This road would become an important attraction in the region, connecting the Quarry and canyon areas of the monument. A picnic area and "dry" campground and day use trails would be developed at Point of Pines, and a highly improved campground would be constructed at Plug Hat or another suitable location along the Harpers Corner road, subject to the feasibility of providing water. Additional short- and long-distance trails (such as the Outlaw Trail) would be accessible from the Harpers Corner road. The Ruple Point trail would be upgraded as described in alternative 3.

The headquarters staff would be relocated to Vernal. The existing headquarters building would then become a district office with additional space. There is potential for using part of this space as an exhibit area for interpreting monument resources other than dinosaur fossils.

Dinosaur's extensive cultural resources are currently uninterpreted. Monument lands were occupied from 7000 B.C. though three subsequent prehistoric periods, and ample displayable material could be obtained. Western exploration and the 19th to 20th century settlement are similarly unaddressed. Natural resources could also be described in the headquarters building if the exhibit area proved large enough, perhaps with an emphasis on river ecology.

The Echo Park and Yampa Bench roads would be upgraded (high-quality gravel) to offer more visitors an opportunity to traverse even more of the monument; pullouts would be established at well-known attractions. The Echo Park campground would be converted to a day use area, and camping would be relocated to the Chew ranch. A trailhead would be established there, and an extensive trail system would lead to Pats Cave, Pool Creek, and the Jenny Lind loop, transforming the Chew ranch into a center for hiking. Similarly, numerous trails would be constructed from the Yampa Bench road to Mantle Cave and other river overlooks.

The scope of recreational opportunities in the Rainbow Park/Island Park area would also be expanded. The access road would be paved, and it would be realigned around McKee Spring to provide additional protection to the petroglyphs. The new Ruple ranch campground would have paved roads. Hiking opportunities would be expanded as in alternative 3.

At Deerlodge Park the campground roads and sites as well as the entrance road would be paved. An informal fire circle or gathering area would be established at the campground for the purpose of presenting informational and interpretive talks for boaters.

At Lodore actions would be the same as under the preferred alternative.

All other visitor use proposals, including those for interpretation, safety, sanitation, and handicap access, would be the same as those in alternative 3. Administrative changes would be similar but would also include relocation of the headquarters staff to Vernal (leaving seasonal housing in the present headquarters area), construction of a new ranger station/residence at Cub Creek, removal of the Echo Park ranger station and use of the Chew ranchhouse as a ranger station/residence for that area, construction of a new ranger station/residence and a small maintenance area at the Ruple ranch, and construction of a maintenance worker residence at Lodore. The park staff would be substantially expanded to support new developments (16.5 new FTEs).

ALTERNATIVES EVALUATION

Tables 4 and 5 show the comparative development and operating costs of the five alternatives. The preferred alternative and alternative 2 would provide substantial benefits in terms of visitor use and resource protection, but significant costs would be incurred--life-cycle costs that would be approximately 2.6 (alternative 2) to 3.0 (preferred alternative) times greater than under the no-action alternative (see table 6).

The differences in the preferred and alternative 2 are mainly in visitor use. In the preferred alternative there would be a primitive drive-in campground at Ruple ranch (thus expanding camping opportunities available in an outlying area), the access road and campground at Lodore would be brought to the same standard as the other principal boat-launching sites, the Yampa Bench road would be improved so that visitors would have less risk of being stranded, and quarry visitors would have added options for walking safely through two different types of terrain on a loop trail to and from the quarry, with interpretation of the colorful scenery and geologic strata in the quarry area. The Ruple ranch area is already used informally for camping and there is scattered use of trails and roads in this area. By designating a campground area here, and providing a ranger on site, use would be better managed and the environment better protected. The preferred alternative would also provide for covered vehicle storage at the quarry maintenance area, ensuring management's more dependable response to emergencies and proper vehicle maintenance. It should be noted that almost 65 percent of the cost for the preferred alternative, compared to alternative 2, is for improved roads/access. In alternative 2 none of the above improvements would be made; however, there would be a new trail to the quarry to make walking safer.

Alternatives 3 and 4 would exceed the basic visitor uses of present, opening new areas of the monument to heavier use through greatly improved vehicular access. These alternatives could result in significantly more impacts on the resources at greatly increased costs--4.1 times (alternative 3) and 6.4 times (alternative 4) the cost of no action. Greatly increased visitor benefits would be offset by the major financial expenditures and by the resultant environmental damage (to soils, vegetation, and endangered species). Visual quality of large areas would be affected by the sight of new roads and developments along them (see "Environmental Consequences" section for more detail).

Table 4: Comparative Development Costs

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
QUARRY, SPLIT MOUNTAIN GREEN RIVER, CUB CREEK					
Roads and Parking	Stabilize Cub Creek road, gravel $ 579,000	Repair Cub Creek road temporarily in response to minor washouts; (close road permanently in case of major erosion in worst section)	Stabilize Cub Creek road, gravel $ 579,000	Stabilize Cub Creek road, pave $ 724,000	Stabilize Cub Creek road, pave $ 724,000
	Reconstruct entrance road (partly contingent on endangered species study) $4,693,150*	No change	Reconstruct entrance road (partly contingent on endangered species study) $4,693,150*	Reconstruct entrance road (partly contingent on endangered species study) $4,693,150*	Reconstruct entrance road (partly contingent on endangered species study) $4,693,150*
	Provide new Split Mountain 30-space parking for boaters $ 72,500	Retain existing Split Mountain parking	Provide new Split Mountain 30-space parking for boaters $ 72,500	Provide new Split Mountain 30-space parking for boaters $ 72,500 Add 25-space boater parking (gravel) $ 32,200	Construct paved 50-space Green River parking for boaters; retain Split Mountain parking for picnickers and other day users and add 10-site picnic area $ 96,600
Campgrounds, Picnic Areas, and River Access	Retain existing Split Mountain and Green River campgrounds; prepare emergency flood response plan for all developments in 100-year flood-plain, monument-wide $ 40,300	Retain existing Split Mountain and Green River campgrounds; prepare emergency flood response plan for all developments in 100-year flood-plain, monument-wide $ 40,300	Retain existing Split Mountain and Green River campgrounds; prepare emergency response plan for all developments in 100-year flood-plain, monument-wide $ 40,300	Retain existing Split Mountain and Green River campgrounds; prepare emergency response plan for all developments in 100-year flood-plain, monument-wide $ 40,300	Retain existing Split Mountain and Green River campgrounds; prepare emergency response plan for all developments in 100-year flood-plain, monument-wide $ 40,300
	Convert a portion of existing Green River campground to accomodate 1 group campsite $ 3,220	No change	Convert a portion of existing Green River campground to accommodate 1 group campsite $ 3,220	Convert a portion of existing Green River campground to accommodate 1 group campsite $ 3,220	Provide 5 group campsites (also suitable for individual camping) at Green River $ 16,100

*Park roads marked with a single asterisk require rehabilitation through special funding to correct serious surface deterioration and avoid closure as a result of major earthslides or washouts. They will be prioritized and funded as possible through other than general management plan sources, such as the Federal Lands Highway Program.

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
	Improve secondary launch ramp at Split Mountain and provide flush toilets for boaters $ 177,100	Retain existing launch ramp at Split Mountain	Improve secondary launch ramp at Split Mountain and provide flush toilets for boaters $ 177,100	Improve secondary launch ramp at Split Mountain and provide flush toilets for boaters $ 177,100	Move launch ramp at Split Mountain to Green River and provide flush toilets for boaters $ 177,100
	Improve picnic area at Placer Point $ 4,830	No change	Improve picnic area at Placer Point $ 4,830	Improve picnic area at Placer Point $ 4,830	Improve picnic area at Placer Point $ 4,830
Trails	Construct loop trail from quarry to lower parking (stream-ridge route) $ 96,600	No change	Construct trail from quarry to lower parking (stream route) $ 54,740	Construct trail from quarry to lower parking (ridge route) $ 54,740	Construct trail from quarry to lower parking (ridge route) $ 54,740
	No change	No change	No change	Construct trail, quarry to Racetrack $ 112,700	Construct trail, quarry to Racetrack $ 112,700
	No change	No change	No change	No change	Construct trail, quarry area to Split Mountain campground $ 281,750
	Upgrade trail to petroglyphs at Cub Creek $ 56,350	No change	Upgrade trail to petroglyphs at Cub Creek $ 56,350	Upgrade trail to petroglyphs at Cub Creek $ 56,350	Upgrade trail to petroglyphs at Cub Creek $ 56,350
	Mark hiking routes to nearby side canyons at Cub Creek $ 1,610	No change	Mark hiking routes to nearby side canyons at Cub Creek $ 1,610	Mark hiking routes to nearby side canyons at Cub Creek $ 1,610	Construct trail to several Cub Creek side canyons and viewpoints $ 338,100
	No change	No change	No change	Use road to Douglass property as foot trail	Use road to Douglass property as foot trail
	No change	No change	No change	No change	Mark Outlaw Trail for hiking and horseback (contingent on determination of historical significance) $ 90,160
Visitor Contact/ Interpretation	Redo exhibits at quarry (HFC)	Redo exhibits at quarry (HFC)	Redo exhibits at quarry (HFC)	Redo exhibits at quarry (HFC)	Redo exhibits at quarry (HFC)
	Improve visitor and employee circulation inside quarry building and reassess interior spaces (HFC)	Improve visitor and employee circulation inside quarry building and reassess interior spaces (HFC)	Improve visitor and employee circulation inside quarry building and reassess interior spaces (HFC)	Improve visitor and employee circulation inside quarry building and reassess interior spaces (HFC)	Improve visitor and employee circulation inside quarry building and reassess interior spaces (HFC)
	Replace/upgrade all signing $ 12,880	Retain existing signing	Replace/upgrade all signing $ 12,880	Replace/upgrade all signing $ 12,880	Replace/upgrade all signing $ 12,880

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Cultural Resources	Stabilize Morris cabin and clean up site $ 28,980	Allow Morris cabin to deteriorate $ 1,610	Stabilize Morris cabin and clean up site $ 28,980	Restore Morris cabin and immediate grounds $ 48,300	Restore Morris cabin and immediate grounds $ 48,300
	Build new collection storage building $ 724,500	No change	Build new collection storage building $ 724,500	Build new collection storage building $ 724,500	Build new collection storage building $ 724,500
	Stabilize Douglass office $ 8,050	No change	Stabilize Douglass office $ 8,050	Stabilize Douglass office $ 8,050	Restore Douglass office $ 40,250
Administration	Increase size of maintenance building and increase covered vehicle storage $ 579,600	No change	Increase size of maintenance building $386,400	Increase size of maintenance building and increase covered vehicle storage $ 579,600	Increase size of maintenance building and increase covered vehicle storage $ 579,600
	No change	No change	No change	Provide seasonal housing at quarry (construct or convert) $ 80,500	Provide seasonal housing at quarry (construct or convert) $ 80,500
	No change	No change	No change	No change	Construct ranger station/residence at Cub Creek $ 80,500
	Demolish metal sheds $ 64,400	No change	Demolish metal sheds $ 64,400	Demolish metal sheds $ 64,400	Demolish metal sheds $ 64,400
Utilities	Provide adequate heating, ventilation, air conditioning at quarry $ 40,250	Provide adequate heating, ventilation, air conditioning at quarry $ 40,250	Provide adequate heating, ventilation, air conditioning at quarry $ 40,250	Provide adequate heating, ventilation, air conditioning at quarry $ 40,250	Provide adequate heating, ventilation, air conditioning at quarry $ 40,250
	Modify sewer system and related utilities at Split Mountain $ 574,770	No change	Modify sewer system and related utilities at Split Mountain $ 574,770	Modify sewer system and related utilities at Split Mountain $ 574,770	Modify sewer system and related utilities at Split Mountain $ 574,770
	Modify Green River sewer and related utilities $ 682,640	No change	Modify Green River sewer and related utilities $ 682,640	Modify Green River sewer and related utilities $ 682,640	Modify Green River sewer and related utilities $ 682,640
	No change	No change	No change	Underground power $ 755,090	Underground power $755,090
	Provide vault toilets at Cub Creek and Placer Point $ 96,600	No change	Provide vault toilets at Cub Creek and Placer Point $ 96,600	Provide vault toilets at Cub Creek and Placer Point $ 96,600	Provide water, power, sewer, and public flush toilets at Cub Creek ranger station $ 433,090
Subtotal	$8,537,330	$ 82,160	$8,302,270	$9,640,280	$10,802,650

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
HEADQUARTERS, ENTRANCE, PLUG HAT, HARPERS CORNER ROAD, AND POINT OF PINES					
Roads and Parking	Realign and stabilize portions of Harpers Corner road to solve slumping problems; place final surface on entire road $6,554,310*	Retain Harpers Corner road and repair on emergency basis (slumping of worst section would close road at least one year) $1,912,680*	Realign and stabilize portion of Harpers Corner road to solve slumping problems; place final surface on entire road $6,544,310	Realign and stabilize portion of Harpers Corner road to solve slumping problems; place final surface on entire road $6,554,310*	Realign and stabilize portion of Harpers Corner road to solve slumping problems; place final surface on entire road $6,554,310*
	No change	No change	No change	Construct new gravel road from Harpers Corner road to Point of Pines, connect to Cub Creek road and develop scenic overlooks $8,689,170	Construct new paved road from Harpers Corner road to Point of Pines, connect to Cub Creek road and develop scenic overlooks $16,222,360
Campgrounds/Picnic Areas	NPS will not provide more campgrounds--any additional needs will be met by private interests outside the park	No change	NPS will not provide more campgrounds--any additional needs will be met by private interests outside the park	Provide new primitive campground at Plug Hat (day labor conversion of existing picnic area)	Provide new developed campground at Plug Hat or comparable site (subject to feasibility of providing water) $ 483,000
	No change	No change	No change	Construct picnic area at Point of Pines $ 16,100	Construct picnic area and day use trails at Point of Pines $ 48,300
	No change	No change	No change	No change	Construct "dry" campground at Point of Pines $ 626,290
Trails	No change	No change	No change	Meet day hiking needs near major developed use areas; upgrade Ruple Point trail and construct spurs to Island Park and Moonshine rapid views $ 507,150	Meet day hiking needs near major developed use areas; upgrade Ruple Point trail and construct spurs to Island Park and Moonshine rapid views $ 507,150
	No change	No change	No change	No change	Expand long distance trail opportunities $ 112,700
	No change	No change	No change	Construct day use trails at Point of Pines $ 112,700	Construct day use trails at Point of Pines $ 112,700

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Visitor Contact/ Interpretation	Improve all signs $ 11,270	No change	Improve all signs $ 11,270	Improve all signs $ 11,270	Improve all signs $ 11,270
	No change	No change	No change	Provide information/ orientation for new Cub Creek to Harpers Corner road at quarry and headquarters areas	Provide information/ orientation for new Cub Creek to Harpers Corner road at quarry and headquarters areas
Cultural Resources	Fence petroglyph site to exclude grazing on BLM land adjacent to Harpers Corner road (pending agreement with BLM) $ 1,610	No change	Fence petroglyph site to exclude grazing on BLM land adjacent to Harpers Corner road (pending agreement with BLM) $ 1,610	Fence petroglyph site to exclude grazing on BLM land adjacent to Harpers Corner road (pending agreement with BLM) $ 1,610	Fence petroglyph site to exclude grazing on BLM land adjacent to Harpers Corner road (pending agreement with BLM) $ 1,610
Administration	Construct additional vehicle storage building and wash area at headquarters maintenance area $ 322,000	No change	No change	Construct additional vehicle storage building and wash area at headquarters maintenance area $ 322,000	Construct additional vehicle storage building and wash area at headquarters maintenance area $ 322,000
	No change	No change	No change	No change	Move headquarters to Vernal; use existing building as district office including district interpretation staff. (Cost of move, remodelling, new lease space in Vernal, etc., is not itemized because of uncertainty of required actions.)
	No change	No change	No change	No change	Add seasonal housing at headquarters area (adapt permanent housing) $ 80,500
Utilities	No change	No change	No change	No change	Provide well at Plug Hat or other site (depth and cost of well not known)
	Convert pit toilets to vault toilets along Harpers Corner road $ 96,600	No change	Convert pit toilets to vault toilets along Harpers Corner road $ 96,600	Convert pit toilets to vault toilets along Harpers Corner road $ 96,600	Convert pit toilets to vault toilets along Harpers Corner road $ 96,600
Subtotal	$6,985,790	$1,912,680	$6,663,790	$16,310,910	$25,178,790

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
ECHO PARK, CHEW RANCH, POOL CREEK, AND YAMPA BENCH					
Roads and Parking	Improve drainage on Echo Park road; gravel in places, and provide pullout parking at Chew ranch, Whispering Cave, and petroglyphs $ 966,000	No change	Improve drainage on Echo Park road; gravel in places, and provide pullout parking at Chew ranch, Whispering Cave, and petroglyphs $ 966,000	Improve drainage on Echo Park road; gravel in places, and provide pullout parking at Chew ranch, Whispering Cave, and petroglyphs $ 966,000	Gravel entire Echo Park road and provide pullout parking at Chew ranch, Whispering Cave, and petroglyphs $2,455,250
	Improve drainage on Yampa Bench road; gravel in places $1,700,160	No change	No change	Improve drainage on Yampa Bench road; gravel in places $1,700,160	Gravel entire Yampa Bench road $8,500,800
Campgrounds	Relocate Echo Park campground and ranger station; move sites away from river $83,720	No change	Relocate Echo Park campground; move sites away from river $ 83,720	Relocate Echo Park campground to south end of Echo Park $ 178,710	Eliminate Echo Park campground; convert to day use area, including picnicking $ 8,050
	No change	No change	No change	Provide for day use at Chew Ranch, including picnicking $ 16,100	Develop campground at at Chew ranch $ 170,660
Trails	Upgrade trail to Pats Cave $ 22,540	No change	Upgrade trail to Pats Cave $ 22,540	Upgrade trail to Pats Cave $ 22,540	Upgrade day use trail opportunities (Pats Cave, Pool Creek, and Jenny Lind loop) $ 270,480
	No change	No change	No change	No change	Provide trailhead at Chew ranch (center for hiking) $ 1,610
	No change	No change	No change	Sign and mark existing trails to rim overlooks along Yampa Bench road $ 67,620	Construct or mark new day use and/or river-oriented trails along the Yampa Bench road $ 135,240
Visitor Contact/ Interpretation	Improve signing, especially at petroglyphs $ 8,050	No change	Improve signing, especially at petroglyphs $ 8,050	Improve signing, especially at petroglyphs $ 8,050	Improve signing, especially at petroglyphs $ 8,050
Cultural Resources	Maintain Chew ranch structures in existing condition	No change (except remove structures in unsafe condition) $ 4,830	Maintain Chew ranch structures in existing condition	Remove all Chew ranch buildings and other structures; restore natural environment $ 9,660	Remodel and use Chew ranchhouse as ranger residence $ 48,300

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Administration	No change	No change	No change	No change	Remove Echo Park ranger station $ 6,440
	No change	No change	No change	No change	Provide station for research and interpretation at Mantle ranch $ 241,500
	No change	No change	No change	Build new ranger/ visitor contact station at Echo Park $ 135,240	No change
Utilities	Provide water at Echo Park river access $ 28,980	No change	Provide water at Echo Park river access $ 28,980	Provide water at Echo Park river access $ 28,980	Provide water at Echo Park river access $ 28,980
	Provide vault toilet at Echo Park $ 48,300	No change	Provide vault toilet at Echo Park $ 48,300	Provide water and vault toilets for re-located Echo Park campsites $ 88,550	Provide water and vault toilets at Chew ranch campground $ 610,190
Subtotal	$2,857,750	$ 4,830	$1,157,590	$3,221,610	$12,485,550

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
RAINBOW PARK, ISLAND PARK, AND JONES HOLE					
Roads and Parking	Install culverts to improve drainage on roads to Island Park and Rainbow Park $ 120,750	No change	Install culverts to improve drainage on roads to Island park and Rainbow Park $ 120,750	Provide high-quality gravel road from boundary to Rainbow Park and Island Park, reroute around McKee Springs $2,447,200	Pave road from boundary to Ruple ranch, reroute around McKee Springs $6,118,000
Campgrounds	No change	No change	No change	Close campground at Rainbow Park and convert to picnicking and day use $ 8,050	Close campground at Rainbow Park and convert to picnicking and day use $ 8,050
	Construct primitive drive-in campground at Ruple ranch (screen from river) $ 114,310	No change	No change	Construct primitive drive-in campground at Ruple ranch (screen from river) $ 114,310	Construct structured drive-in campground at Ruple ranch with paved loops (screen from river) $ 392,840
Trails	No change	No change	No change	Sign and upgrade Ely Creek trail from Ruple ranch to Jones Hole $ 128,800	Sign and upgrade Ely Creek trail from Ruple ranch to Jones Hole $ 128,800
	Upgrade trail along McKee Spring petroglyphs $ 11,270	No change	Upgrade trail along McKee Spring petroglyphs $ 11,270	Provide no formal access to rock art	Construct new access trail to McKee Spring and upgrade trail along petroglyphs $ 22,540
	Maintain road to Whirlpool Canyon overlook	No change	Maintain road to Whirlpool Canyon overlook	Maintain road to Whirlpool Canyon overlook	Maintain road to Whirlpool Canyon overlook
Visitor Contact/ Interpretation	Improve all signing $ 8,050	No change	Improve all signing $ 8,050	Improve all signing $ 8,050	Improve all signing $ 8,050
Administration	Quarter seasonal in remodeled cabin at Ruple ranch $ 12,880	No change	No change	Quarter seasonal in remodeled cabin at Ruple ranch $ 12,880	Construct new ranger station/residence at Ruple ranch $ 135,240
	No change	No change	No change	No change	Construct small maintenance area building at Ruple ranch $ 53,130
Utilities	Provide vault toilet at Ruple ranch $ 48,300	No change	No change	Provide water and vault toilet at Ruple ranch $ 312,340	Provide water and sewer with flush toilet at Ruple ranch $ 726,110
	Provide vault toilet at Rainbow Park $ 48,300	No change	Provide vault toilet at Rainbow Park $ 48,300	Provide vault toilet at Rainbow Park $ 48,300	Provide vault toilet at Rainbow Park $ 48,300
Subtotal	$ 363,860	$0	$ 188,370	$3,079,930	$7,641,060

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
DEERLODGE PARK					
Roads and Parking	Repave and improve drainage on entrance road to prevent washouts $3,139,500*	No change	Repave and improve drainage on entrance road to prevent washouts $3,139,500*	Repave and improve drainage on entrance road to prevent washouts $3,139,500*	Repave and improve drainage on entrance road to prevent washouts $3,139,500*
Campgrounds	Gravel campground roads and sites (relocate campsites out of floodplain) $ 114,310	No change	Gravel campground roads and sites (relocate campsites out of floodplain) $ 114,310	Gravel campground roads and sites (relocate campsites out of floodplain) $ 114,310	Pave campground roads roads and sites (relocate campsites out of floodplain) $ 313,950
	Construct dirt launch ramp at improved location $ 24,150	No change	Construct dirt launch ramp at improved location $ 24,150	Construct dirt launch ramp at improved location $ 24,150	Construct dirt launch ramp at improved location $ 24,150
Visitor Contact/ Interpretation	Sign campground on US 40	No change	Sign campground on US 40	Sign campground on US 40	Sign campground on US 40
	No change	No change	No change	No change	Provide campfire circle
Utilities	Provide vault toilets $ 96,600	No change	Provide vault toilets $ 96,600	Provide vault toilets $ 96,600	Provide flush toilets; develop water and sewer $ 454,020
Subtotal	$3,374,560	$0	$3,374,560	$3,374,560	$3,931,620

Facility/Location	Alternative	No Action	Alternative 2	Alternative 3	Alternative 4
LODORE					
Roads and Parking	Pave access road from main highway (within boundary) $1,127,000	No change	No change	No change	Pave access road from main highway (within boundary) $1,127,000
Campgrounds	Retain campground, pave campground road and establish shade trees $ 267,260	Retain campground	Retain campground	Retain campground	Retain campground, pave campground road and establish shade trees $ 267,260
River Access	Build new launch ramp $ 56,350	Make existing launch location flexible, no new permanent facilities	Make existing launch location flexible, no new permanent facilities	Make existing launch, location flexible, no new permanent facilities	Build new launch ramp $ 56,350
Trails	Upgrade nature trail $ 27,370	No change	Upgrade nature trail $ 27,370	Upgrade nature trail $ 27,370	Upgrade nature trail $ 27,370
Cultural Resources	Rehabilitate ranger cabin exterior $ 8,050	No change	Rehabilitate ranger cabin exterior $ 8,050	Rehabilitate ranger cabin exterior $ 8,050	Rehabilitate ranger cabin exterior $ 8,050
Administration	No change	No change	No change	No change	Construct new maintenance residence $ 165,830
Utilities	Provide floodproof flush toilets and modify water and sewer system adequate for entire development $ 481,390	No change	Provide floodproof vault toilets $ 96,600	Provide floodproof vault toilets $ 96,600	Provide floodproof flush toilets and develop water and sewer system adequate for entire development $ 481,390
	No change	No change	No change	No change	Underground power $ 96,600
Subtotal	$1,967,420	$ 0	$ 132,020	$ 132,020	$2,229,850
EQUIPMENT (parkwide)	Septic pumper truck, dump truck, motor grader, 3 pick-up trucks $ 220,000	No change	Septic pumper truck, dump truck, motor grader, 3 pick-up trucks $ 220,000	Septic pumper truck, dump truck, motor grader, 3 pick-up trucks $ 220,000	Septic pumper truck, dump truck, motor grader, 3 pick-up trucks $ 220,000
FENCE (parkwide)	Fence boundary ($ 660,100**)	Fence boundary ($ 660,100**)	Fence boundary ($ 660,100**)	Fence boundary ($ 660,100**)	Fence boundary ($ 660,100**)
Total Capital Cost (Gross $)	$24,306,710	$1,999,670	$20,038,600	$35,979,310	$62,489,520
FLHP Eligible Roads	14,386,960	1,912,680	14,386,960	14,386,960	14,386,960
Total Capital Cost, GMP Sources	$ 9,919,750	$ 86,990	$ 5,651,640	$21,592,350	$48,102,560
SUMMARY					
Roads, Parking	$4,565,410	$ 0	$1,738,250	$14,631,230	$35,244,010
Campground, River Access	885,550	40,300	447,630	697,180	2,637,230
Trails	215,740	0	173,880	1,091,580	2,252,390
Visitor Contact, Interpretation	40,250	0	40,250	40,250	40,250
Cultural	771,190	6,440	771,190	800,170	871,010
Administration	978,880	0	450,800	1,194,620	1,809,640
Utilities	2,242,730	40,250	1,809,640	2,917,320	5,028,030
Equipment	220,000	0	$ 220,000	$ 220,000	$ 220,000
	$9,919,750	$86,990	$5,651,640	$21,592,350	$48,102,560

**This item is not included in the development cost totals for the alternatives because it will be funded as part of the Natural Resources Management Plan.

Table 5: Annual Comparative Operations and Maintenance Costs*

	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Quarry					
Roads, Parking					
Cub Creek Road	2,000	1,500	2,000	12,000	14,200
Entrance Road**	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)
Parking	500	1,000	500	2,600	2,600
Campgrounds	35,300	35,300	35,300	35,700	35,700
Trails	1,600	1,000	1,600	2,200	4,000
Visitor Contact, Interpretation	3,000	3,000	3,000	3,000	3,000
Cultural Resource Preservation	19,000		19,000	19,000	19,000
Administration	16,000	3,000	16,000	46,000	56,000
Utilities	43,600	41,900	43,600	48,900	55,900
Subtotal	121,000	86,700	121,000	169,400	190,400
Headquarters, Entrance					
Roads, Parking					
Harpers Corner Road**	(75,000)	(75,000)	(75,000)	(75,000)	(75,000)
Point of Pines Road				20,000	25,000
Campgrounds	3,000	3,000	3,000	13,500	34,500
Trails	15,000	15,000	15,000	20,400	22,400
Visitor Contact, Interpretation	8,500	4,000	8,500	12,500	12,500
Cultural Resource Preservation	1,000		1,000	1,000	1,000
Administration	75,000	25,000	75,000	76,000	121,000
Utilities	8,500		8,500	8,500	13,500
Subtotal	111,000	47,000	111,000	151,900	229,900
Echo Park					
Roads, Parking					
Echo Park Road	8,000	8,000	8,000	8,000	8,000
Yampa Bench Road	1,500	1,500	1,500	1,500	2,000
Campgrounds	1,500	1,500	1,500	5,000	4,800
Trails	500		500	500	2,600
Visitor Contact, Interpretation	1,000		1,000	1,000	1,000
Cultural Resource Preservation					1,500
Administration				10,000	11,500
Utilities	6,000		6,000	6,000	9,500
Subtotal	18,500	11,000	18,500	32,000	40,900
Rainbow Park					
Roads, Parking	2,600	1,700	2,600	2,600	2,000
Campgrounds	800	800	800	12,800	25,500
Trails	2,000		2,000	2,500	9,000
Visitor Contact, Interpretation	6,000		6,000	9,000	10,000
Cultural Resource Preservation					
Administration	18,000			18,000	26,000
Utilities				6,400	11,700
Subtotal	29,400	2,500	11,400	51,300	84,200

Deerlodge Park					
Roads, Parking**	(10,000)	(15,000)	(10,000)	(10,000)	(10,000)
Campground, River Access	1,000	1,000	1,000	1,000	3,000
Trails					
Visitor Contact, Interpretation	1,500		1,500	1,500	1,500
Cultural Resource Preservation					
Administration					1,500
Utilities	500	500	500	500	30,000
Subtotal	3,000	1,500	3,000	8,000	36,000
Lodore					
Roads, Parking	2,000	1,000	1,000	1,000	2,000
Campground, River Access	1,700	1,700	1,700	1,700	3,000
Trails	1,000	1,000	1,000	1,000	2,000
Visitor Contact, Interpretation					
Cultural Resource Preservation	1,000	1,000	1,000	1,000	1,000
Administration					20,800
Utilities	40,000	1,000	1,000	1,000	40,000
Subtotal	45,700	5,700	5,700	5,700	68,800
Total Annual O&M Cost***	329,000	154,000	271,000	418,000	650,000
15-Yr. Life Cycle O&M Cost***	2,994,000	1,400,000	2,469,000	3,811,000	5,923,000

*Costs include staffing requirements, which are detailed in appendixes D and E.

**O&M cost for these roads is included in the existing operating budget (see 15-year base operating budget, table 6); therefore, these figures are not totaled on this table.

***Rounded to nearest thousand dollars.

Table 6: 15-Year Life-cycle Costs

	Preferred	Alt. 1 No-Action	Alt. 2	Alt. 3	Alt. 4
Construction Costs (gross)	24,306,000	1,999,700	20,038,600	35,979,300	62,489,500
15-Year Base Operating Budget (1985 Base)	10,173,000	10,173,000	10,173,000	10,173,000	10,173,000
Additional Operation and Management Costs	2,994,000	0	2,469,000	3,811,000	5,923,000
Total	37,473,700	12,172,700	32,680,600	49,963,300	78,585,500
Relative Cost	3.08	1.0	2.68	4.10	6.46

The alternative to move monument headquarters from Dinosaur, Colorado, to Vernal, Utah, was investigated but was not selected as the preferred because it did not appear to be cost-effective. Although moving this function to Vernal would expedite some interagency contacts in Utah, it would reduce the effectiveness of equally important and frequent Colorado contacts, particularly for resource management personnel. The present location, although somewhat remote, appears to be the most suitable location for the total flow of administrative contacts. Staff housing options would be improved by a relocation. However, with retention of the headquarters facility as a district base of operations, the government would need to support two administrative locations when one is currently adequate.

Many of the utility-related changes in the preferred alternative are prompted by modern sanitary practice or by regulation (e.g., converting from pit toilets to vault toilets and pumping sewage out of floodplains to nonfloodable sites); these will not be assessed for their relative cost. Vault toilets appear to be more cost-effective, however, than flush systems. The cost of operating and maintaining a vault toilet system is approximately one-tenth the cost of flush systems.

In alternatives 3 and 4 consideration was given to undergrounding the power lines at the quarry, Split Mountain, and Green River. However, it was agreed that for the preferred alternative the overhead lines were not intrusive enough to warrant the estimated $755,000.

Trails are proposed in areas of high use where demand has already been demonstrated (e.g., where trails have randomly developed in the quarry and Cub Creek areas). Establishing high-standard trails elsewhere would

not be cost-effective because of the high cost of construction versus the expected low volume of use.

River use accounts for nearly half of the monument's annual visitor hours. River access roads (e.g., Lodore and Rainbow Park) vary in standard and dependability. The no-action alternative would retain these conditions; the preferred alternative would bring access roads and boat ramp facilities up to levels commensurate with their levels of use.

Campgrounds in the monument are seldom filled to capacity, and additional camping demands (for hookups, etc.) are being met by private enterprise outside the monument. Therefore, additional campsites in the monument are not needed. The low-cost proposal for a primitive campground at the Ruple ranch is desirable because outside camping opportunities are too distant. The site is in a highly attractive setting that is already showing the effects of unregulated camping. Without action, resource damage is likely.

The road alternative analyses below are based on the number of visitors (and visitor hours) that will be served over the lifespan of the plan. Cumulative totals for visitation over the next 15 years are based on forecasts of expected trends. Visitation at Dinosaur has increased fairly slowly over the last decade; continuation of this trend would imply about 1 percent growth per year. More recently, an increased rate indicates that the long-range trend might be closer to the systemwide forecast of 5 percent annual growth for the entire national park system. These two rates are the forecast range for this analysis. (Refer to the discussion of visitor use patterns and trends in the "Affected Environment" section for additional information.)

The roads into the monument reach several key destination points and pass through a variety of scenic resources; in dry years and good weather they dependably support existing use. (See Road Improvements map in "Facility Analysis" section.) The preferred alternative, and to a lesser degree alternative 2, would maintain present roads and repair deteriorating portions. These measures would avoid costly and unexpected repairs, greatly improve the safety of these roads, and decrease the chance that visitors would be stranded by earthslides and washouts. At much greater cost, alternatives 3 and 4 would upgrade additional roads to an all-weather standard, allowing access by most visitors and creating opportunities for more visitors to see larger portions of the monument and surrounding areas.

The Point of Pines road alternatives (3 and 4) consider developing a gravel or a paved road between Cub Creek and the Harpers Corner road. Two assumptions are made. First, the new road would attract a small additional percentage of US 40 travelers who would not normally enter the monument. Currently, 4 percent of the traffic on US 40 drives on the Harpers Corner road. With a gravel Point of Pines road, this might increase to 5 percent, or an additional 20,000 visits per year to the monument. A paved Point of Pines road would likely attract 6 percent of this traffic, or 40,000 additional visits. Second, a large portion of

the visitors to the quarry and to Harpers Corner would be enticed to drive the new road. Based on other gravel road use in the monument, a gravel Point of Pines road would probably attract 10 percent of the visitors at the quarry and on the Harpers Corner road (an estimated 18,000 visits per year). A paved Point of Pines road would be driven by an estimated 75 percent of these visitors, or approximately 135,000 each year.

The preferred alternative for Point of Pines is not to build the road because of the comparatively high cost per visitor hour, the environmental damage that would be incurred, and the fact that the road would be outside the boundary. Suitable access between the quarry and Harpers Corner is already available to the general public on US 40.

With the improvement and graveling of the entire Echo Park and Yampa Bench roads (alternative 4), it is assumed that small, increased proportions of the traffic on the Harpers Corner road would be enticed to travel on these two routes. In contrast, the preferred alternative calls for the upgrading of the Echo Park and Yampa Bench roads by improving drainage and graveling only in places. These actions would not result in significant increases in use; however, correction of the present impediments to travel caused periodically by mud, washouts, and earthslides, and less chance that vehicles would be stranded justify the increased expense. More dependable access by park personnel to manage wildlife and river use would also be realized.

Tables 7, 8, and 9 display the total life-cycle costs of alternatives for these three roads (including 15-year operations and maintenance costs). It is assumed that these projects would result in increased lengths of stay in the monument because the segments are lengthy, requiring between 4 to 6 hours to drive and would not duplicate other opportunities for touring in the monument. Based on these assumptions, the total number of visitor hours for each alternative has been calculated and totaled over the 15-year life of the plan. The cost per visitor hour has also been calculated (by dividing by the total life-cycle cost of the alternative by the 15-year cumulative visitor hours). As stated previously the higher cost alternatives which would upgrade the overall standards of these roads could not be justified on a cost-per-visitor-hour basis.

Table 7: Cost of Cub Creek to Harpers Corner Road Network (Gross Dollars)*

	Preferred & Alt. 2	Alt. 1 No-Action	Alt. 3	Alt. 4
Cub Creek Road				
Capital Improvement Costs	$580,000	$ 0	$ 725,000	$ 725,000
Operations & Maintenance	2,000	1,500	10,000	10,000
Point of Pines Road				
Capital Improvement Costs	0	0	8,689,000	16,222,000
Operations & Maintenance	0	0	20,000	25,000
Total Capital Improvement Costs	$580,000	0	$9,414,000	$16,947,000
15-Year Operations & Maintenance Cost**	$ 18,220	$ 13,670	$ 273,300	$ 318,850
15-Year Life-Cycle Cost**	$598,220	$ 13,670	$9,687,300	$19,265,850
15-Year Cumulative Visitor Hours				
1% Growth	8,631	8,631	13,241	18,544
5% Growth	11,570	11,570	17,750	24,860
Life-Cycle Cost per Visitor Hour				
1% Growth	$0.07	$0.002	$0.73	$0.93
5% Growth	$0.05	$0.001	$0.55	$0.69

*This table is based on the assumption that a gravel Point of Pines road (alt. 3) would require 4 hours of visitor travel time, but if it was paved (alt. 4), only 2 hours of travel time would be required.

**Discounted at 8%

Table 8: Cost of Echo Park Road (Gross Dollars)

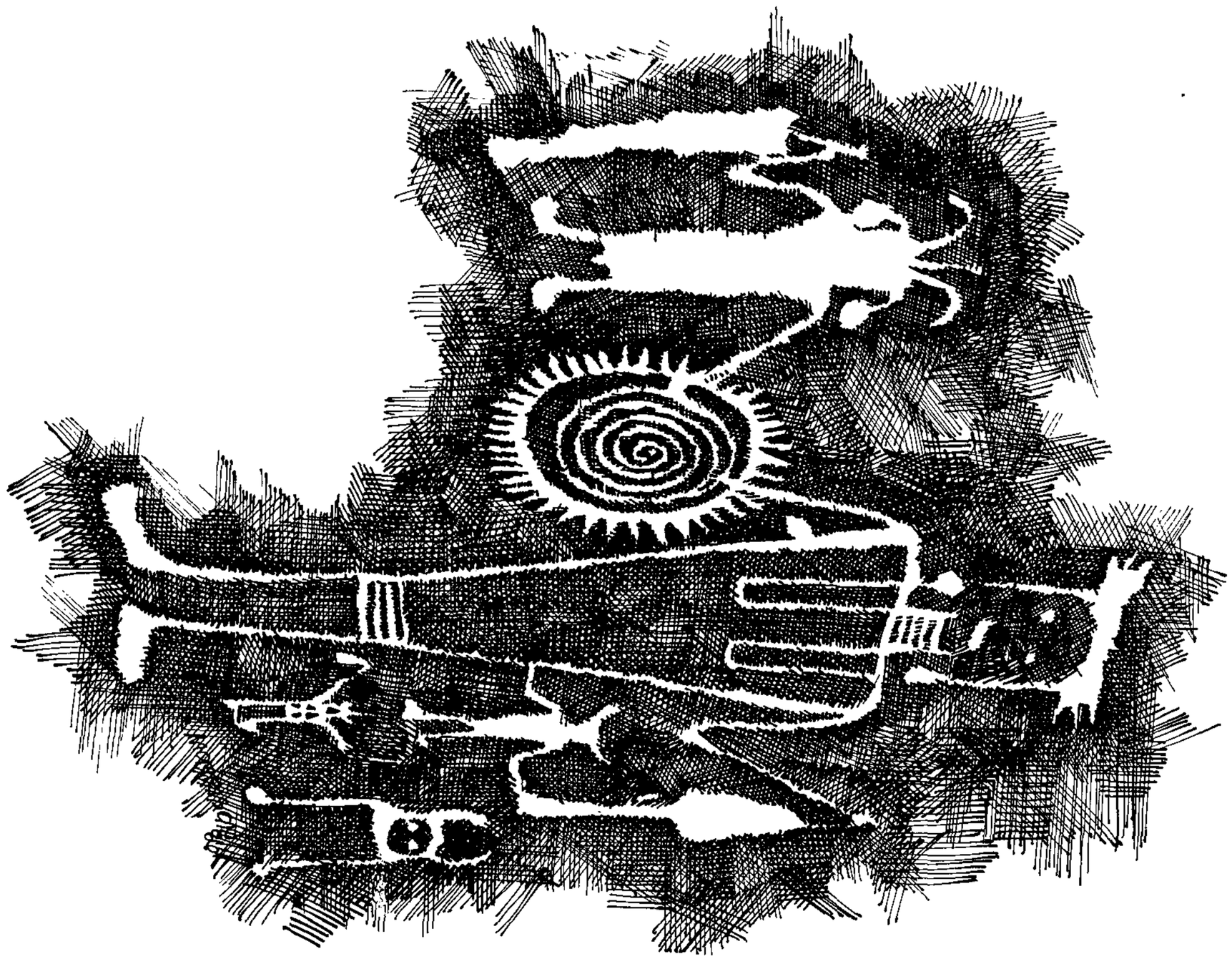
	Alts. 2, 3 & Preferred	Alt. 1 No-Action	Alt. 4
Capital Improvement Costs	$966,000	$ 0	$2,455,250
Operations & Maintenance	8,000	8,000	8,000
15-Year Life-Cycle Operations & Maintenance Cost*	$ 72,900	$ 72,900	$ 72,900
15-Year Life-Cycle Cost*	1,038,900	72,900	2,528,100
15-Year Cumulative Visitor Hours			
1% Growth	597,200	282,500	1,130,000
5% Growth	800,500	378,700	1,514,600
Life-Cycle Cost per Visitor Hour			
1% Growth	$1.74	$0.26	$2.24
5% Growth	$1.30	$0.19	$1.67
Assumption:			
% Harpers Corner Road Visits on Echo Park Road	10%	5%	20%

*Discounted at 8%

Table 9: Cost of Yampa Bench Road (Gross Dollars)

	Alts. 3 & Preferred	Alt. 1 (No-Action) & Alt. 2	Alt. 4
Capital Improvement Costs	$1,700,160	$ 0	$8,500,800
Operations & Maintenance	1,500	1,500	2,000
15-Year Life-Cycle Operation & Maintenance Cost*	$ 13,700	$ 13,700	$ 18,200
15-Year Life-Cycle Cost*	1,713,800	13,700	8,519,000
15-Year Cumulative Visitor Hours			
1% Growth	84,700	42,400	211,900
5% Growth	113,600	56,800	284,000
Life-Cycle Cost per Visitor Hour			
1% Growth	$20.22	$0.32	$40.21
5% Growth	$15.09	$0.24	$30.00
Assumption:			
% Harpers Corner Road Visits on Yampa Bench Road	1%	.5%	2%

*Discounted at 8%



LAND PROTECTION PLAN

INTRODUCTION

POLICIES

This section constitutes the land protection plan for Dinosaur National Monument and applies to all action alternatives. It describes the recommended strategies for nonfederal lands within the boundary as well as certain nonfederal and federal lands adjacent to the boundary. A land protection plan is necessary to carry out the purposes of this unit of the national park system and to fulfill the policy requirements of the U.S. Department of the Interior and the National Park Service.

On May 7, 1982, the Department of the Interior issued a policy statement (47 FR 19784) to guide use of the federal portion of the Land and Water Conservation Fund. The policy requires that all federal land management agencies that use LWCF monies, including the National Park Service, take the following steps in acquiring the lands, waters, and interests necessary to achieve natural, cultural, wildlife, and recreation management objectives:

> Identify what lands or interest in lands need to be in federal ownership to achieve the purposes of the unit.
>
> Make the maximum practical use of cost-effective alternatives to direct federal purchase of private lands, and when acquisition is necessary, acquire or retain only the minimum interests necessary to meet management objectives.
>
> Cooperate with landowners, other federal agencies, state and local governments, and the private sector to manage lands for public use or to protect them for resource conservation.
>
> Formulate, or revise as necessary, plans for land acquisition and resource use or protection to ensure that sociocultural impacts are considered and that the most outstanding areas are adequately managed.

The National Park Service has published instructions requiring that land protection plans conforming to departmental policy be prepared for each unit of the national park system that contains private or other nonfederal lands within its authorized boundary (48 FR 21121).

This land protection plan does not constitute an offer to purchase private lands or interests in lands. Rather, it is intended to guide future land protection activities subject to the availability of funds and other constraints. The plan in no way diminishes the rights of nonfederal landowners.

Dinosaur National Monument is considered an "inholding area" for land protection policy purposes. Inholding areas of the national park system are those park units that were established as part of the system prior to

July 1959. Agency policy toward these areas, which includes Dinosaur National Monument, can be summarized as follows.

> The National Park Service shall pursue an opportunity purchase program and, subject to the availability of funds, acquire those lands offered for sale by property owners.
>
> The National Park Service shall take those measures necessary to prevent uses that would damage the resources that the park area was established to protect.

Any land acquisition proposed by this plan will be executed in accordance with the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. This law (PL 91-646) requires the federal government to provide fair and equitable treatment of landowners whose property is acquired for park purposes. The act also provides certain benefits to landowners and tenants.

This land protection plan supercedes the previous "Land Acquisition Plan" (NPS 1980c) for Dinosaur National Monument dated May 7, 1980. This land protection plan will be reviewed every two years and revised as necessary to reflect changing conditions.

MAJOR LAND PROTECTION ISSUES WITHIN THE MONUMENT

Grazing Issue

In 1960, Congress determined that grazing within the boundaries of Dinosaur National Monument is to be eliminated and set forth provisions for the systematic phasing out of grazing activities (PL 86-729, September 8, 1960; 74 Stat. 857, see appendix A).

The Dinosaur National Monument Natural Resource Management Plan (NPS 1983c) describes in detail the issues and impacts of grazing on resources and visitor use and how the intent of Congress can be followed. A summary of those issues and impacts follows. These impacts and issues also apply to state and private lands and to the leases and allotments appurtenant to both.

One concern is the observed difference in species composition and diversity and abundance between grazed and ungrazed vegetative communities. For example, exotic species such as cheat grass appear far more prevalent on grazed ranges. The proliferation of sagebrush may be attributed in part to grazing. There may be influences, as yet undocumented, on sensitive, threatened, and/or endangered plant species. These differences also may affect faunal communities. Bighorn sheep are seldom observed in areas grazed by domestic livestock. Elk tend to leave suitable ranges when cattle are moved onto those ranges.

Based on references cited in the Natural Resources Management Plan, both the total cryptogamic cover and the number of cryptogamic species

significantly decrease under grazing pressure.* The subsequent reduction in soil stability render those soils more vulnerable to water and wind erosion. Studies suggest that the reduction in soil stability must also result in a decline in carrying capacity on those ranges. Soil compaction, independent of the loss of cryptogamic cover, would reduce infiltration and increase runoff (and thus increase erosion).

Domestic livestock have had observable detrimental effects on cultural resources, particularly archeological sites. Substrates below overhangs or in caves in the canyon country, such as those commonly used by Fremont and older cultures, are often severely compacted and littered with manure. In several instances artifacts such as manos and metates have been observed on the surface in these impacted areas. More fragile types of artifacts, such as corncobs, potsherds, and arrowheads, are subject to destruction or displacement. Other surface archeological sites also are subject to trampling.

Conflicts between grazing operations and recreational uses exist in Dinosaur. The effects of grazing are of greatest visibility in river campgrounds, i.e., losses of vegetation and occasionally copious amounts of manure. Complaints by river boaters are common.

Grazing allotments on federal lands within the monument are determined by the location and ownership of base lands (privately owned lands that have appurtenant grazing privileges extending beyond the land actually owned). Where the base lands are on land outside the monument, grazing privileges on monument land may continue for a period of 25 years after September 8, 1960, and thereafter for the lifetime of the original permittee and any dependent heirs (as of 1960) provided the original permittee and/or his heirs maintain continuous legal control (from 1960) of the base land. Where base lands are inside the monument, the use of these grazing privileges on monument land may continue until such time as the National Park Service purchases the base land inholdings. (See the Grazing Allotment map for locations within the monument where grazing privileges exist.)

The phaseout of grazing in Dinosaur will extend over a period of time. Grazing on eleven allotments (52,330 acres; 2,768 AUMs**) ends after the 1985 grazing year. Grazing on four allotments (19,180 acres; 1,269 AUMs) will be completely terminated after the lifetime of the permittee or upon sale of the base land. Grazing on the remaining seven allotments (60,980 acres; 1,287 AUMs) will end when the Park Service purchases the subject base land inholdings (see table 10).

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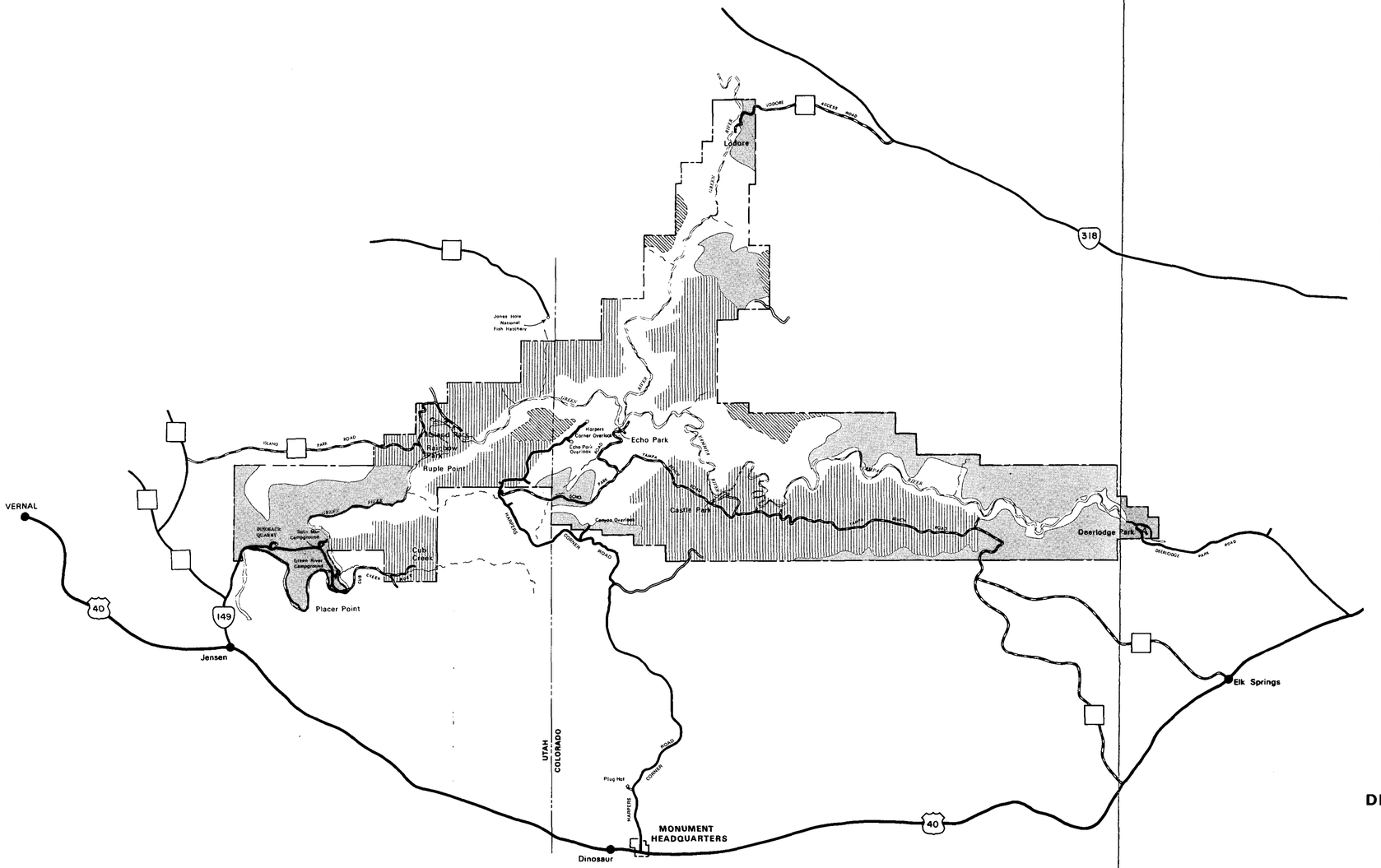
*Crytogamic species are the nonflowering plants, including mosses and lichen.

**AUMs = Animal Unit Months - Defined as the ability to support one head of livestock for one month.

Table 10. Acreage Involved for Grazing Privileges

Allotment Name	Size (acres)	Present Permittee	Maximum Preference (AUMs)	Code for Termination of Grazing*
Browns Park	1,870	Raftopoulos, S.	132	1
Haworth	4,560	Blevins, F.	55	1
Zenobia	10,570	Walker, J.B.	145	1
			342	3
Big Joe	3,290	Walker, J.B.	65	2
Iron Mine	7,410	Nottingham, R.	268	1
Tepee	6,880	Nottingham, R.	189	1
Richardson	1,180	Sheridan, D.	16	1
Sawmill Canyon and Disappointment	2,940	Bogle Farms, Inc.	146	1
Cactus Flat	10,160	Three Springs Ranch	1,044	1
Blue Mountain (Mantle)	32,520	Mantle Ranch, Inc.	392	2
			561	3
Blue Mountain (Ross)	2,900	Ross L.	98	3
Blue Mountain (Jolley)	1,210	Jolley, D.	144	1
Iron Springs Bench	1,850	Chew, D. & L.	53	1
Murray	2,040	Murray, L.G.	215	2
Harpers Corner and	5,150	Chew, D. & L.	398	2 & 3
Docs Valley	2,850	Wilkins, V.	78	2
Green River	2,500	Chew, D. & L.	113	2 & 3
		Wilkins, V.	6	2
Dinosaur	12,590	Snow, L.	281	1
		Vincent Brothers	116	1
McFarley Flat	1,680	Rasmussen, D. & L.	40	1
Island Park	12,890	Powell, W.	27	2
Wild Mountain	4,490	Hacking, R.C.	186	2
			34	3
		Rasmussen, D. & L.	139	1
Massey	960	Massey, F.	41	2
Total Acres	132,490		5,324	

*1 = expired in 1985; 2 = expire after 1985 grazing year based on lifetime of permittee and heirs; 3 = expire when inholding base lands purchased by National Park Service



GRAZING ALLOTMENTS

- EXPIRED IN 1985
- EXPIRE AFTER 1985 BASED ON LIFETIME OF PERMITTEE AND HEIRS
- EXPIRE WHEN INHOLDING BASE LANDS PURCHASED BY NPS
- NO GRAZING AREAS

N

0 1 2 4 6 8 10 MILES

GRAZING ALLOTMENTS

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

122	20,027
JULY 84	DSC

ON MICROFILM

Basically two types of nonfederal ownership are affected in the phaseout of grazing within the monument: state of Utah lands (involving grazing leases on approximately 1,370 acres), and private ranchlands. Although only about 4,000 acres of privately owned lands are involved, the grazing privileges relating to these lands extend to 80,160 acres of federal land within the monument that are grazed. State lands must be acquired through exchange, because state policy prohibits their purchase unless replacement lands are provided. The state requires that the Utah Division of State Lands and Forestry maximize revenue from their lands for the state school fund; therefore, all of their surface rights within the monument are leased for grazing.

Oil, Gas, and Mineral Development Issue

The revenue-generating objectives of the state of Utah that were mentioned above also apply to subsurface rights. To date the state has leased nearly every tract within the monument where they have subsurface mineral rights for exploration and extraction of oil and gas resources. While recognizing the valid existing rights of subsurface landowners, legislation and proclamations establishing Dinosaur National Monument did not authorize the exploration and extraction of federal or nonfederal oil, gas, or other mineral resources within the monument boundary. Also, oil, gas, and mineral development within the monument are incompatible activities because of their impact upon the scenic, natural, and cultural resources and the visitor experience. Impacts upon the monument's natural environment would include removal of vegetation, erosion of soil, and degradation of air in the immediate area and water quality in adjacent stream drainages. Impacts upon the monument's cultural resources would include the disruption or destruction of archeological sites. This would result in mixing of objects so that the value of their spatial relationships would be lost to science. Adverse effects on visitors would include the sight of derricks, pumps, sludge pits, tanks, and access roads and the sound of equipment, all of which would intrude upon the natural scene.

Although there is a significant amount of exploration and extraction activity within the Uinta basin, no such development activity has taken place within the monument. There are no known mineral resources within the monument that would be profitable to develop at the present time. The National Park Service has the authority to regulate oil and gas and other mineral development, but regulation as a protection tool would still permit this development, which is otherwise permitted by law. The issue is how this incompatible activity within the monument should be dealt with and how to address the state of Utah mineral rights and leasing questions.

Entrance and Access Roads Ownership Issue

In the act of September 8, 1960 (PL 86-729, 74 Stat. 857), the secretary of interior was authorized to select "the location of an entrance road or

roads to the monument and to points of interest therein, from U.S. Route 40." In securing the interest needed to construct the roads, the National Park Service was permitted a right-of-way not exceeding an average of 25 acres per mile and scenic easements adjoining the right-of-way not exceeding an average of 100 acres per mile. On existing park entrance roads this amounts to a 200-foot road right-of-way and 400 feet of scenic easement on both sides.

The issue, then, is that the National Park Service does not now have ownership or management responsibility along certain access roads leading in and out of the monument and therefore cannot ensure the protection of visual quality along the roads for park visitors. Private residences, mining activities, billboards, and other visual intrusions could be placed along these scenic approach roads. The issue is if secretarial selection should be used for these areas. If secretarial selection is used, the following two sections of road would be involved:

realignments around earthslides on the Harpers Corner road

formal establishment of the Echo Park road corridor from Harpers Corner road to the monument boundary

Secretarial selection would take place by describing the roadway and adjacent scenic easement and publishing the notice of selection and description in the Federal Register. If these additional selected lands were made part of the monument, future mineral leasing would be precluded from the surface of the selected lands and continued access to the monument would be ensured.

Status of Remnants Issue

Because of prior land acquisition for Dinosaur National Monument there are three parcels of land owned and managed by the National Park Service that lie outside the present monument boundary. This land protection plan needs to identify the appropriate future status for these lands.

ISSUES FROM EXTERNAL CONDITIONS

Several activities outside the monument affect or potentially affect natural and scenic resources within the boundary:

proposed water developments (impoundments and withdrawals) affecting aquatic and riparian resources and recreation along the Yampa River

fluctuating releases from Flaming Gorge Dam affecting aquatic and riparian resources and recreation along the Green River

pollution or flow disruptions of tributary streams originating outside the monument that impact upon the Green and Yampa rivers in the monument (stock pond/reservoir impoundments, cattle excrement, silting and sedimentation, pesticides and herbicides, fertilizers, etc.)

power plant emissions with visual impacts from smoke plumes and general deterioration of air quality affecting natural resources

mining activity near the monument (such as existing phosphate and coal mining) and related noise, dust, air and water quality, and visual impacts

oil and gas exploration and extraction adjacent to monument boundary, resulting in noise, visual impacts, ground disturbance, water pollution, etc.

surface disturbance and dust from sand and gravel extraction operations as seen from the Quarry and Split Mountain areas (Green River peninsula)

cattle trespassing on lands inside the monument from lands outside the monument

conversion of agricultural land to higher intensity uses on private lands adjacent to the monument, including the Green River peninsula just south of the Quarry area

pesticides (herbicide and insecticide) used on adjacent federal, state, and private lands

existing and potential commercial uses on private lands at Jensen, Utah (along US 40 and the quarry entrance road) and close to headquarters near Dinosaur, Colorado

LANDOWNERSHIP AND USE

REGIONAL LANDOWNERSHIP AND USE

Surrounding the monument are federal, state, and private lands. Including the monument, the federal government owns 61 percent of the land in Uintah County and 36 percent in Moffat County. Most federal lands are administered by the Bureau of Land Management. Browns Park National Wildlife Refuge on the Green River above Lodore and Jones Hole National Fish Hatchery on Jones Creek, both north of the monument, are both managed by the U.S. Fish and Wildlife Service. Protection of wildlife habitat and production of waterfowl are the primary management goals of the Browns Park National Wildlife Refuge. The Jones Hole National Fish Hatchery produces trout for streams, lakes, and reservoirs in several states. Most of the state lands surrounding the monument are managed by the Colorado State Land Board, the Utah Division of State Lands and Forestry, and the Utah Division of Wildlife Resources. Private lands outside the monument boundary are generally to the south and east.

Cattle grazing is the dominant use outside the boundary, involving most federal, state, and private lands. Exceptions are residential and retail commercial activity on private lands in Jensen, Utah, and in Dinosaur, Elk Springs, Rangely, and Maybell, Colorado. Vernal, Utah (Uintah county seat), and Craig, Colorado (Moffat county seat), provide the majority of commercial services, including motels, shops, supermarkets, and restaurants. US 40, which serves these communities, is the primary transportation link through the region.

There are a few industrial uses on private lands surrounding the monument, including sand and gravel mining near the Green River just south of the Quarry area and a coal mine railroad located approximately two miles south of headquarters.

Most public lands surrounding the monument are leased or allotted for livestock grazing. This is true for most Bureau of Land Management lands in the four resource areas (White River, Little Snake, Book Cliffs, and Diamond Mountain) adjacent to the monument. Many state and federal lands surrounding the monument are open to mineral leasing and entry, including oil and gas development. Almost all federal lands next to the monument are already leased for oil and gas exploration and others could be leased, depending on future management decisions. The potential for oil and gas production is unknown, but there is currently little oil and gas development taking place in the immediate area. Five areas of Bureau of Land Management lands adjacent to the monument have been designated as wilderness study areas; however, no Bureau of Land Management wilderness has been officially designated.

Irrigated cropland occupies only 0.6 percent of the land in Moffat County and about 3 percent in Uintah County. Dry cropland covers only 1 percent; wheat is the most important crop, followed by nonirrigated hay, barley, and oats.

MONUMENT LANDOWNERSHIP AND USE

See Landownership map for a breakdown of current landownership in the monument.

Table 11: Summary of Landownership and Acquisition History in the Monument

Surface Ownership (in acres)	
Federal lands	204,458.01
Private lands	4,667.81
Other public lands (state, county, etc.)	2,015.87
Total (gross acreage)	211,141.69

Subsurface Ownership (in acres)	
Federal ownership	207,090.08
State of Utah ownership	2,811.39
Private ownership	1,158.06
Moffat County ownership	82.16
Total	211,141.69

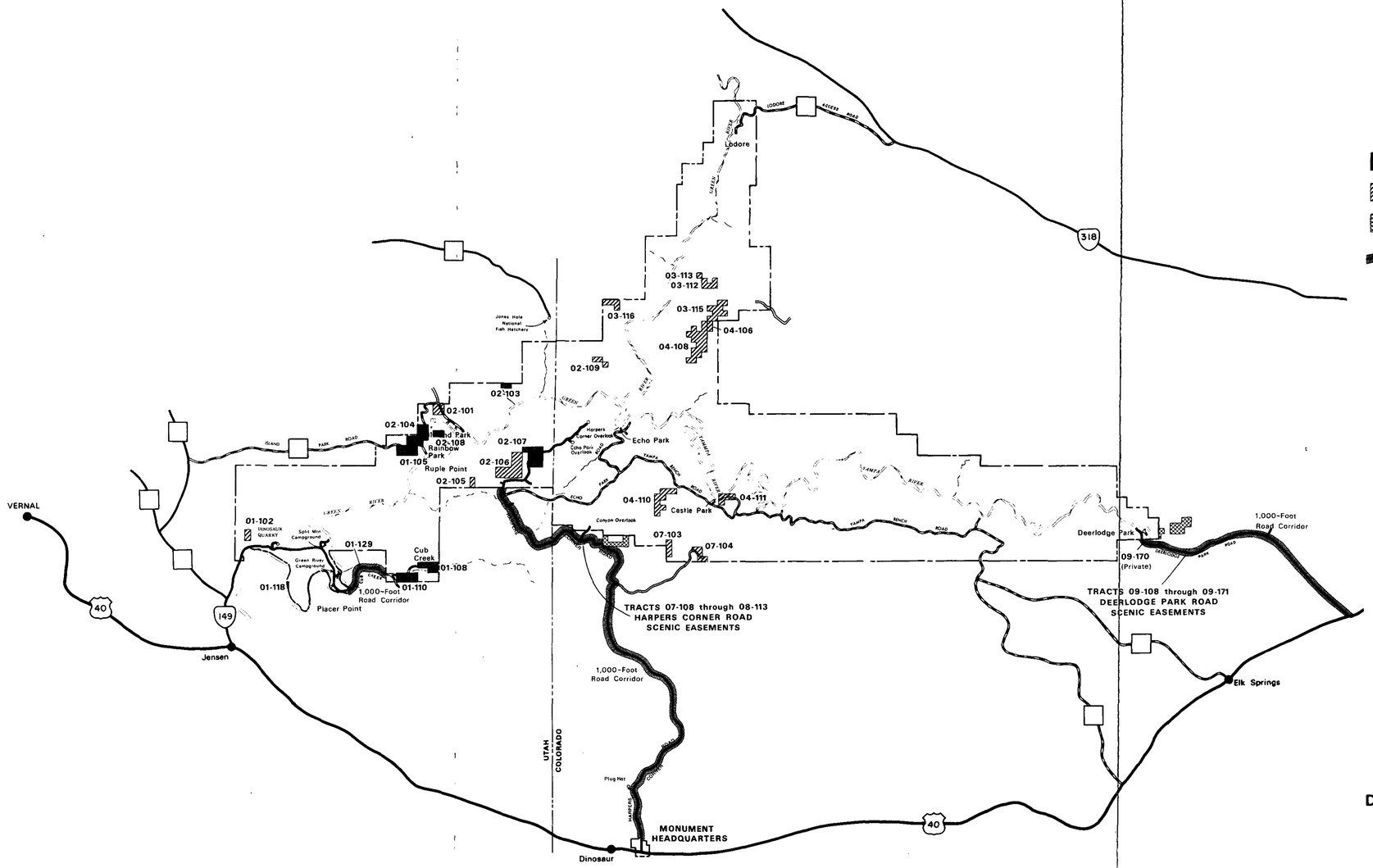
Method of Acquisition	Fee Acres	Less-Than-Fee Acres
Purchase	6,436.52	606.56
Donation	418.21	.00
Exchange	9,850.22	.00
Transfer	323.06	.00
Withdrawal	209,303.09	2,286.18
Other Federal	194.21	445.79
Total acres acquired, all methods	226,525.31	3,338.53
Acres disposed inside boundary	25,405.83	
Net acreage within boundary	201,119.48	

Expenditures to date for land acquisition include the following:

Fee acquisition (7,078.42 acres)	$666,021.50
Scenic Easements (606.56 acres)	18,107.95
Total land acquisition expenditures	$684,129.45

There have been no declarations of taking or condemnation actions in the history of the monument. At this time, there are no pending actions. There are also no legislatively imposed ceilings for land acquisition expenditure or acreage limitations for the monument.

Most private landowners within the monument are ranchers, and many of their operations within Dinosaur are part of larger ranchland holdings outside the monument. Most landowners reside in northwestern Colorado or northeastern Utah. Some ranches have been in the same family for two or more generations, and ranching operations have been in the area since the 1800s. Names like Walker, Mantle, Chew, Karren, Wilkins, Hacking, and Snow have been commonplace throughout the region for a long time, and numerous historic resources bear their names. However, the Mantle Ranch is the only currently occupied residence within the monument, and residency there is only part-time.



STATE OF UTAH INHOLDINGS

PRIVATE INHOLDINGS

NPS–MANAGED LANDS OUTSIDE MONUMENT BOUNDARY

1,000-FOOT ROAD CORRIDOR MANAGED BY NPS (Includes 200-Foot Right-of-Way and 800-Foot Scenic Easement)

NOTE: Tract numbers identify state and privately owned lands. See table 13 for description of surface ownerships.

N

0 1 2 4 6 8 10 MILES

LANDOWNERSHIP

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

122	20,028
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ON MICROFILM

PROTECTION ALTERNATIVES

The following land protection alternatives have been analyzed for their applicability in protecting the resources and visitor experiences at Dinosaur National Monument.

FEDERAL AND STATE REGULATIONS

There are numerous federal regulations enforced in and around Dinosaur National Monument that provide varying degrees of protection for the monument resources. They include laws and authorities governing protection of wetlands and major water courses, endangered species, extraction of minerals, discharge of dredge and fill material, and maintenance of air and water quality. However, most of these laws apply only to federally owned lands and cannot be enforced on private lands.

Colorado and Utah state laws and regulations address resource extraction, land use, environmental quality management, social and economic concerns such as accelerated growth impacts, and nature preservation. Additionally, enabling laws are provided for local governments to exercise regulatory authority, including zoning and other land use laws. Both states have policies and procedures for consolidating various permit processes--Colorado through the joint review process, Utah through the state clearinghouse.

FEDERAL LAWS AND REGULATIONS PERTAINING TO MINERAL EXPLORATION AND DEVELOPMENT WITHIN DINOSAUR NATIONAL MONUMENT

The Mining in the Parks Act, passed by Congress in 1976, closed all units of the national park system to mineral entry under the Mining Law of 1872 that had not previously been withdrawn by their enabling statutes. It also provided for the regulation and control of mineral development activities on patented and unpatented mining claims within units of the national park system.

The Mining in the Parks Act is implemented by the National Park Service in regulations in 36 CFR 9, Subpart A. The primary method used by the National Park Service to ensure compliance with the regulations is to require a plan of operations for all activities proposed for patented and unpatented mining claims, including both exploration and development. The National Park Service also requires that a performance bond be posted to ensure reclamation will be undertaken. The regulations seek to achieve the middle ground of permitting claimants to exercise their rights while maintaining the integrity of the affected units of the national park system.

In 36 CFR 9, Subpart B, regulations of the National Park Service for controlling nonfederally owned oil and gas apply to all units of the national park system where access to operations is on, across, or through federally owned or controlled lands or waters (except for units in Alaska). A plan of operations and reclamation bond are required of operators and form the basis for the National Park Service's regulatory activities for the exercise of these private rights.

Other federal laws regulating mineral and energy development in the national parks include:

The Surface Mining Control and Reclamation Act (30 U.S.C. 1201 et seq.) prohibits surface coal mining within units of the national park system subject to valid existing rights.

The Geothermal Steam Act of 1970 (30 U.S.C. 1001) prohibits leasing of federal geothermal resources in units of the national park system.

The Presidential Proclamation Number 2290, dated July 14, 1938 (53 Stat. 2454), which expanded Dinosaur National Monument to encompass the canyons of the Green and Yampa rivers, declared that, subject to all valid existing rights, the monument lands were reserved from all forms of appropriation under the public land laws.

The Federal Coal Leasing Amendments Act of 1976 (30 U.S.C. 202a et. seq.) prohibits the leasing and mining of federal coal in units of the national park system.

UNREGULATED MINERAL ACTIVITIES

In units of the national park system where the federal government has not acquired the subsurface interests the National Park Service currently has no regulations to control nonfederal mineral development activities other than oil and gas. It is possible for the National Park Service to use several of its general authorities in the Code of Federal Regulations (Chapter 36, Parts 1, 2, 4 and 14) to control aspects of potential operations associated with nonfederal minerals other than oil and gas, but there is no method by which the National Park Service can regulate the totality of a mineral development operation conducted for such minerals. It should be noted, however, that even though certain regulatory controls are available, legislation and proclamations establishing Dinosaur National Monument, while recognizing the valid existing rights of subsurface landowners, did not authorize the extraction of any mineral resource, including oil and gas, within the monument boundary.

LOCAL LAND USE REGULATIONS

Local zoning and other land use authorities of local government limit the density, type, location, and character of private development and can control some development without federal acquisition of lands or interest in lands. These local authorities can support NPS management objectives when allowable economic uses of the land are compatible with protection requirements. Zoning does not, however, ensure permanent resource protection because it may be changed or variances may be granted. Zoning does not ensure that the public use and development needs of the Park Service will be met.

Moffat and Uintah counties maintain the authority to regulate land use on all private lands adjacent to the monument area. Both counties have adopted comprehensive land use plans and zoning ordinances, but neither has had reason to enforce regulations on private lands within the national monument.

The Moffat County zoning resolution was adopted by the Board of County Commissioners in January 1983 and became effective in March 1983. Most of the ordinance applies to the area in and around the county seat, Craig. The county has zoned private land adjacent the monument either A (agricultural) or O (open). The agricultural zoning permits single- or multiple-family residences, agricultural uses, feed lots, mineral extraction and other uses. The open space zoning is more restrictive and is intended for recreation facilities and wildlife protection; however, it also permits transportation facilities, including airports, and the extraction of mineral resources.

County land use controls for the private lands adjacent to the Utah portion of the monument are the responsibility of Uintah County. A master plan for the Ashley Valley area of the county, which includes the community of Jensen and private lands west and south of the monument, was adopted in April 1982. The county zoning and subdivision ordinances and zoning map, which defines zoning classifications for all private lands in the area, was also adopted in April 1982. This land use plan calls for very low density residential uses west and southwest of the monument, except at Jensen where zoning allows a variety of commercial uses along US 40. Areas identified under "parks and open space use" include the Green River area beginning immediately at the monument boundary and extending southward. For an area generally north of Jensen, between the town and the monument entrance near the quarry, the county zoning ordinance and map specify an A-1 agricultural zone. Mainly farm uses and one- and two-family dwellings are permitted. Minimum lot sizes for single-family homes must be at least 16,000 square feet (about 1/3 acre).

The final and largest zoning district in this portion of Uintah County, including areas to the north, west, and south of the monument, is zoned M&G-1 for mining and grazing. This zone covers large tracts of desert and open rangeland. Livestock grazing and other agricultural activities are acceptable uses, and single-family dwellings, reservoirs, and oil and gas drilling operations are permitted. Also, open pit and underground

mines, gravel and rock quarries, oil refineries, and electric generating power plants can be developed as conditional uses. Five-acre-minimum lot sizes are required for the single-family residences in the M&G-1 zone. There are no area, width, location, or height requirements for other than residential buildings in this zone except for a 30-foot setback requirement from major highways.

COOPERATIVE AGREEMENTS/MEMORANDUMS OF UNDERSTANDING

Cooperative agreements and memorandums of understanding are documents that define administrative arrangements between two or more parties. For Dinosaur National Monument agreements could be negotiated between the National Park Service and the Bureau of Land Management, the U.S. Fish and Wildlife Service, the states of Colorado and Utah, and other units of government. The terms of agreement could apply to one or more issues and to specific geographic areas within or adjacent to the monument. Land use or resource management activities and levels of development could all be the subject of such agreements. The agreements would contain any necessary restrictive provisions to protect cultural and natural resources, wildlife habitat, and scenic views, and would prescribe joint research and data collection, monitoring, and planning. Cooperative agreements could also address recreational activities. Agreements are intended to last only as long as all parties are benefitted.

ACQUISITION

Types of Acquisition

Fee simple acquisition is the acquisition of all interest in a property through several methods such as purchase, donation, exchange, or condemnation. NPS acquisition of land in fee provides the highest degree of protection of land and its resources and provides the greatest opportunity for visitor use. Fee acquisition is appropriate in those instances where (1) resources are highly significant or (2) the area is needed for public use. An investment of federal funds requires fee acquisition prior to developing campgrounds, roads scenic overlooks, and other visitor facilities. These criteria apply to most of the state and private lands within the monument.

An easement is a legally enforceable interest in land created by a transfer of certain property rights by the same methods of acquisition used to acquire fee title. Property ownership may be envisioned as a bundle of rights, including, among others, the rights to graze livestock, cut trees, construct facilities, and exclude the public from the property. The number of such rights that may be included in an easement is theoretically unlimited. To provide the levels of land protection required by the National Park Service, the terms and stipulations of easements must be specified to provide for the level of protection required.

Use of easements as a land protection tool is suitable where some reasonable private land uses can continue on the property without compromising resource values or visitor use goals. Whether to purchase a property in fee or in easement depends upon several factors, including resource management needs, legislative provisions or restrictions, visitor use needs, and the interest of the owner to continue certain uses. The appraised value of the fee estate compared to the value of an easement, along with other costs and benefits, should also be considered. Easements are often appropriate where the objective is to continue existing agricultural, residential, or ranching uses. In the present case, easements would not be appropriate because a major resource management objective of the monument is to eventually eliminate all grazing on monument lands and maintain or restore natural conditions. These lands must be acquired in fee before grazing can be eliminated.

Methods of Acquisition

Opportunity purchase is possible when a landowner wants to sell, the National Park Service wants to buy, and funds are available. The National Park Service appraises the property, and the landowner is encouraged to accompany the appraiser to point out features of the property that should be considered in making the appraisal. The offer is based on an approved appraisal estimate of fair market value--the price that an owner could reasonably expect to receive if the property was sold on the open market. The offer price cannot be less than the approved appraised value. If the landowner and the National Park Service are unable to agree on a price, negotiations to purchase the property cease unless an incompatible use threatens (see explanation of condemnation proceedings later in this section). The landowner is under no obligation to sell, nor is the National Park Service under any obligation to buy.

The National Park Service may elect to acquire a property subject to the reservation by the owners of use and occupancy for life or a term of years not to exceed 25 years. At the end of the term of the reservation or because of termination for some other lawful reason, the use and occupancy ends. A reservation is paid for by deducting its value from the purchase price, effecting a savings to the government.

Private nonprofit trusts can acquire fee or less-than-fee interests in lands. If the lands are within the authorized boundary of a park unit, and if National Park Service land protection and management objectives are met, the trusts can donate or sell the lands to the United States. Several areas adjacent to the monument might be particularly well suited for trust involvement, which would complement federal protection activities within the monument. Acquisition of scenic easements by trusts is recommended in most instances because view protection is the most critical need and the continuation of grazing on private lands adjacent to the monument is compatible.

Donations and bargain sales are methods of acquiring lands or interests in lands at less than full market value. A bargain sale is part sale and part charitable contribution. Landowners may receive tax advantages by donating or bargain selling their land (at less than fair market value) to the United States or to eligible nonprofit organizations. Landowners interested in this approach should consult their own tax advisor to ascertain what financial advantages may exist for them from a donation or bargain sale.

Nonfederal lands or interests in lands can be exchanged for other available federal lands of equal value outside the monument boundaries in the same state as the nonfederal land. If the value of these lands is not equal then a cash difference can be paid by either party in order to equalize values. Private parties may either donate or bargain sell the amount of cash difference due them, but the state and federal governments cannot donate or waive any cash difference payments that may be involved in an exchange. The state of Utah properties within the monument will most probably be exchanged because the state has traditionally been interested in replacement lands rather than cash for their properties.

A land exchange between the National Park Service and state of Utah can be accomplished by a comprehensive exchange package involving numerous parcels, or through "Project Bold." The state of Utah began the Project Bold program in the spring of 1981 to produce a statewide land exchange proposal with the federal government to replace scattered state land sections and land rights with more manageable units. Congress will have to enact legislation allowing this massive exchange because the proposal far exceeds the secretary of the interior's authority under the Federal Land Policy and Management Act of 1976 (43 USC 1714c).

Condemnation is a sovereign power of the federal government. The authority of the United States of America to spend public money for the acquisition of privately owned land for public purposes through the process of condemnation (eminent domain) has been considered constitutional by the courts since 1896 (see United States vs. Gettysburg Electric Railroad Company, 160 U.S. 668 (1896)).

In Dinosaur National Monument, in accordance with National Park Service policy for inholding areas, condemnation will not be used unless the land is or is about to be put to an incompatible use and only in those cases where other reasonable protection efforts failed. The National Park Service will make every effort to seek negotiated settlements before initiation of condemnation. Incompatible uses within Dinosaur National Monument are listed later in the "Recommendations" section of this land protection plan.

There are two types of condemnation actions--condemnation by complaint only is initiated by the filing of a complaint by the National Park Service. In these situations, title to the land does not pass to the government until a court or jury has determined just compensation and this amount has been paid to the owner. Condemnation also can be used to clear a

title and to resolve price differences. Congress also provides for a complaint with a declaration of taking, which vests title to property in the United States immediately upon filing papers in the court and the deposit of an estimate of just compensation. Declarations of taking are typically used where title to the land is needed by the United States immediately, such as in an instance of imminent resource damage.

LAND PROTECTION RECOMMENDATIONS

A management objective of Dinosaur National Monument, as stated in the "Statement for Management" (NPS 1985), is to "acquire private and state inholdings as they become available" and to phase out grazing as required by PL 86-729. The long-range objective of the monument, as recommended in this land protection plan, is to acquire all lands within the monument boundaries in fee except for those lands along access roads authorized for acquisition of easements in the 1960 legislation. Wherever possible, acquisition through purchase is recommended for private landholdings. Land exchanges are also a possibility and will be considered. For state of Utah lands, a land exchange is recommended as the most likely and feasible method of acquisition. State of Utah law precludes donation, and generally the state policy has been to seek at least acre-for-acre replacement of land. A land exchange with the state of Utah would either be accomplished through Project Bold or through a separate land exchange package whereby all state holdings within the monument would be exchanged for federal lands of similar value elsewhere in the state of Utah.

Grazing is incompatible with legislative and management objectives except along access roads leading into the park. Except along these major road corridors, the use of easements or the acquisition of other less-than-fee interests in private lands within the monument is not appropriate given the fact that the lands are almost exclusively valued for their grazing use, which is to be phased out and because they do not realize NPS objectives for preserving and protecting monument resources.

Full implementation of the phaseout of grazing within the monument will not be completed until the fee purchase or exchange of private and state lands occurs. This is the only realistic long-term protection tool available.

Within the monument easements can best be used to protect scenic values along major roads, including the Cub Creek, Deerlodge Park, Harpers Corner, and Echo Park road corridors. These would be acquired from both public and private owners through purchase, donation, or exchange.

Although many federal and state laws and regulations provide limited protection for monument resources, they do not ensure that compatible uses will continue on private or leased lands within and near the monument or that NPS management objectives will be met. This land protection plan supports the enforcement of all applicable federal and state laws and regulations but recommends that these laws be viewed as supplemental to the need for federal acquisition of lands or interests where incompatible uses threaten monument values or the lands are needed for visitor activities and facilities.

Local zoning ordinances are not a protection method for the National Park Service to rely upon for an indefinite period of time. Local land use regulations and policies change over time and are intended primarily to

meet local needs. Similarly, the primary objective of local zoning is not resource protection of the land in a natural state. This land protection plan encourages the enforcement of existing county ordinances to aid federal protection efforts on an interim basis until all private properties within the monument are acquired. More frequent communication between county planning and the monument staffs and establishment of a systematic review of development and rezoning proposals are recommended. Additionally, as appropriate, park management and staff would comment on land use plans and proposals on private lands that are close to the monument boundary. Such involvement could result in recommendations involving the location, design, and siting of commercial, industrial, residential, and other uses that could affect monument resources and visitors.

The counties are responsible for regulating land use on private lands along US 40 and in such communities as Dinosaur, Colorado, and Jensen, Utah. These small towns are gateways for visitor entry to the monument. Although many commercial facilities are beneficial to visitors, their appearance and location are also important. The park staff would provide positive influence and technical assistance in achieving goals of mutual benefit to the counties and to the National Park Service.

If any nonfederal lands in the boundaries of Dinosaur National Monument--state or private--were subjected to a use incompatible with park purposes, condemnation would be used as necessary to prevent adverse impacts on monument resources and visitors. This authority would be used only when reasonable negotiations and other appropriate mitigating measures to avoid impacts failed.

As nonfederal tracts are acquired, it is recommended that any associated water rights be acquired as well. Not acquiring water rights associated with the purchase of surface ownerships may risk diversion of water away from the monument and could adversely affect streamflows, water quality, habitat protection, and visitor use.

The land protection plan recommendations can be summarized as follows:

Fee acquisition through purchase	3,500.17 acres
Fee acquisition through exchange	1,964.91 acres
Fee acquisition through donation	50.96 acres
Less-than-fee acquisition (scenic easements)	1,167.64 acres
Total	6,683.68 acres

SURFACE TRACT PRIORITIES, SUMMARY, AND RECOMMENDATIONS

Surface Tract Priorities

The following criteria are the basis for determining the priorities for protecting nonfederal lands within the monument:

A. Properties containing important natural and cultural resources.

B. Properties heavily used by or highly visible to visitors. This includes lands along the Green and Yampa rivers in the Quarry area, and along portions of the Harpers Corner road.

C. Baseland properties which, if acquired, would allow grazing privileges that are attached to them to be eliminated (per 1960 legislation).

D. Properties needed to a lesser degree than priority B for scenic protection of monument roads, trails, and visitor use areas.

Priority 1 lands, as listed below, meet criteria A and B. Priority 2 lands meet criterion A or B. Priority 1 and 2 lands may meet criterion C as well. Priority 3 lands meet only criterion C. Priority 4 lands meet criterion D.

Following are all the recommended acquisitions for nonfederal lands within the monument boundary in priority order. This priority listing may be adjusted based on additional information and will be reviewed at least every two years. The listing should be viewed as a guide to park management to determine which properties have the highest priority for protection and to prioritize the allocation of limited land acquisition monies.

Table 12. Priority of Nonfederal Land Acquisition

Priority 1:	Island Park/Rainbow Park - state of Utah (tracts 01-105, 02-104, 02-108) Mantle ranch (tract 04-111) Cub Creek - state of Utah (tracts 01-108, 01-110) *Echo Park Road right-of-way (tracts to be identified) Deerlodge Park road right-of-way (tract 09-170) Harpers Corner Road right-of-way (tracts to be identified as needed for road realignment)
Priority 2:	Quarry area - state of Utah (tract 01-118) Harpers Corner road - Chew ranchlands (tract 02-106) Harpers Corner road - state of Utah (tract 02-107) Zenobia Basin - Walker ranch properties (tracts 03-112, 03-113, 03-115, 04-106, 04-108) Red Rock ranch - Mantle (tract 04-110) Island Park - Staley ranch property (tract 02-101)
Priority 3:	Round Top and Buena Vista Peaks - Ross ranch properties (tracts 07-103, 07-104) Ruple Point - Chew ranch property (tract 02-105) Hacking ranch property - (tract 02-109)
Priority 4:	Douglass property near quarry (tract 01-102) Sage Creek - state of Utah (tract 02-103) Harpers Corner road easements (07-108, 07-114, 07-115, 08-103, 08-107-8, 08-111-13) *Echo Park Road easements (tracts to be identified) Deerlodge Park road easements (tracts 09-108 to 09-169, and 09-171) Wild Mountain properties (tract 03-116) Cub Creek corridor (tract 01-129)

*Acquisition of fee or less-than-fee interests within the Echo Park corridor will first require a notice of selection by the secretary of the interior, as authorized by PL 86-729 (1960 legislation).

Surface Tract Summary and Recommendations (tract-by-tract)

A complete tract-by-tract description of nonfederally owned land within the monument and a summary of the land protection recommendations by tract follow. Refer to the Landownership map to locate specific parcels. This map shows all nonfederal lands within the monument that are proposed for acquisition and management by the National Park Service.

Sage Creek

Tract 02-103; total acres: 80.0; no improvements

View of Sage Creek tract from Ely Creek Trail

Description. Tract 02-103 is owned and managed by the Utah Division of Wildlife Resources. The tract is in the northwest section of the monument on the west side of Hardscrabble Mountain, west of Jones Hole Creek and next to the monument boundary. Vegetation includes grasses, sagebrush, rabbitbrush, shadscale, and juniper. The topography is gently sloping, and water resources are limited to the Sage Creek drainage. The walls of Whirlpool Canyon are visible to the south.

Resource Protection Issues. The parcel is being administered by the Utah Division of Wildlife Resources for wildlife management. Bureau of Land Management lands just outside the monument boundary to the north are also managed for wildlife enhancement. The state of Utah owns the mineral rights on the property as well, but has not leased these subsurface rights for oil and gas or other resource development.

Visitor Use Issues. The Ely Creek trail is just to the north of this property (on BLM land). The open, pleasant, rolling character of the property is similar to other lands bordering the trail. The seven-mile-long Ely Creek trail could be used more in the future because of additional visitor-related development in Island Park area.

Recommendation. The recommended method of protection is fee acquistion through Project Bold or a Dinosaur National Monument-specific exchange agreement.

Rationale. Visitor use occurs along the adjacent Ely Creek trail. Regarding resource management, except for hunting, the current state management is generally compatible with monument management. As long as the subsurface mineral rights are not leased and/or minerals extracted, continued state ownership is acceptable in the short term; however, the long-term goal remains federal ownership and management. In addition, the property was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Staley Ranch

Tract 02-101; total acres: 160.0; no improvements except for minor ranch structures

Portion of Staley Ranch from Island Park Road

Description. Tract 02-101 is in the northwest section of the monument along the road leading to Ruple ranch and Island Park. The land is adjacent to the monument boundary and is part of a much larger ranch outside of the monument. The property is used for grazing, has some cattle pens, and is fenced. It has rolling topography with several draws, one of which contains a year-round stream. Sagebrush, pinyon, juniper, rabbitbrush, and snakeweed are present. This property is visible from Ruple ranch, Green River, and Island Park.

Resource Protection Issues. The property is in critical winter deer range and is highly visible from both the Island Park overlook on Harpers Corner road and the road approaching Ruple ranch. The property is base lands for grazing privileges within the monument (12,890 acres).

Visitor Use Issues. The property is at the entrance to Island Park. Visitor use proposals make the future use of this property more important than is now the case.

Recommendation. The recommended method of protection is acquisition in fee title.

Rationale. The monument access road to Island Park goes through tract 02-101. A term or life estate would allow continued ranching of the area, but for a limited period, and would lessen impacts on the owner. The acquisition of this tract would implement a primary legislative and management objective by removing grazing base lands within the monument. In addition, this property was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Massey Cabin Site

Tract 03-116; total acres: 160.0; no improvements

View south from tract 03-116 toward Canyon of Lodore

Description. Tract 03-116 is in the northwest portion of the monument on Wild Mountain. Although the site has scenic views of Lodore Canyon and Hells Half Mile, there are no improved roads to allow visitors direct access, resulting in little visitor use. This area was burned by a fire in 1981.

The property is steeply sloped, is vegetated with pinyon, juniper, cheatgrass, and thistle, and has intermittent streams and small springs. This is also the old Massey cabin site, although little evidence remains. Present use involves a seasonal residence including two trailers and an oil storage tank. Grazing is evident along with minor timber cutting.

Resource Protection Issues. This is one of two privately owned tracts within the park that is not base land for grazing privileges. Grazing privileges expired in 1985. The land has been recently subdivided into three parcels, and a small mobile home or trailer is now sited on the northwestern portion of the Born property. The Rasmussen brothers (David and Louis) own 80.0 acres, Jack Born owns 40 acres, and a man from California owns 40 acres. When the property was subdivided, an issue was raised regarding the monument boundary lines and private property lines. There may be a difference between the original homestead description and corrections made when the area was surveyed. A recent title search by the Lands Office of the National Park Service Rocky Mountain Region failed to find any record of subdivision or ownership transfer. For this reason, it is thought that title is being conveyed under a contract for deed, which means that title does not transfer until the property is paid for.

Visitor Use Issues. The remoteness of the site precludes easy access by vehicle. Even though there are excellent views of Lodore Canyon, visitor use is low at this time.

Recommendation. The recommendation is to purchase this property in fee title. Use of the property should also be consistent with the permitted uses on other existing private tracts within the monument.

Rationale. Even though acquisition of the tract is a lower priority than others because of its remote location, recent events indicate that the property is not being used in accordance with park purposes (subdivision of land and use as a seasonal residence). The tract should be closely monitored. If the property continues not to be used compatibly with park purposes, the park superintendent will consult with the regional director to determine appropriate action. In addition, this property was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Walker Ranch

Tracts 03-112, 03-113, 03-115, 04-106, 04-108; total acres: 1,461.12; no improvements except for rustic ranch cabins

Walker Ranch in Zenobia Basin

Description. These five tracts are in Zenobia Basin in the northeast portion of the monument, east of the Green River and Lodore Canyon. The area is a large basin flanked by steep slopes. It is heavily grazed and has several springs. Vegetation consists of sagebrush, rabbitbrush, pinyon, and juniper. The properties are very remote, with access by four-wheel-drive vehicle along a poorly maintained dirt road, and horseback, and on foot. During the property inventory numerous mule deer and elk were sighted. Present use of these tracts is primarily for livestock grazing.

Resource Protection Issues. These tracts are base land for grazing within the monument. Cattle grazing in this area has had an impact on wildlife because bighorn sheep, mule deer, and elk are competing for the same range as cattle. The owner has expressed a desire to use aerial-sprayed chemicals to control the growth of sagebrush and improve the quality of forage. The chemicals could drift onto adjacent public land.

Visitor Use Issues. Zenobia Basin is a scenic and historic area, containing a section of the Outlaw Trail. There has been recent demand for backcountry use and day and overnight horseback trips.

Recommendation. The recommended protection for this property is acquisition in fee through a land exchange if possible, or purchase.

Rationale. Whether acquired by exchange or purchase, acquisition of these tracts would implement a primary management and legislative objective by removing grazing appurtenant to base lands within the monument, involving 13,860 acres of grazing privileges. In addition, this property was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Rainbow Park

Tracts 02-104, 01-105; total acres: 744.68; no improvements

View of tract 02-104 from overlook on Island Park road

Description. These tracts are owned by the state of Utah and managed by the Utah Division of State Lands and Forestry. Tract 01-105 is along the road to Rainbow Park; tract 02-104 is along the road to Island Park. Vegetation on the tracts is sagebrush, cheatgrass, and greasewood.

Resource Protection Issues. Both tracts are leased for cattle grazing and for potential oil and gas development. The area is within critical winter deer range and should be maintained in a natural condition.

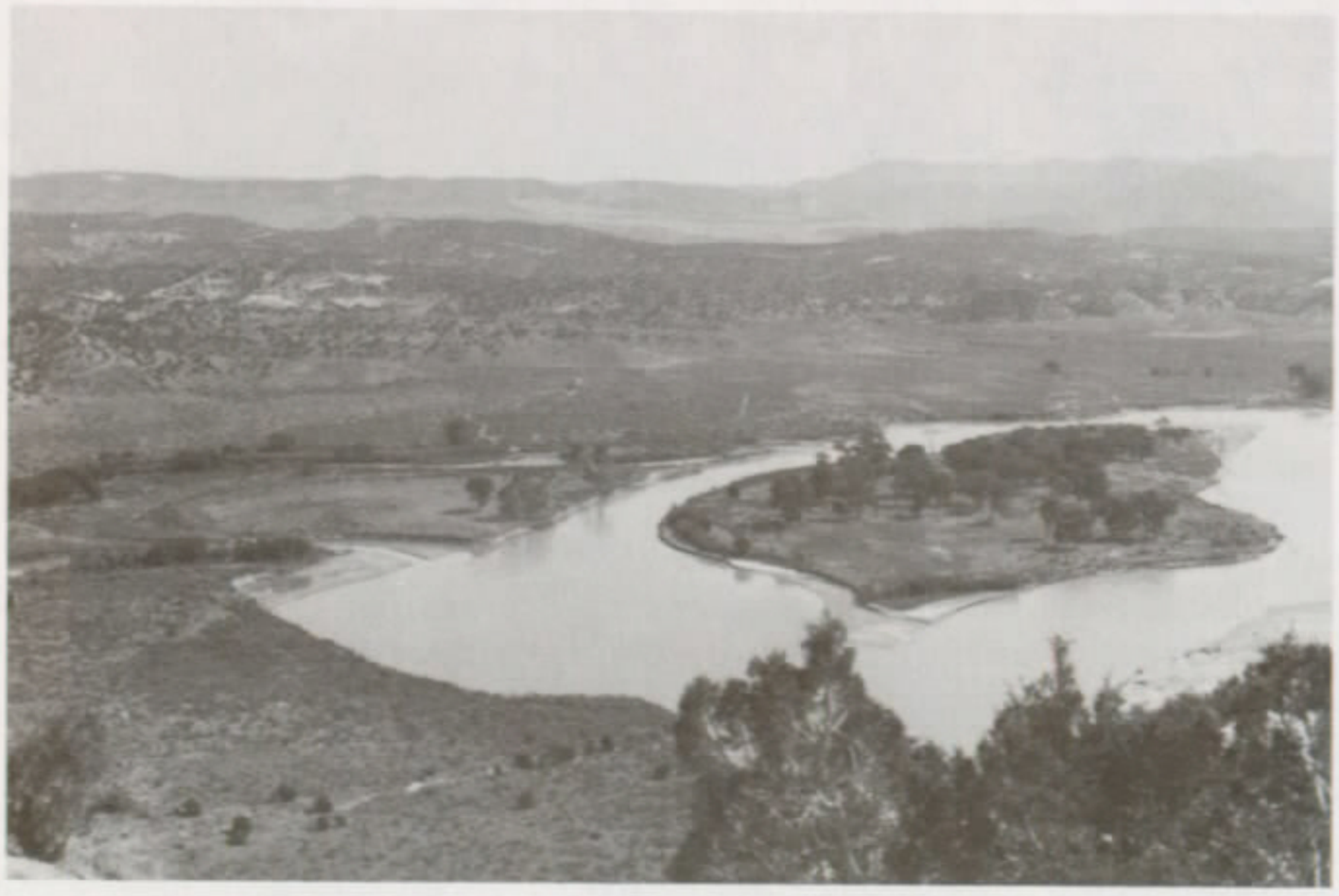
Visitor Use Issues. Both tracts are critical for scenic/visual protection because they are transected by the main roads used for visitor access to Rainbow Park and Island Park. The Ruple Ranch overlook on the Island Park road, which includes expansive views of the park and the mouth of Whirlpool Canyon, is within tract 02-104. Interpretation and protection of the McKee Spring petroglyphs as proposed by the general management plan could be adversely affected by leasing of tract 01-105 for oil and gas and other mineral development (the petroglyph site is close to tract 01-105 and is underlain by subsurface tracts DM-10 and 11).

Recommendation. The recommended protection for these tracts is fee acquisition by exchange through Project Bold or a Dinosaur National Monument-specific exchange.

Rationale. Eventual acquisition of these parcel would also help eliminate grazing within the monument--a principal NPS goal. In addition, portions of these two tracts are potential additions to the wilderness proposed for Dinosaur National Monument. Because of existing visitor use and expected increases due to campground development and improved interpretation, scenic qualities along the Island Park Road need to be protected from mineral development. Critical winter deer range must also be protected, as does the outstanding rock art at McKee Spring, which is underlain by subsurface mineral rights. In addition portions of both tracts were identified as "potential wilderness additions" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Island Park

Tract 02-108; total acres: 75.23; no improvements



View of 02-108 from overlook on Island Park Road

Description. This property is owned by the Utah Division of Wildlife Resources and managed for wildlife enhancement. The tract is on the east bank of the Green River in Island Park in the Upper Meadow area south of Ford Island. Access to the property is by boat; there is no road access. The site is flat near the river and gently sloping elsewhere. One-third of the parcel is covered by cottonwood trees, and sagebrush covers the remainder. The parcel includes waterfowl habitat, critical winter deer range, and winter bald eagle habitat.

Resource Protection Issues. Unlike most other state properties within the monument, this parcel has not been leased for oil and gas development. State management is not compatible with the monument's wildlife management objectives because hunting is allowed on the parcel.

Visitor Use Issues. The site is visible from the scenic overlook on the Island Park road and also highly visible from the river, affecting the visual experience of the river user. It is just west of a proposed campground at the Ruple ranch and could serve as a river campsite rotation area.

Recommendation. The recommended method of protection is fee acquistion through Project Bold or a Dinosaur National Monument-specific exchange agreement.

Rationale. Federal ownership is most appropriate because of the site's wildlife and scenic values in this central and highly visible portion of Island Park. State ownership does not guarantee long-term protection of the site and precludes river campsite development. In addition, this property was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Orchid Draw

Tract 01-102; total acres: 80.0; no improvements

Orchid Draw

Description. This is one of two privately owned tracts that is not base land for grazing. It is at the far west end of the monument about 1 mile west of the quarry visitor center. This tract is on the south flank of the Split Mountain anticline and has distinctive multicolored soils, steep rock outcrops, riparian vegetation, a spring, and a seasonal stream.

Resource Protection Issues. The property is near the main entrance road to the quarry. The owner has bulldozed a primitive road into the site and installed a plastic pipe waterline to tap into the property's water resources. More development could disturb fossils and other natural features.

Visitor Use Issues. Because of its geologic formations and riparian habitat, and its proximity to the Quarry area, Orchid Draw could be used for interpretation. The owner's father and first owner of the tract, Earl Douglass, made the initial discovery of the quarry site. A trailhead along the main road near the entrance to Orchid Draw and a provision for a display and a self-guiding trail to the quarry interpretive story is included as a visitor use alternative in the general management plan. Potential for future use of this type still exists.

Recommendation. The recommended method of protection is acquisition in fee title.

Rationale. The property is close to the quarry, has high potential for discovery of fossils, and has future interpretive value. In addition, this property was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Quarry Area

Tract 01-118; total acres: 16.0; no improvements

View of tract 01-118 on the Green River

Description. This tract, southeast of the quarry visitor center, is owned by the state of Utah and managed by the Division of State Lands and Forestry. It is partially within the floodplain of the Green River and contains some riparian vegetation but is covered mainly with desert shrub (greasewood, shadscale, sagebrush). It is currently grazed, and waterfowl habitat is present.

Resource Protection Issues. This tract has been leased for cattle grazing and for potential oil and gas development. This activity could affect the vegetation and wildlife including riparian habitat and could result in dust and other air quality problems.

Visitor Use Issues. If exploration and drilling for oil and gas occurred, it would have major visual impacts on the Quarry area, and impacts on the new trails and overlooks proposed in the general management plan. Noise levels might also be significant.

Recommendation. The recommended method of protection for this tract is acquisition in fee through Project Bold or a Dinosaur National Monument-specific exchange.

Rationale. This property is adjacent to the most heavily used area of the monument where development would be highly visible and incompatible with park purposes. Acquisition of the parcel would help eliminate grazing within the monument, a principal NPS goal.

Cub Creek Road

Tract 01-129; total acres: 10.33; no improvements

Tract 01-129 (in foreground and to right of road)

Description. This small, privately owned tract is within the authorized easement area of the Cub Creek road corridor. All other tracts in this area have federally owned road easements. The private parcel contains one of the primary access routes to the adjacent Chew ranch property, just east of the Green River bridge crossing.

Resource Protection Issues. Lack of federal ownership of the easement could subject a small area adjacent to the Cub Creek road right-of-way to potential adverse development.

Visitor Use Issues. Development would detract from the scenic drive along the Cub Creek road.

Recommendation. The recommended protection method for this tract is acquisition of a scenic easement.

Rationale. Federal easement ownership will perpetuate the existing agricultural uses of the tract and complete the scenic easement ownership along this section of the Cub Creek road corridor.

Cub Creek Area

Tracts 01-108 and 01-110; total acres: 547.76; no improvements

View of portion of tract 01-110 from north

Description. These two parcels are owned by the state of Utah and managed for grazing by the Division of State Lands and Forestry. Tract 01-110 is transected by the Cub Creek road, just east of the intersection

with the Point of Pines road. Tract 01-108 is just east of the end of the Cub Creek road. Distinguishing features of tract 01-110 include Navajo sandstone outcroppings and Elephant Toes Butte. The topography of the two sites varies from steep cliffs to gently rolling meadow land. Vegetation includes cottonwoods along Cub Creek and pinyon/juniper, greasewood, cheatgrass, and sagebrush away from the creek. The parcels include winter deer range and are used occasionally by bald eagles. Tract 01-108 is just east of the Morris cabin. Tract 01-110 has dense concentrations of prehistoric sites.

Resource Protection Issues. Both tracts have been leased for cattle grazing and potential oil and gas development which, if developed, could greatly impact archeological resources. The Cub Creek petroglyphs and prehistoric habitation sites on tract 01-110 make this property a critical archeological resource. Grazing has already resulted in impacts on soils and surface archeological sites.

Visitor Use Issues. General management plan proposals for the Cub Creek area, interpretation of the petroglyphs, and trails in the Hog Canyon area are currently precluded by state ownership. Proposed improvements of the main access road to Cub Creek are partly in tract 01-110. The area is receiving increasing visitor use, and the tracts comprise terrain that is critical to the scenic protection of this area.

Recommendation. The recommended method of protection is fee acquisition through Project Bold or a Dinosaur National Monument-specific exchange agreement.

Rationale. The Cub Creek area is a critical visitor, cultural, and natural resource area. Visitor use proposals are limited by state ownership, and these properties should be acquired before road and trail improvements are made. This area should be precluded from energy development and grazing to provide scenic protection for public use and site protection for irreplacable archeological resources. Portions of both tracts were identified as a "potential wilderness additions" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Harpers Corner Road

Tracts 07-108, 07-114, 07-115, 08-101, 08-103, 08-107, 08-108, 08-111, 08-112, 08-113; total acres: 307.90; no improvements

View of Harpers Corner road and adjacent scenic easement area

Description. These 10 tracts are owned by three private landowners. The tracts are along Harpers Corner road within the 1,000-foot-wide road corridor authorized for acquisition by legislation (involving the scenic easements within 400-foot-wide strips on both sides of the 200-foot Harpers Corner road right-of-way). The 10 tracts are being used for cattle grazing and are vegetated mainly with sagebrush and juniper. The topography varies from gently rolling terrain to steep slopes.

Visitor Use Issues. Because the scenic easements have not been acquired on these tracts, there is potential for visually obtrusive development adjacent to the Harpers Corner road right-of-way.

Recommendation. The recommended method of protection for the 10 tracts is acquisition of a scenic easement through purchase, donation, or exchange.

Rationale. Existing uses (ranching) of the properties are compatible, and easement acquisition would perpetuate the existing conditions and avoid the potential for future changes that would adversely impact monument resources.

Chew Ranch Properties

Tracts 02-105, 02-106; total acres: 720.0; no improvements

View of tract 02-106 from east

Description. These two inholdings are a small portion of the Chew ranch, the majority of which is outside of the park boundary. The family has been ranching in the area for three generations. Both parcels are base land for grazing within the monument. Tract 02-105 is remote and cannot be seen from Harpers Corner road. It has low ridges and shallow valleys with some bedrock exposures and is vegetated with sagebrush, mountain mahogany, juniper, and ponderosa pine. No water resources exist. Tract 02-106 is adjacent to Harpers Corner road and is highly visible along certain sections. This tract is predominantly sagebrush. The area includes rolling hills and a gently sloping valley. Intermittent streams drain through the tract into Island Park.

Resource Protection Issues. Cattle compete with wildlife for forage. Protection of the drainage into Island Park is another resource management goal (tract 02-106).

Visitor Use Issues. Tract 02-106 is highly visible from the Harpers Corner road and is well inside the monument boundary. Hikers cross portions of tract 02-105 when using the Ruple Point trail, and the landowner has expressed concern over conflicts between his livestock and visitors.

Recommendation. The recommended method of protection is acquisition in fee title.

Rationale. The location of tract 02-106 is visually sensitive due to the proximity of the Harpers Corner road. The acquisition of these two tracts would implement a primary legislative and management objective by removing grazing base lands within the monument. Involved are some 9,500 acres of grazing privileges.

Tract 02-107

Total acres: 501.24; no improvements

Tract 02-107 from east

Description. Adjacent to the Chew Ranch tract 02-106, this parcel is owned by the state of Utah and managed for grazing by the Division of State Lands and Forestry. The property lies on both sides of Harpers Corner road approximately 1 mile southwest of the Echo Park overlook, and it has rolling valley and wash topography vegetated with sagebrush and juniper.

Resource Protection Issues. The primary protection concerns include the competition of cattle grazing with wildlife, potential damage from mineral exploration and extraction activities, and protection of the drainage into Island Park. Some of this tract drains into Trail Draw and Echo Park, the remainder into the Green River at the head of Island Park. It has

also been leased for potential oil and gas development. It also lies within the preferred summer range of the reintroduced (1984) bighorn sheep herd.

Visitor Use Impacts. This property is highly visible from Harpers Corner road and is close to heavily used overlooks.

Recommendation. The recommended method of protection is acquisition in fee through Project Bold or a Dinosaur National Monument-specific exchange.

Rationale. This property should be in federal ownership because of its proximity to Harpers Corner road to eliminate grazing within the monument and to preclude the potential for oil and gas exploration and extraction. Part of this tract was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Ross Ranch - Round Top Mountain

Tracts 07-103, 07-104; total acres: 314.79

View of tract 07-103 from west

Description. These two inholdings are part of a larger ranching operation outside the monument boundary. Both properties are used for grazing and are base lands for grazing privileges within the park. The

tracts are on the flanks of Round Top Mountain and are accessible from the road to the Round Top fire lookout. Tract 07-103 is slightly rolling and slopes toward Red Rock Canyon. Tract 07-104 is more steeply sloped and has deep valleys and high ridges. Vegetation includes sagebrush, serviceberry, mountain mahogany, arrowleaf/balsam root, and some scattered groves of aspen. Both parcels have intermittent streams and are in prime summer deer and elk range.

Resource Protection Issues. Competition between cattle and wildlife for forage is the primary natural resource issue.

Visitor Use Issues. Although these tracts are not in a heavily used area, there are some spectacular views from tract 07-104 toward the south and east. Tract 07-103 is visible from two viewpoints on Harpers Corner road as well as from the Yampa Canyon viewpoint.

Recommendation. The recommended protection method is acquisition in fee title.

Rationale. The acquisition of this tract would implement a primary legislative and management objective by removing grazing base lands within the monument. Involved are 4,110 acres of grazing privileges. In addition, this property was identified as a "potential wilderness additions" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Red Rock Ranch

Tract 04-110; total acres: 360.0; improvements include a cabin, road, trailer, and other agriculturally related structures

Tract 04-110 from northeast

Description. The property contains fields which were cleared for cultivated crops in the mid-1970s. It has been in the same ownership for two generations. It is base land for grazing rights within the park. It is just south of the Yampa Bench road, approximately 4 miles east of the intersection with the Echo Park road. Physiographic features include part of the Billiard Table, Cottonwood Canyon, and Red Rock Canyon. The property is highly visible from Echo Park overlook, Round Top Mountain, and short sections of the Yampa Bench road. The topography includes steep-sided cliff faces, rolling hills, and shallow stream valleys. Vegetation includes sagebrush, juniper, pinyon, some box elder, and cottonwood along the stream drainage. Water resources include a spring. Archeological resources are likely on this site. The property is in a deer and antelope winter range.

Resource Protection Issues. Because of its deer and antelope range, the protection it provides for the watershed, base lands for grazing, and potential for archeological discovery, this tract is integral to resource values of surrounding federal land.

Visitor Use Issues. The private ownership of this tract precludes public use of this attractive area and hinders entry to Red Rock and Cottonwood canyons. The tract has high visibility from the Yampa Bench road and viewpoints along the Harpers Corner road. Also, the ranch has potential for hiking into nearby canyons.

Recommendation. The recommended protection method is acquisition in fee title.

Rationale. Acquisition would implement a primary legislative and management objective by removing grazing base lands within the monument. In addition, this property was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Mantle Ranch

Tract 04-111; total acres: 160.00; improvements include cultivated fields, a residence, and additional ranch buildings and facilities

Tract 04-111 from west, tract is located south of Yampa River

Description. The tract occupies a prominent position along the Yampa River in Castle Park and includes ranch buildings and alfalfa fields. Distinguishing features include the riverfront, the mouth of Hells Canyon, and the steep walls of Yampa Canyon. The property is visible from Round Top Mountain, Martha's Peak, and Harpers Corner. Vegetation includes juniper, pinyon, sagebrush, box elder, cottonwood, and tamarisk. Water resources include the Yampa River and the mouth of Hells Canyon drainage. There are major archeological resources on the property, and the site is considered eligible for nomination to the National Register of Historic Places as an archeological district. The area has been sporadically inhabited by prehistoric cultures since A.D. 800. This is the only occupied residence within the monument, although in recent years it has seldom been occupied for extended periods. Historically, the present owner is the second generation on this site and is also the owner of the Red Rock ranch inholding (tract 04-110).

Resource Protection Issues. There is a need to protect prime archeological resources that are known to exist on the site. In the past, the owner has placed old cars and refrigerators along the southern bank of the Yampa River to control bank erosion problems, thereby impacting the riverbank view for passing boat parties. The tract provides access to wild peregrine aeries and Colorado squawfish spawning areas.

Visitor Use Issues. Private ownership precludes public use of this highly scenic and archeologically significant property. It is proposed as a river campground and emergency boat launching area for access to Warm Springs rapids. It has future potential for a day use area and cultural interpretive site.

Recommendation. The recommended protection method is acquisition in fee title. A land exchange also may be suitable.

Rationale. Fee purchase would be necessary to allow for public use and development (e.g., river campground, etc.). The area could be used as an outlying station for study, protection, management, and interpretation of archeology at the potential National Register site. It is also a prime location for monitoring whitewater boat use on the Yampa and for launching emergency rescues for boat accidents. It is the only emergency access to the river between Deerlodge and Echo parks. Part of this tract was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974. Deer use this location during the winter. Acquisition of this tract would implement a primary legislative and management objective by removing grazing base lands within the monument. Including Red Rock Ranch, 32,520 acres of grazing privileges are involved.

Deerlodge Park Road

Tracts 09-108 through 09-171; total tracts: 41 nonfederal; total ownership: 6 nonfederal; total improvements = 1 (within 400-foot scenic easement); total nonfederal acres: 852.28

View of Deerlodge Park road from southeast

Description. All of the Deerlodge Park campground area is owned in fee by the federal government and is managed by the National Park Service. However, there is an 11-mile-long road corridor that connects this part of the monument to US 40. Dinosaur National Monument legislation authorizes acquisition of a 1,000-foot-wide corridor (200 feet of right-of-way and 800 feet of scenic easement) to protect the visual qualities of the road. The road corridor contains a total of 1,471.95 acres; 296.11 acres in right-of-way, and 1,175.84 in scenic easement. All but 9.37 acres (tract 09-170) of the road right-of-way is in federal ownership. Still in private ownership are 849.58 acres within the authorized scenic easement corridor on both sides of the road right-of-way. Within the 1,000-foot corridor 622.37 acres are in federal ownership.

Land along the road is generally rolling, except for a small bench where the road parallels the Yampa River.

Resource Protection Issues. There is potential for incompatible use within the 800 feet of scenic easement road corridor such as rural residential development or sand and gravel extraction.

Within the federally owned lands in the road corridor there are three federal oil and gas leases, three applications to lease additional lands, and three leases pending approval; one other lease is on the simultaneous listing. A mobile home is within the authorized scenic easement area.

Visitor Use Issues. The main purpose of the corridor aside from the road right-of-way is to provide scenic protection between US 40 and Deerlodge Park. Development within the authorized easement area would diminish the visual qualities of this rangeland foreground.

Recommendation. Title to the 9.37 acres of private land within the right-of-way should be acquired in federal ownership. Acquisition of the remaining nonfederal lands within the scenic easement area is also recommended.

Rationale. Tract 09-170 must be acquired to complete public ownership of the Deerlodge Park road right-of-way. Scenic easement purchases are a lower priority due to less visitor use of this area compared to the Cub Creek and Harpers Corner roads, but the tracts still should be acquired to protect the scenic entry for visitors. Secretarial selection precludes mineral entry and leasing within the 1,000-foot corridor.

(no photo available)

Hacking Ranch - Wild Mountain

Tract 02-109; total acres: 120.00; total ownerships = 1; no improvements except water troughs and tanks

Description. Tract 02-109 is on the southeast slope of Wild Mountain and is very difficult to reach by vehicle. This tract is readily visible from several areas along the Harpers Corner road. From the tract, there are exceptional views of Harpers Corner, Jones Hole, Echo Park, Zenobia Peak and Basin, Yampa Canyon, Lodore Canyon, Whirlpool Canyon, and Island Park. The property is rolling to steeply sloped and is vegetated with sagebrush, serviceberry, aspen, and native grasses. It contains several springs used by livestock and wildlife. Present use is for grazing; the property is base land for grazing privileges within the monument.

Resource Protection Issues. The area is the only inholding base land on Wild Mountain. Most of the grazing on Wild Mountain will cease in 1985 or shortly thereafter; only grazing appurtenant to this property will remain. Because of its water resources, this property is important for wildlife use including deer, elk, and possibly bighorn sheep.

Visitor Use Issues. Informal trails with exceptional scenic value pass through the parcel.

Recommendation. The recommended protection method is acquisition in fee title.

Rationale. The tract is important because of its exceptional scenic values (including views from Harpers Corner), plentiful water, and potential for trail development. Acquisition of this tract would implement a primary legislative and management objective by removing grazing base lands within the monument. There are 4,490 acres of grazing privileges involved. In addition, this property was identified as a "potential wilderness addition" in the Wilderness Recommendation, Dinosaur National Monument that was submitted to Congress in December 1974.

Table 13: Surface Ownership Summary

Tract #	Acquisition Priority	Area of Monument*	Common Name/ Owner	Acreage	Interest or Protection Needed
01-102	4	Quarry area	Orchid Draw/ Douglass	80.00	Fee
01-105	1	Rainbow Park	State of Utah, Division of State Lands and Forestry	304.68	Fee
01-108	1	Cub Creek	State of Utah, Division of State Lands and Forestry	240.00	Fee
01-110	1	Cub Creek	State of Utah, Division of State Lands and Forestry	307.76	Fee
01-118	2	Quarry area	State of Utah, Division of State Lands and Forestry	16.00	Fee
01-129	4	Cub Creek	Chew	10.33	Scenic easement
02-101	2	Island Park	Staley Ranch (McLean, Day, Staley)	160.00	Fee
02-103	4	Sage Creek	Sage Creek/State of Utah, Division of Wildlife Resources	80.00	Fee
02-104	1	Rainbow Park - Island Park	State of Utah, Division of State Lands and Forestry	440.00	Fee
02-105	3	Harpers Corner	Chew	80.00	Fee
02-106	2	Harpers Corner	Chew	640.00	Fee
02-107	2	Harpers Corner	State of Utah, Division of State Lands and Forestry	501.24	Fee
02-108	1	Island Park	State of Utah, Division of Wildlife Resources	75.23	Fee
02-109	3	Wild Mountain	Hacking	120.00	Fee

Tract #	Acquisition Priority	Area of Monument*	Common Name/ Owner	Acreage	Interest or Protection Needed
03-112	2	Zenobia Basin	Walker	115.94	Fee
03-113	2	Zenobia Basin	Walker	120.00	Fee
03-115	2	Zenobia Basin	Walker	392.38	Fee
03-116	4	Wild Mountain	Rasmussen (80 acres) Born (40 acres) Hand (40 acres)	160.00 (total)	Fee
04-106	2	Zenobia Basin	Walker	72.80	Fee
04-108	2	Zenobia Basin	Walker	760.00	Fee
04-110	2	Yampa Bench	Red Rock Ranch/Mantle	360.00	Fee
04-111	1	Yampa Bench	Mantle	160.00	Fee
07-103	3	Roundtop	Ross	114.79	Fee
07-104	3	Roundtop	Ross	200.00	Fee
07-108	4	Harpers Corner Road	Chew	16.29	Scenic easement
07-114	4	Harpers Corner Road	Chew	53.25	Scenic easement
07-115	4	Harpers Corner Road	Chew	55.78	Scenic easement
07-119		Point of Pines Road	USA/NPS	172.26	Scenic easement (transfer to BLM)
07-120		Point of Pines Road	USA/NPS	2.26	Scenic easement (transfer to BLM)
07-121		Point of Pines Road	Snow	6.84	None (proposed deletion)
07-122		Point of Pines Road	USA/NPS	76.20	Scenic easement (transfer to BLM)
07-125		Point of Pines Road	USA/NPS	43.30	Fee (transfer to BLM)
07-127		Point of Pines Road	USA/NPS	20.69	Fee (transfer to BLM)
08-101	4	Harpers Corner Road	Vincent Brothers	28.92	Scenic easement

Tract #	Acquisition Priority	Area of Monument*	Common Name/ Owner	Acreage	Interest or Protection Needed
08-103	4	Harpers Corner Road	Vincent Brothers	26.62	Scenic easement
08-107	4	Harpers Corner Road	Vincent Brothers	51.88	Scenic easement
08-108	4	Harpers Corner Road	Vincent Brothers	48.20	Scenic easement
08-111	4	Harpers Corner Road	K Cattle Company	24.33	Scenic easement
08-112	4	Harpers Corner Road	K Cattle Company	.17	Fee
08-113	4	Harpers Corner Road	K Cattle Company	2.46	Scenic easement

The implementation of the following land protection recommendations within segment 09 by the National Park Service is possible because of the recent formal selection of the 1,000-foot-wide Deerlodge Park corridor by the secretary of the interior, effective September 10, 1985 (see appendix A).

09-105		Deerlodge Park Road	USA/NPS	4.91	Fee/right-of-way
09-106		Deerlodge Park Road	USA/NPS	18.35	Fee/right-of-way
09-107		Deerlodge Park Road	USA/NPS	17.68	Fee/right-of-way
09-108	4	Deerlodge Park Road	Bogle Farms, Inc.	1.01	Scenic easement
09-110	4	Deerlodge Park Road	Weaver	.09	Scenic easement
09-111	4	Deerlodge Park Road	Bogle Farms, Inc.	39.37	Scenic easement
09-112	4	Deerlodge Park Road	Bogle Farms, Inc.	79.95	Scenic easement
09-113		Deerlodge Park Road	USA/NPS	19.57	Scenic easement
09-114		Deerlodge Park Road	USA/NPS	.76	Fee/right-of-way
09-115	4	Deerlodge Park Road	Bogle Farms, Inc.	13.29	Scenic easement
09-116		Deerlodge Park Road	USA/NPS	17.44	Scenic easement
09-117		Deerlodge Park Road	USA/NPS	9.35	Fee/right-of-way
09-118	4	Deerlodge Park Road	Hoover	9.91	Scenic easement
09-120		Deerlodge Park Road	USA/NPS	55.45	Scenic easement
09-121		Deerlodge Park Road	USA/NPS	23.34	Fee/right-of-way
09-122		Deerlodge Park Road	USA/NPS	42.19	Scenic easement
09-123	4	Deerlodge Park Road	Bogle Farms, Inc.	31.72	Scenic easement

Tract #	Acquisition Priority	Area of Monument*	Common Name/ Owner	Acreage	Interest or Protection Needed
09-124	4	Deerlodge Park Road	Bogle Farms, Inc.	29.75	Scenic easement
09-125	4	Deerlodge Park Road	State of Colorado	30.07	Scenic easement
09-127	4	Deerlodge Park Road	State of Colorado	20.89	Scenic easement
09-130	4	Deerlodge Park Road	Weaver	2.94	Scenic easement
09-131	4	Deerlodge Park Road	Weaver	52.97	Scenic easement
09-132	4	Deerlodge Park Road	Weaver	2.77	Scenic easement
09-133	4	Deerlodge Park Road	Bogle Farms, Inc.	2.96	Scenic easement
09-134	4	Deerlodge Park Road	Bogle Farms, Inc.	5.93	Scenic easement
09-135	4	Deerlodge Park Road	Rinker	18.22	Scenic easement
09-136	4	Deerlodge Park Road	Rinker	15.37	Scenic easement
09-137	4	Deerlodge Park Road	Rinker	49.70	Scenic easement
09-138	4	Deerlodge Park Road	Bogle Farms, Inc.	26.05	Scenic easement
09-139	4	Deerlodge Park Road	Bogle Farms, Inc.	28.22	Scenic easement
09-140		Deerlodge Park Road	USA/NPS	1.40	Scenic easement
09-141	4	Deerlodge Park Road	Bogle Farms, Inc.	39.38	Scenic easement
09-142		Deerlodge Park Road	USA/NPS	1.62	Scenic easement
09-143	4	Deerlodge Park Road	Warner	27.34	Scenic easement
09-144	4	Deerlodge Park Road	Warner	24.58	Scenic easement
09-145		Deerlodge Park Road	USA/NPS	2.41	Scenic easement
09-146	4	Deerlodge Park Road	Bogle Farms, Inc.	.12	Scenic easement
09-147	4	Deerlodge Park Road	Dehart	11.71	Scenic easement
09-148	4	Deerlodge Park Road	Dehart	7.60	Scenic easement
09-149	4	Deerlodge Park Road	Bogle Farms, Inc.	.33	Scenic easement
09-150	4	Deerlodge Park Road	Bogle Farms, Inc.	3.25	Scenic easement

Tract #	Acquisition Priority	Area of Monument*	Common Name/ Owner	Acreage	Interest or Protection Needed
09-151		Deerlodge Park Road	USA/NPS	29.20	Scenic easement
09-152		Deerlodge Park Road	USA/NPS	83.75	Scenic easement
09-153	4	Deerlodge Park Road	Bogle Farms, Inc.	.55	Scenic easement
09-154	4	Deerlodge Park Road	Bogle Farms, Inc.	10.44	Scenic easement
09-155		Deerlodge Park Road	USA/NPS	22.21	Scenic easement
09-156	4	Deerlodge Park Road	Bogle Farms, Inc.	78.60	Scenic easement
09-157	4	Deerlodge Park Road	Bogle Farms, Inc.	61.22	Scenic easement
09-158		Deerlodge Park Road	USA/NPS	2.31	Scenic easement
09-159		Deerlodge Park Road	USA/NPS	15.30	Scenic easement
09-160		Deerlodge Park Road	USA/NPS	16.18	Scenic easement
09-161	4	Deerlodge Park Road	Bogle Farms, Inc.	12.64	Scenic easement
09-162	4	Deerlodge Park Road	Bogle Farms, Inc.	.24	Scenic easement
09-163		Deerlodge Park Road	USA/NPS	13.61	Scenic easement
09-164	4	Deerlodge Park Road	Bogle Farms, Inc.	2.47	Scenic easement
09-165	4	Deerlodge Park Road	Bogle Farms, Inc.	19.84	Scenic easement
09-166		Deerlodge Park Road	USA/NPS	3.10	Scenic easement
09-167		Deerlodge Park Road	USA/NPS	2.47	Fee/right-of-way
09-168		Deerlodge Park Road	USA/NPS	.52	Scenic easement
09-169	4	Deerlodge Park Road	Bogle Farms, Inc.	71.90	Scenic easement
09-170	4	Deerlodge Park Road	Bogle Farms, Inc.	9.37	Fee/right-of-way
09-171	4	Deerlodge Park Road	Bogle Farms, Inc.	9.52	Scenic easement
09-174		Deerlodge Park Road	USA/NPS	3.51	Fee/right-of-way

*Refer to Landownership map for exact location.

SUBSURFACE TRACT RECOMMENDATIONS AND SUMMARY

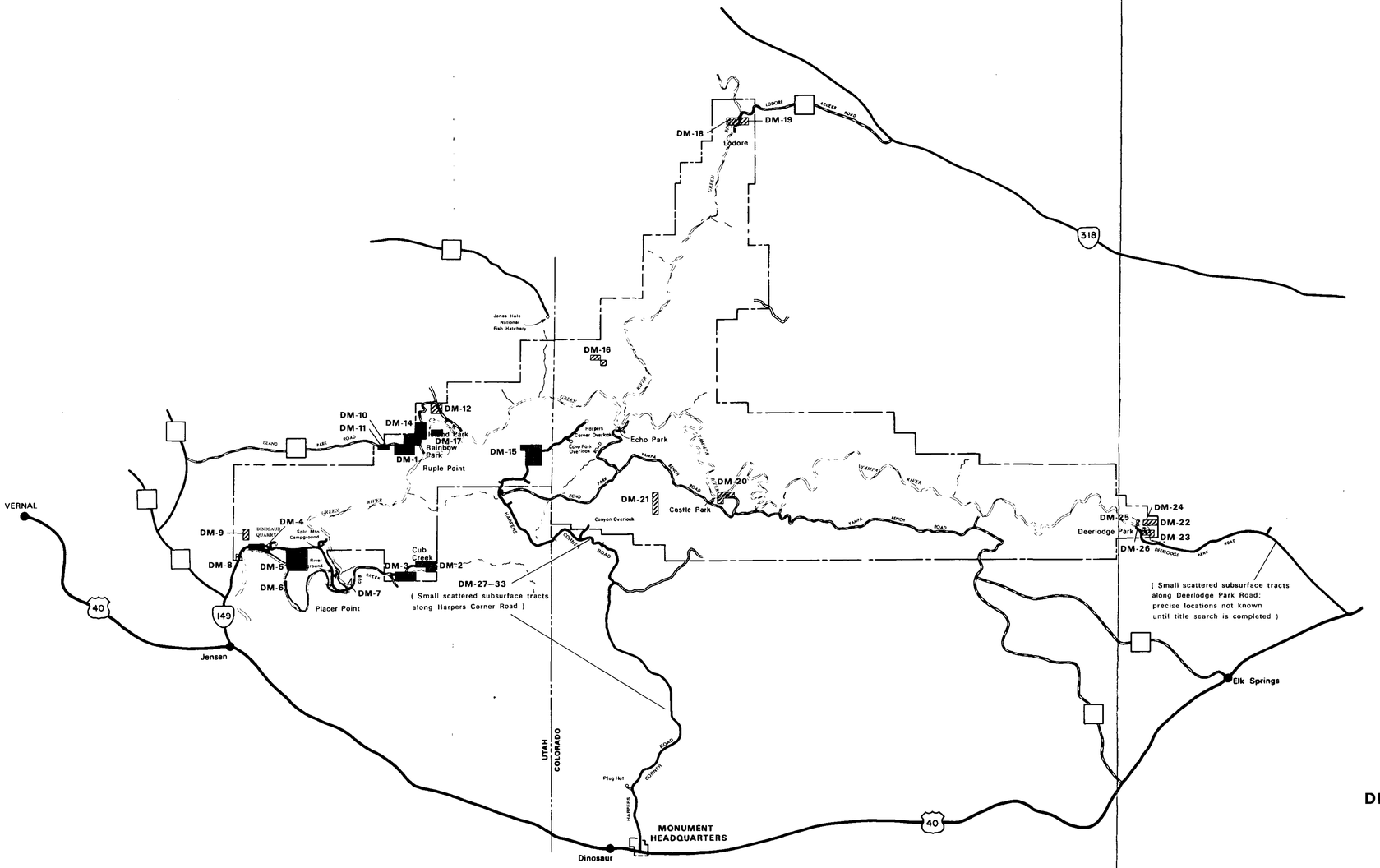
The Subsurface Ownership map shows the location of nonfederal subsurface ownership within Dinosaur National Monument. In many cases subsurface ownership coincides with surface ownership.

The full potential for mineral development within the monument cannot be determined; however, mineral extraction activities are incompatible with the purposes for which Dinosaur National Monument was established. While recognizing the valid existing rights of subsurface landowners, legislation and proclamations establishing Dinosaur National Monument did not authorize the exploration and extraction of federal or nonfederal oil, gas, or other mineral resources within the boundaries of the monument. Such activities would be considered incompatible activities by the National Park Service and would have an adverse impact on the natural, cultural, scenic, paleontological, and scientific values of Dinosaur National Monument. The National Park Service would pursue appropriate legal means to prevent adverse impacts on these resources.

Acquisition of nonfederal subsurface interests within Dinosaur National Monument is therefore necessary to carry out the purposes of the monument as established by Congress and presidential proclamation. Donation and exchange are the preferred methods of acquisition. Purchase is also expected to be necessary and appropriate as funds are available. Condemnation may be necessary if all other means of protection are found to be inadequate. In any case, except where donation is involved, it is recognized that owners of subsurface rights will require compensation when their rights are acquired by the National Park Service. Until such time as all nonfederal subsurface rights can be acquired by the National Park Service, all applicable federal regulatory authorities, including the regulatory requirements of 36 CFR 9, subpart B, would be fully applied to any proposed mineral activity.

Issuance of a notice of selection on September 10, 1985, by the secretary of the interior on the Deerlodge Park road corridors has made these areas part of the monument and, under the Mineral Leasing Act, they are automatically closed to the future mineral entry and leasing of federal minerals, subject to valid existing rights. Notice of selection on the Echo Park road corridor would still be required to provide the same level of protection within that area.

When the National Park Service acquires the nonfederal subsurface rights, they may be encumbered by leases to other parties. When these leases expire, they cannot be renewed because title to the minerals is vested to the United States and federal leasing laws prohibit the disposal of federal minerals within units of the national park system. It is proposed that existing leases of record be allowed to expire. Acquisition, including condemnation as a last resort, should be used as necessary when the development of existing leases would result in adverse impacts on monument resources. Refer to the tract-by-tract description of subsurface ownership and recommendations (table 14).



STATE OF UTAH

PRIVATE

NOTE: Includes both full or partial mineral rights ownership. See appendix for description of subsurface ownerships.

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SUBSURFACE OWNERSHIP

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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Table 14: Subsurface Ownership and Lease Summary

Mineral Tract #	Area of Monument*	Subsurface Owner	Acreage	Lease Holder	Lease Terms	Surface Owner	Interest or Protection Needed
DM-1 (Surface 01-105)	Rainbow Park	State of Utah	304.68	Tully Corporation #36317	Oil, gas, and hydrocarbons, 10-yr. lease starting 1/1/79	State of Utah	Mineral rights
DM-2 (Surface 01-108)	Cub Creek	State of Utah	240.00	Texaco, Inc. #37017	Oil, gas, and hydrocarbons, 10-yr. lease starting 9/1/79	State of Utah	Mineral rights
DM-3 (Surface 01-110)	Cub Creek	State of Utah	307.76	Texaco, Inc. #37010	Oil, gas, and hydrocarbons, 10-yr. lease starting 8/6/79	State of Utah	Mineral rights
DM-4 (Reference 01-114)	Quarry area	State of Utah	163.64	Texaco, Inc. #37013	Oil, gas, and hydrocarbons, 10-yr. lease starting 9/1/79	U.S.A.	Mineral rights
DM-5 (Reference 01-117)	Quarry area	State of Utah	635.02	Texaco, Inc. #37015	Oil, gas, and hydrocarbons, 10-yr. lease starting 9/1/79	U.S.A.	Mineral rights
DM-6 (Surface 01-118)	Quarry area	State of Utah	16.00	Texaco, Inc. #37009	Oil, gas, and hydrocarbons, 10-yr. lease starting 9/1/79	State of Utah	Mineral rights
DM-7 (Surface 01-129)	Quarry area	Chew	10.33	None	None	Chew	Mineral rights
DM-8 (Reference 01-134)	Quarry area	Snow--oil and gas restricted; U.S.A.--all other minerals	20.18	None	None	U.S.A.	None additional
DM-9 (Surface 01-102)	Quarry area	Douglass--all minerals except phosphate; U.S.A.--all phosphate	80.00	None	None	Douglass	Mineral rights
DM-10 (Reference 01-136)	Island Park Road	U.S.A.--All oil and gas State of Utah--all other minerals	36.39	None	None	U.S.A.	Mineral rights
DM-11 (Reference 01-137)	Island Park Road	State of Utah	36.43	Tully Corporation #36317	Oil, gas, and hydrocarbons, 10-yr. lease starting 1/1/79	U.S.A.	Mineral rights

Mineral Tract #	Area of Monument*	Subsurface Owner	Acreage	Lease Holder	Lease Terms	Surface Owner	Protection Needed
DM-12 (Surface 02-101)	Island Park	Staley	160.00	None	None	Staley	Mineral rights
DM-14 (Surface 02-104)	Rainbow Park - Island Park	State of Utah	440.00	Tully Corporation #36340	Oil, gas, and hydrocarbons, 10-yr. lease starting 2/1/79	State of Utah	Mineral rights
DM-15 (Surface 02-107)	Harpers Corner	State of Utah	501.24	Sonja McCormick #39959	Oil, gas, and hydrocarbons, 10 yr. lease starting 4/1/82	State of Utah	Mineral rights
DM-16 (Surface 02-109)	Wild Mountain	Hacking	120.00	None	None	Hacking	Mineral rights
DM-17 (Surface 02-108)	Island Park	U.S.A.--all phosphate; State of Utah--all other minerals	75.23	None	None	State of Utah Division of Wildlife	Mineral rights
DM-18 (Reference 03-123)	Lodore	Browns Park Cattle Co.	69.13	None	None	U.S.A.	Mineral rights
DM-19 (Reference 03-123)	Lodore	Browns Park Cattle Co.	90.88	None	None	U.S.A.	Mineral rights
DM-20 (Surface 04-111)	Yampa Bench	Mantle Ranch, Inc.	160.00	None	None	Mantle Ranch, Inc.	Mineral rights
DM-21 (Surface, 04-110), also (Reference 04-112)	Yampa Bench	Mantle/Red Rock Ranch, Inc.	160.00	None	None	Mantle Ranch, Inc.	Mineral rights
DM-22 (Reference 06-155)	Deerlodge Park	U.S.A.--½ all minerals Grimm--½ all minerals	80.00	None	None	U.S.A.	Mineral rights
DM-23 (Reference 06-116, 06-117, 06-118)	Deerlodge Park	Lily Park Stock Assoc.--½ all minerals Tuttle--¼ all minerals Bogle Farms, Inc.--¼ all minerals	84.04	None	None	U.S.A.	Mineral rights
DM-24 (Reference 06-119)	Deerlodge Park	U.S.A.--½ all minerals Grimm--½ all minerals	65.48	None	None	U.S.A.	Mineral rights

Mineral Tract #	Area of Monument*	Subsurface Owner	Acreage	Lease Holder	Lease Terms	Surface Owner	Protection Needed
DM-25 (Reference 06-120)	Deerlodge Park	U.S.A.--½ all minerals Grimm--½ all minerals	10.03	None	None	U.S.A.	Mineral rights
DM-26 (Reference 06-121)	Deerlodge Park Road	U.S.A.--½ all minerals Grimm--½ all minerals	1.00	None	None	U.S.A.	Mineral rights
DM-27 (Reference 07-166)	Harpers Corner Road	State of Utah	4.32	None	None	U.S.A. (right-of-way)	Mineral rights
DM-28 (Reference 07-106)	Harpers Corner Road	State of Utah	11.07	None	None	U.S.A. (scenic easement)	Mineral rights
DM-29 (Surface 08-103)	Harpers Corner Road	Moffat County	26.62	None	None	Vincent et al.	Mineral rights
DM-30 (Reference 08-123, 08-124)	Harpers Corner Road	Morgan--½ all minerals Calder--¼ all minerals K. Ranch Co.--¼ all minerals	0.17	None	None	U.S.A. (right-of-way)	Mineral rights
DM-31 (Surface 08-101)	Harpers Corner Road	Moffat County	28.92	None	None	Vincent et al.	Mineral rights
DM-32 (Surface 08-103)	Harpers Corner Road	Moffat County	26.62	None	None	U.S.A.	Mineral rights
DM-33 (Surface 08-111)	Harpers Corner Road	Morgan--½ all minerals Calder--¼ all minerals K. Ranch Co.--¼ all minerals	24.33	None	None	K. Cattle Co.	Mineral rights

*Refer to Subsurface Ownership map for exact location.

Note: A complete title search has not been done on the 1,000-foot Deerlodge Park road corridor to determine what nonfederal mineral rights exist, if any.

The Energy, Mining, and Minerals Division of the National Park Service will provide assistance to the monument staff in identifying what additional federal actions and/or regulations are needed to help protect the monument from exploration and extraction of minerals, sand and gravel, and oil and gas resources within or adjacent to the monument.

COMPATIBLE AND INCOMPATIBLE USES

The following lists of compatible and incompatible uses would serve as the basis for land protection actions within the monument on an interim basis until the recommended interest in lands could be acquired.

Properties where use remained compatible would normally be acquired on an opportunity purchase basis, that is, only when the owner desired to sell his or her land and the National Park Service had funds to purchase the property. Acquisition of land where current uses are considered "compatible" in the short term is necessary to meet long-range objectives for resource protection and visitor use.

Compatible Uses

wildlife habitat

open space

hunting and fishing, in accordance with applicable state laws and federal regulations

normal maintenance and upkeep of private property

minor modifications to existing structures and outbuildings. Structures may be razed and replaced so long as the new structure is essentially the same size, is designed to serve the same purpose as its predecessor, and occupies essentially the same site.

existing ranching/grazing uses permitted under legislative and policy provisions and in accordance with the Natural Resource Management Plan and its cultural resource component

The superintendent of Dinosaur National Monument should be notified of any proposed land usage NOT included in the above listing. Questions regarding compatible/incompatible uses should be directed to monument headquarters.

Incompatible Uses

The following list of "incompatible" uses includes those actions that would have an adverse impact on monument resources and opportunities for public use:

new agricultural uses, including grazing or the cultivation or irrigation of a meadow or pasture

substantial additions to existing structures

subdivision of land

new single- or multiple-family seasonal or year-round residence, including, but not limited to, trailers, mobile homes, and cabins

damage to the natural, cultural, or scenic resources of the monument

modification of land forms and vegetation including, but not limited to, bulldozing to clear and level land

commercial use not covered under concession agreement

industrial use

mineral, rock, or earth extraction activity including, but not limited to the exploration for or extraction of sand, gravel, phosphate, and limestone

exploration for, or extraction of, oil and gas resources

commercial logging

new major agricultural support structures and facilities (including, but not limited to, stockponds, barns, and storage buildings)

If any nonfederal property is subjected to an incompatible use, necessary actions would be taken to protect park resources. This could include the use of condemnation authority if other efforts failed to prevent or mitigate resource damage.

LANDS OUTSIDE THE MONUMENT BOUNDARY

Fee-0 Lands

Table 15 indicates the actions recommended for future management of lands outside the monument boundary that are owned by the federal government and managed by the National Park Service (fee-0 lands). These lands represent remnants acquired through past land acquisition transactions.

Other Federal Lands

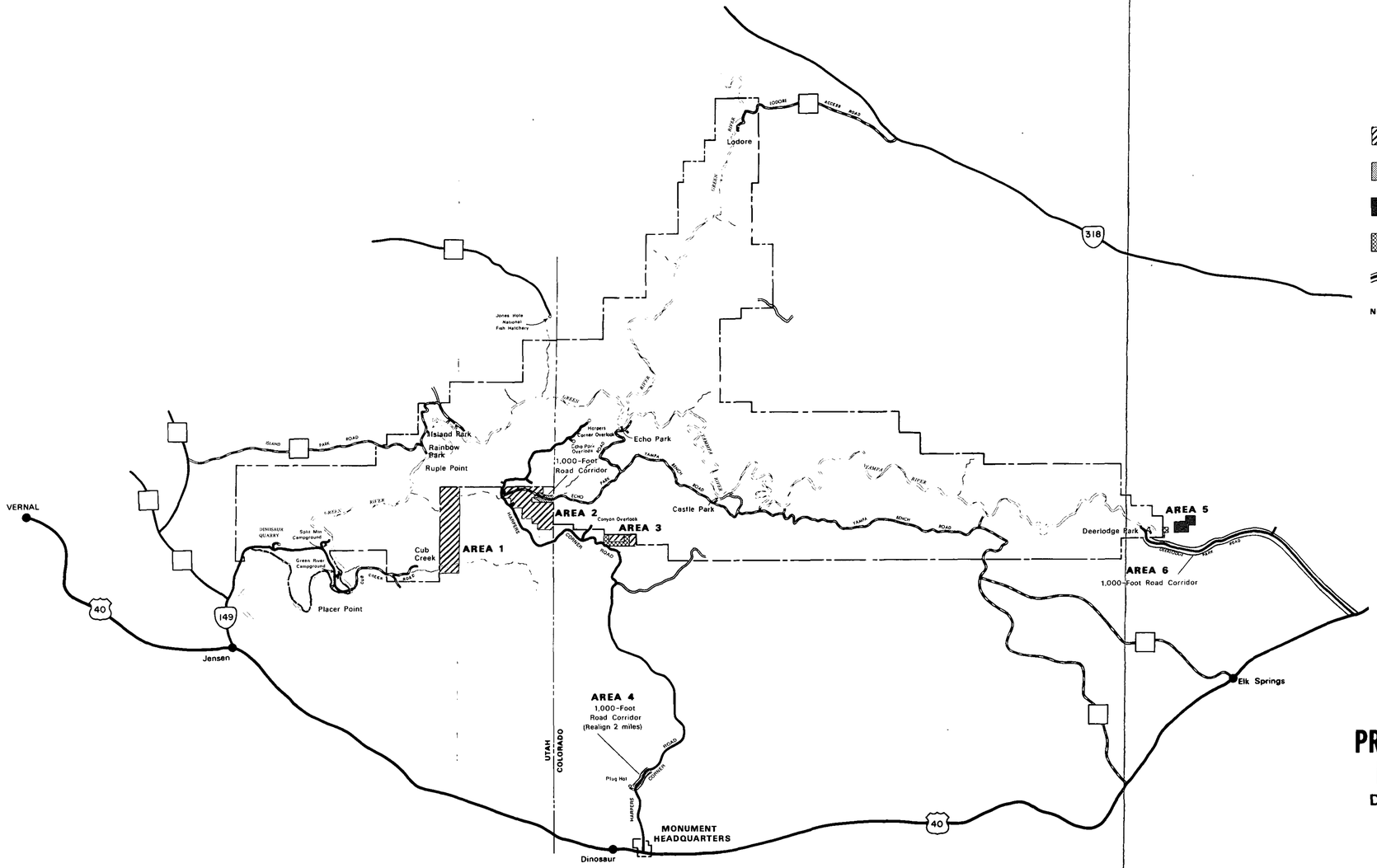
For all Bureau of Land Management lands surrounding the monument the National Park Service would continue to work with the Craig and Vernal districts to coordinate planning activities and to share NPS concerns regarding management of mineral leases, wildlife, and scenic resources.

Table 15: Recommended Management of Fee-0 Lands

Tract #	Area	Acres	Action Recommended	Rationale
07-156 (Area 3)*	Harpers Corner road	276.03	Retain in federal ownership; include later in monument boundary if authorized.	Located contiguous to the monument boundary along primary visitor use road; highly visible.
09-172 (Area 5)*	Deerlodge Park	47.62	Retain in federal ownership; include later in monument boundary if authorized.	Located contiguous to the monument boundary and contains significant riparian habitat.
09-173 (Area 5)*	Deerlodge Park	322.59	Dispose of property with the deed restriction (easement) to limit use of property to agricultural uses; as option, property can also be exchanged for Deerlodge Park road easements or other private lands within the monument.	Property is not contiguous to boundary or needed for public use. However, land is highly visible from the entrance road, and overlooks; thus land uses should be restricted

*For location of areas, refer to Proposed Changes in Federal Land Management Status map later in this section.

Tracts 09-172 and 09-173 from Deerlodge Park road, Yampa River in foreground



PROPOSED FOR WITHDRAWAL BY BLM

PROPOSED FOR RIGHT-OF-WAY AND EASEMENT PURCHASE BY NPS

PROPOSED TRANSFER FROM NPS ADMINISTRATION TO PRIVATE OWNERSHIP (With Restrictions)

CONTINUED NPS MANAGEMENT OF LAND OUTSIDE MONUMENT BOUNDARY

1,000-FOOT ROAD CORRIDOR ADDED TO MONUMENT BY SECRETARY OF INTERIOR ON SEPT. 10, 1985 (AREA 6)

NOTE: For discussion of proposals for Areas 1 through 6, see text.

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PROPOSED CHANGES IN FEDERAL LAND MANAGEMENT STATUS

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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Additionally, to ensure the compatibility of land uses surrounding Dinosaur National Monument, certain lands adjacent to the monument boundary, approximately 4,420 acres which are administered by the BLM, are proposed for protective withdrawal or restrictive management zoning. Subject to valid existing rights, these public lands and minerals should be withdrawn from all forms of appropriation, including settlement, sale, location, or entry under the general land laws, including the mining laws (30 USC 2) and mineral leasing laws. Hunting and future grazing leases need not be precluded but should be subject to site-specific determinations by the Bureau of Land Management.

This general management plan and land protection plan therefore propose that the secretary of the interior, by the authority of section 204 of the Federal Land Policy and Management Act, issue a public land order to close these 4,420 acres of public land and minerals to surface entry and mining in perpetuity. With such action, the Bureau of Land Management would retain management of the lands and provide the necessary protection, address the potential for adverse use, and provide for the public to use and enjoy these areas. The National Park Service would seek a interagency agreement or memorandum of understanding with the Bureau of Land Management. If the desired level of protection could not be provided, a boundary change would be recommended to add the areas to the monument.

The lands recommended for protective withdrawal or special zoning are as shown on the Proposed Changes in Federal Land Management Status map; an area-by-area description and rationale for action follows.

Area 1 - Area 1 involves all of sections 18, 19, 30, and 31 in Township 4S, Range 25E and is proposed for withdrawal by BLM. Approximately 2,560 acres are included. The lands are solely within the state of Utah.

The rationale for this area's withdrawal is primarily protection of viewsheds. This withdrawal would ensure the protection of the headwalls and upper slopes of Moonshine Draw, a deep and rugged gorge that is an eastward extension of Split Mountain Gorge--one of the monument's major scenic features. Area 1 can also be seen from the Ruple Point trail and Island Park overlook, and any adverse uses could be very visible. The proposed withdrawal includes Docs Valley (a pleasant, ponderosa-covered drainage that contrasts with the adjacent brushy terrain) and portions of Daniels Canyon (a deep narrow canyon with springs). There is also potential in the southern part of this area for day hiking connecting with the Cub Creek/Morris ranch area (includes section of the Outlaw Trail).

The size of and/or need for the Area 1 withdrawal is contingent on the following:

Approximately 600 acres in the southern portion of Area 1 (section 31) is part of the sizable BLM Daniels Canyon wilderness study area (UT-080-414). Two proposals have been made regarding this wilderness study area under HR 1214. BLM recommended this 2,496-acre wilderness

study area as a potential addition to Dinosaur National Monument. Then the Department of the Interior recommended that a larger area, 5,818 acres, that includes Area 1 and all but 40 acres of the 2,496-acre Daniels Canyon wilderness study area be added to the monument. The Department of the Interior further recommended that the legislation to add this 5,818-acre area to the monument be deferred pending study of the area under section 202 of the Federal Land Policy and Management Act. Therefore, depending on the outcome of the study and pending legislation, none or a portion of Area 1 would need to be withdrawn.

Area 2 - Area 2 includes the federally owned portions of sections 13, 14, 15, 23, and 24 in Township 4S, Range 25E, entirely in the state of Utah. Approximately 1,660 acres of BLM managed land are involved. This area is the top priority for protection for lands adjacent to the monument boundary. There are several reasons for this withdrawal. The area is within the drainage of Iron Springs Wash and Stuntz Draw, which unite to form scenic Pool Creek. This creek flows into the Green River at Echo Park. It also includes the east end of a geologically important and spectacular monoclinal fold that is exposed in the walls of Stuntz Draw. This geologic feature forms the steep outer wall of the Yampa Bench.

Area 2 is not only of geologic interest, but also forms the foreground for the first views of Yampa Canyon by monument visitors traveling north on the Harpers Corner road. Farther along the road, this area dominates the viewsheds from most overlooks.

Area 2 from Harpers Corner road

Echo Park Road Corridor. A second proposal for area 2 is for the National Park Service to acquire a 1,000-foot corridor on federally and privately owned portions of the Echo Park road. This important visitor use road extends about 3 miles from its intersection with Harpers Corner road eastward to the monument boundary and then continues beyond to Echo Park. The corridor would include BLM lands in area 2 and privately owned portions of sections 13 and 14 in Township 4S, Range 25E in Utah. A 200-foot road right-of-way and 800-foot-wide scenic easement would be acquired. The portion of area 2 within the proposed corridor would be recommended for secretarial selection. This action would establish a continuous 1,000-foot-wide corridor managed by the National Park Service between Harpers Corner road and the monument boundary. The 1960 legislation (PL 86-729, 74 Stat. 857) already authorizes the secretary of the interior to select 1,000-foot corridors along visitor access roads leading into the monument. This road corridor qualifies but to date has not been included in the monument boundary. The acquisition is required for several reasons. The National Park Service currently provides maintenance on the road and plans some road improvements that would be facilitated by this acquisition. Acquisition of scenic easements will assist in protecting this scenic gateway to the Echo Park area, which includes views of Iron Springs Wash and Stuntz Draw.

Echo Park road corridor

Area 3 - Area 3 includes portions of sections 28 and 29 in Township 4N, Range 103W in Colorado and is about 476 acres. Previously it was recommended that tract 07-156, a National Park Service parcel of about 276 acres that is adjacent to but outside the monument boundary, be retained in federal ownership and included in the monument boundary at a later date. However, this leaves two adjacent parcels of BLM managed land of 120 and 80 acres that would be very difficult to manage. The 120-acre BLM parcel is surrounded on all sides by NPS land and the 80-acre BLM parcel is bordered on three sides by NPS land. Thus, withdrawal of these parcels is recommended in the plan to provide integrated management for Area 3.

Area 3

Area 4 - Because of imminent earth slides a ¼-mile section of the Harpers Corner road needs to be relocated. This situation is discussed in the "Development Issues" section of the general management plan. The proposal is to acquire the necessary rights-of-way and scenic easements for the new section of road. The 1960 legislation authorizing secretarial selection of the road and scenic easement corridor has already led to designation of a continuous 1,000-foot corridor (200 feet as right-of-way and 400 feet on either side of the road as scenic easement) in the earthslide area. If BLM lands are needed for the new section of corridor, administrative transfer of lands and minerals will be necessary. If private ownership is involved, the rights-of-way will be acquired through opportunity purchase, exchange, or condemnation (if necessary). The scenic easement portion will be acquired through opportunity purchase or exchange unless the area is subjected to an incompatible use. Those portions of the existing 1,000-foot corridor that are no longer

needed because of road realignment would be returned to BLM management or exchanged for new road alignment areas, depending on their former status.

Area 5 - This area includes two NPS parcels in the Deerlodge Park area. See the description of FEE-O lands earlier in this section for recommended actions.

Area 6 - This area involves lands included in a notice of selection by the secretary of the interior on September 10, 1985, to establish NPS ownership of all surface lands and minerals within a 1,000-foot-wide corridor between US 40 and Deerlodge Park. These approximately 11 miles of corridor were authorized for inclusion in the monument boundary (1960 legislation). Continued BLM management of grazing uses outside of the fenced 200-foot right-of-way but within the 800-foot remainder of the 1,000-foot corridor is provided for. Now that the area has been selected, all future surface mineral activity including oil and gas exploration and extraction is precluded. The action provides for scenic protection of the Deerlodge Park corridor.

Private residential use within the authorized
Deerlodge Park road corridor

Point of Pines Road

Some of the development alternatives in the general management plan describe a potential Point of Pines road between Cub Creek and the Harpers Corner road. Although there is no record of a federal right-of-way and easement corridor from Cub Creek up to Point of Pines, much of the 200-foot right-of-way between Point of Pines and the Harpers Corner road is in federal ownership but has not been withdrawn for monument purposes. The same holds true for the contiguous 800 feet of scenic easement (400 feet on either side of the right-of-way), except for one 6.84-acre parcel in private ownership between Point of Pines and the Harpers Corner road. However, the final general management plan does not propose construction of a Point of Pines road, so it would be unnecessary to follow through with authorization provided in the 1960 legislation to establish the remainder of the corridor for NPS management. Therefore, the established section of corridor between Point of Pines and the Harpers Corner road is recommended for return to BLM administration. The five small tracts within either the scenic easement or right-of-way portion that are now managed by the National Park Service are recommended for transfer to the Bureau of Land Management to allow for a more logical or consistent management of the Point of Pines Road. The Bureau of Land Management is encouraged to provide protective status to the Point of Pines road corridor and to consider the establishment of overlooks and potential picnic and camping sites within the Point of Pines area.

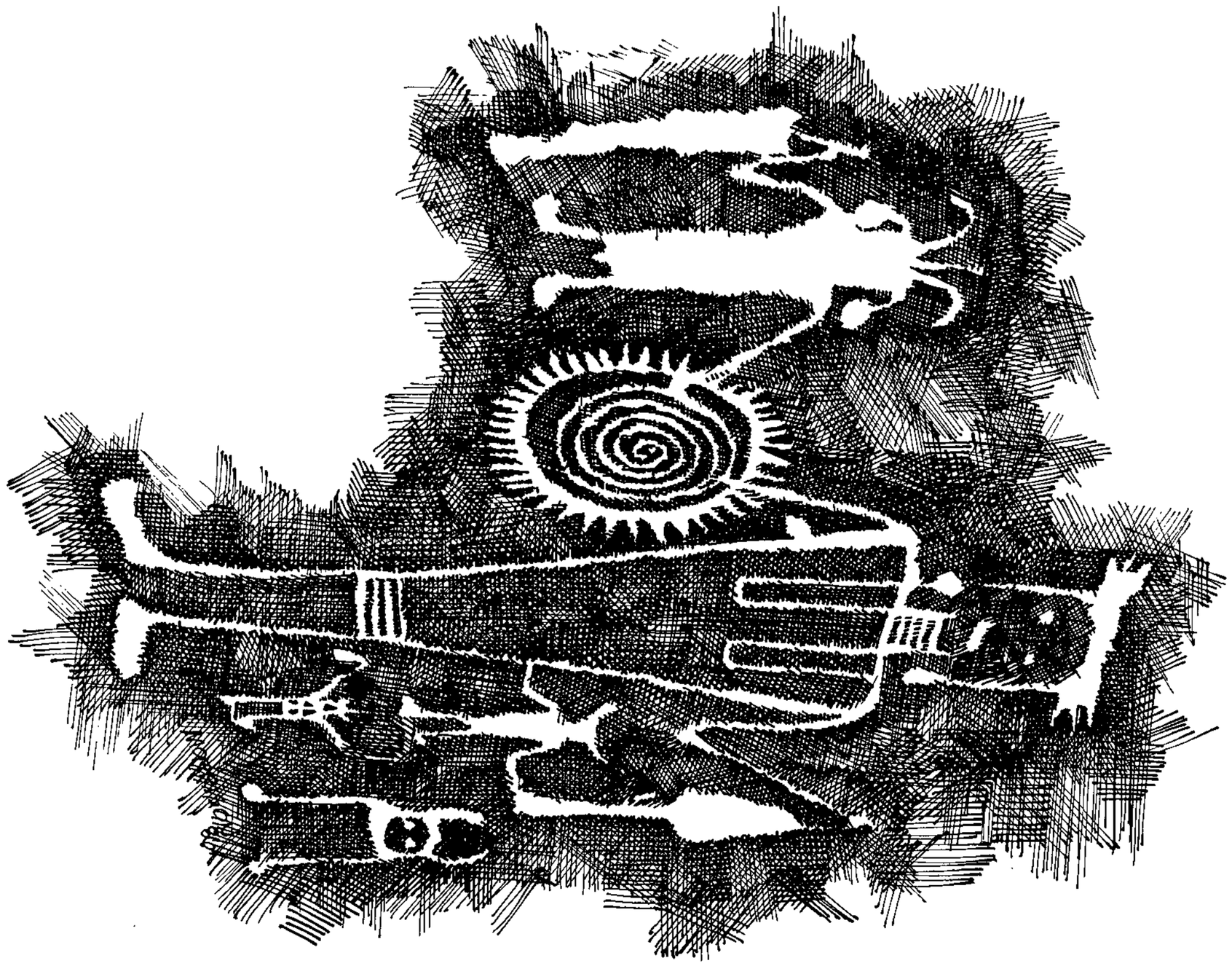
RECOMMENDATIONS TO ADDRESS ISSUES OF EXTERNAL CONDITIONS

To the extent that land and resource problems outside the monument boundary affect the resources and visitor experience inside, the National Park Service needs to monitor and enforce applicable laws and participate in intergovernmental coordination and review procedures (external concerns of the National Park Service are listed in an earlier section). The National Park Service would consult with Moffat and Uintah counties about local land use issues on private lands surrounding the monument that may affect the monument. This would include NPS participation in land use planning, rezonings, and other areas--as an area landowner providing review and comment on a case-by-case basis and as an agency concerned with general area land use. Matters relating to roads and highways, utilities, land use, health and safety, tourism and visitor use, and access would be of concern. Additionally, the National Park Service will continue to expand its intergovernmental coordination efforts relating to management and resource planning for various federal lands surrounding the monument, including those managed by the Bureau of Land Management and the U.S. Fish and Wildlife Service. Monument staff would puruse opportunities to participate in the planning and case-by-case review of area land and resource proposals by these agencies. This would allow staff to share resource and visitor use information and concerns and would provide the opportunity to address any problem areas at an early stage.

The monument's Natural Resource Management Plan identifies the specific actions necessary to address external problems within the authority or purview of the National Park Service.

IMPACTS

Refer to the "Environmental Consequences" section of this document for impacts of the land protection plan proposal.



AFFECTED ENVIRONMENT

THE MONUMENT

NATURAL ENVIRONMENT

Geology/Terrain

Dinosaur National Monument is the remote heart of a semiarid region with deep canyons, rivers, and high plateaus. Elevations within the monument range from 4,735 feet near the quarry to 9,006 feet at Zenobia Peak. The land is extremely varied, with rugged mountainous areas, bench and plateau lands, steep rocky canyon slopes, and sheer rock walls.

Rock formations of many ages spanning 1.1 billion years are present in the monument. Fossil remains of plants and animals from ancient marine, coastal, river and desert environments have been found. Trilobites (fossils from the Cambrian), dinosaurs from the Jurassic, and mammalian vertebrates from the Tertiary represent a span of 360 million years. The most significant and well-known geologic formation is the Morrison, where the fossilized remains of many dinosaurs and other reptiles are being quarried today. This formation is widespread in the Quarry area and also crops out in the Rainbow Park and Deerlodge Park areas.

Paleontological Resources

The most significant paleontological resources at Dinosaur National Monument are the dinosaur fossils. For management purposes these resources are separated into the (1) quarry face specimens, uncovered but left in situ, and the nonquarry fossils that are outside the main quarry area (both of which are categorized as natural resources), and (2) the removed bones, referred to as the fossil collection. A complete description of the historic, scientific, and educational significance as well as management actions for the in situ quarry and nonquarry fossils (i.e., natural resources) can be found in the Natural Resources Management Plan.

Since its discovery in 1909 by Earl Douglass, the quarry deposit has been of worldwide importance. It is the greatest quarry of Jurassic dinosaurs in the world; thousands of individual fossil bones have been found and are housed in museum collections around the world. The quarry is famed for its large number of individuals, species, complete skeletons, skulls, and several rare juvenile dinosaurs. The excellent state of preservation has resulted in specimens of great scientific value that have contributed to our understanding of dinosaur anatomy, ecology, and community structure. The quarry gives visitors a unique opportunity to view firsthand the frequent discovery and daily study of dinosaur fossils and is the principal visitor experience at Dinosaur.

Although large numbers of fossils were removed from the quarry between 1909 and 1924, nearly all bones uncovered since 1953 have been left in situ on the quarry face. (Between 1924 and 1953 no work was done on

the quarry.) The quarry face, which forms the north wall of the quarry building, is 150 feet long and 50 feet wide; it is part of a sandstone bed that is tilted at a 70-degree angle. The quarry has been intensively studied by many paleontologists and continues to be a source for scholarly research and publication. Because the bones are in situ, the fossil/sediment relationships remain undisturbed, offering a research opportunity and potential that cannot be matched by museum collections.

Although little attention has been paid to nonquarry fossil resources, preliminary work has shown that significant fossils exist elsewhere in the monument. The fossil resources at Dinosaur have been and will continue to be one of the richest in the world, making the gathering of baseline data on the distribution, extent, and significance of this resource essential. A 1984 survey team found 107 new locations in the Morrison Formation; the need to complete a fossil survey is great.

Vegetation/Soils

The vegetation of Dinosaur National Monument is adapted to the semiarid climate. A diversity of plant species results from the wide variations in elevation, slope, exposure, soils, and moisture availability. Five major vegetative communities exist in the monument, of which sagebrush/grassland and pinyon/juniper are the most extensive. The other major communities include mountain shrub, Douglas fir/ponderosa pine, and riparian. Table 16 shows the general vegetation composition and community type at the major developed areas of the monument.

Man's activities have resulted in changing the distribution and abundance of natural vegetation and in introducing nonnative species. Grazing by domestic livestock and suppression of natural fires have led to the spread and domination of sagebrush and juniper at the expense of grass. Exotics such as cheatgrass and Russian thistle are widespread; tamarisk and giant whitetop are common along the Green River.

Sites with deep, well-developed soils on level to moderately rolling areas are occupied primarily by the sagebrush/grassland community. Other species in this community include shadscale, saltbush, greasewood, rabbitbrush, Indian ricegrass, sand dropseed, needle-and-thread grass, western wheatgrass, and cheatgrass.

Pinyon/juniper is the most common community in the monument and occupies sites where soils are shallow and/or rocky. This community is invading sagebrush/grassland communities in some areas. The understory vegetation is usually sparse, except where the community is invading sagebrush areas.

The mountain shrub community occurs at several elevations on soils ranging from well-developed to shallow and poorly developed. Shrub species include serviceberry, mountain mahogany, and bitterbrush; sagebrush, snowberry, snowbrush, chokecherry, currant, and aspen also occur.

Table 16: Vegetative Types at Development Sites

Location	Common Plants	Community Type
Quarry Entrance Road	Saltbush, shadscale, cheatgrass, rabbitbrush, greasewood	Sagebrush/grassland
Split Mountain	Cottonwood, hackberry, big sagebrush, rabbitbrush, snakeweed, cheatgrass	Riparian, sagebrush/grassland
Placer Point	Cottonwood, greasewood, big sagebrush	Riparian, sagebrush/grassland
Green River	Cottonwood, hackberry, big sagebrush, rabbitbrush, snakeweed, cheatgrass	Riparian, sagebrush/grassland
Cub Creek Road	Flats - greasewood, four-wing saltbush, rabbitbrush, cheatgrass; Slopes - juniper, rabbitbrush, sagebrush, some pinyon, and Indian ricegrass	Sagebrush/grassland Pinyon/juniper
Morris Cabin	Cottonwood, lombardy poplar, fruit trees, ornamentals, bluegrass, cheatgrass, chickory, greasewood, big sagebrush, rabbitbrush	Riparian, sagebrush/grassland
Harpers Corner Road	Big sagebrush, native bunchgrasses, mountain mahogany, rabbitbrush	Sagebrush/grassland, mountain shrub
Plug Hat	Pinyon, juniper, cheatgrass, sagebrush, phlox	Pinyon/juniper
Point of Pines	Manzanita, ponderosa pine, aspen, antelope bitterbrush, sagebrush	Mountain shrub, Douglas fir/ponderosa pine
Echo Park	Cottonwood, box elder, rabbitbrush, cheatgrass	Riparian
Chew Ranch	Sagebrush, snakewood, rabbitbrush, cottonwood	Sagebrush/grassland, riparian
Yampa Bench	Pinyon, juniper, big sagebrush, rabbitbrush, snakeweed	Pinyon/juniper
Island Park Road	Saltbush, shadscale, buckwheat, big sagebrush, rabbitbrush	Sagebrush/grassland
Rainbow Park	Tamarisk along riverbanks, sagebrush, rabbitbrush, box elder	Riparian
Ruple Ranch	Cottonwood, cheatgrass, Russian thistle, big sagebrush	Riparian, sagebrush/grassland
Deerlodge Park	Cottonwood, rabbitbrush, snakeweed, big sagebrush	Riparian, sagebrush/grassland
Lodore	Cottonwood, tamarisk, rabbitbrush, snakeweed, cheatgrass, big sagebrush	Riparian, sagebrush/grassland

Dry sites at high elevations on moderate slopes with shallow rocky soils are often occupied by ponderosa pine. These stands are relatively open and have sparse understories typical of adjacent communities.

Small dense stands of Douglas fir can be found at high elevations on scattered sites with steep slopes and northern exposure. These stands usually have little understory vegetation and heavy litter layers.

Riparian communities parallel the Green and Yampa rivers. Species composition and distribution are highly variable; primary species include boxelder, cottonwood, willow, reed, and scouring rush. Other common species are sumac, hackberry, and non-native tamarisk, the last of which can be found in almost pure stands in some areas along the Green River.

Wildlife

Large unglates found in the monument include bighorn sheep, pronghorn antelope, mule deer, and elk. Migrating or transient bears are seen about once a year. Large mammalian predators native to the area include coyote, bobcat, mountain lion, and fox. River otters were endemic, but have been extirpated. Many mammals, including chipmunks, ground squirrels, marmots, muskrats, minks, weasels, badgers, skunks, beavers, and prairie dogs inhabit the monument.

The canyon walls are important nesting areas for golden eagles, peregrine and prairie falcons, and other birds of prey. Bald eagles, turkey vultures, goshawks, and red-tailed, ferruginous, rough-legged, Cooper's, northern harrier, and sharp-shinned hawks also occupy this habitat. Canada geese nest along the Green and Yampa rivers as well as on canyon ledges in the Lodore Canyon--an unusual phenomenon.

Threatened and Endangered Species

Although no extensive plant surveys have been performed for the monument, it is possible that the threatened Uintah Basin hookless cactus (*Sclerocactus glaucus*) could be found within the monument. There are several category I species* that might also be present: grass milkvetch (*Astragalus chloodes*), Horseshoe Bend Milkvetch (*Astragalus equisolensis*), and *Oenothera acutissima*. Category II species** that might also be present include Dinosaur milkvetch (*Astragalus saurinus*), spiny sweet vetch (*Hedysarum boreale* var. *gremiale*), and *Hymenoxys depressa*.

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*Appropriate to list as threatened or endangered but not yet listed.
**Probably appropriate for listing; more research is needed.

A sensitive species list was developed in 1984 through cross-referencing the botanical collections at the monument with lists of state and federal species of concern. However, no surveys were done to verify locations or determine if the plants still exist. Vegetation surveys would be necessary prior to ground disturbance in those areas where any of these sensitive species may be found (Split Mountain, the quarry, headquarters, Island Park, Orchid Draw, Yampa Bench).

Other plants which are not currently under review by the Fish and Wildlife Service for listing as endangered species but which are endemic to the vicinity of the monument are Astragalus detritalis, Astragalus duchesnensis, Eriogonum saurinum, Eriogonum viridulum, Parthenium ligulatum, Penstemon angustifolius, var. vernalensis, Cirsium owenbyi, and Cymopterus duchesnensis.

The endangered gray wolf (Canis lupus) and threatened grizzly bear (Ursus arctos horribilis) have been totally extirpated. Endangered animal species present in the monument include the peregrine falcon, bald eagle, Colorado squawfish, and humpback chub. The last of the endangered bonytail chub was found in 1979; the environment of this species may have been adversely affected by the construction of Flaming Gorge Dam. The rare razorback sucker, which is on the Colorado endangered list, inhabits the monument, and it is possible that the endangered black-footed ferret (Mustela nigripes) does as well. Rare spotted bats (Euderma maculatum) have been collected immediately north of the monument and could possibly occur in the monument, although no surveys have been conducted.

Recovery efforts for the peregrine falcon are active in Dinosaur National Monument. An approved peregrine falcon management program has been through section 7 consultation in accordance with the Endangered Species Act (16 USC 1531 et seq.). The sheer cliffs along the Yampa and Green rivers are important aerie sites, and the diverse vegetative communities provide habitat for an abundant prey base. The peregrine population in Dinosaur represents the northernmost remnant of wild peregrines in the Rocky Mountain area, and these sites are regarded by peregrine biologists and the Peregrine Falcon Recovery Team as a critical nucleus for repopulating adjacent areas.

The monument provides important winter habitat for the endangered bald eagle. From December through March concentrations of eagles can be seen along the Green and Yampa rivers in cottonwood bottoms, particularly in Deerlodge Park, Gates of Lodore, Island Park, below Split Mountain, and in the Green and Yampa canyons. Some of the sites include adjacent lands outside the monument. This habitat has been reduced, possibly because of the construction of the Flaming Gorge Dam and the subsequent reduction in cottonwood regeneration. If the large mature cottonwoods are not replaced, these preferred roosting sites may no longer be available.

The three endangered fish species (two federal and one state) once occurred throughout the entire Colorado River system, but their ranges

are now extremely restricted and their populations have been severely reduced. Flow modifications, siltation, chemical pollution, introduction of and predation by exotic species, loss or modification of habitats, and loss of migratory routes are suspected to be the primary reasons for the population decline. The Yampa River in Dinosaur may be the single most important area for survival of these species.

Water Resources

The Green and Yampa river ecosystems are the critical water resources at Dinosaur National Monument. Flaming Gorge Dam has modified the natural flows of the Green River, resulting in changes in channel configuration, sediment transport, riparian and aquatic communities, and recreation and aesthetic values. Because the Yampa River is the only remaining large tributary of the entire Colorado River system without a major mainstream impoundment, its natural and scientific values are unique. Its natural flows are regarded by biologists as the primary factor sustaining three endangered fish species in the Yampa itself and in the Green River below. The Dinosaur Natural Resources Management Plan has recommended many actions to deal with the management of the rivers and river-related resources (see the "Resources Management" section of the preferred alternative).

Proposals by a variety of industrial and agricultural interests to impound the Yampa River upstream from the monument constitute the most significant resource management issue today. The quantification of the claim for the reserved water rights was filed with the Colorado Water Court on June 15, 1984, and defined the minimum quantities of water necessary to carry out the established purposes of Dinosaur National Monument. This claim for an instream minimum flow right was denied, so the National Park Service has filed an appeal with the Colorado Supreme Court to review the decision of the District Court, Water Division No. 6, Colorado, granting the motion for summary judgment denying the federal government's application for instream minimum flow rights on the Yampa River. A water resources management plan (which will identify consumptive and nonconsumptive uses) will be prepared when the reserved water rights issues for nonconsumptive instream flows have been resolved.

A water quality study of main streams performed for the monument in the late 1970s proved inconclusive. At present, there is insufficient baseline information available to evaluate water quality within the monument. Generally speaking, conditions in the monument are similar to those in Browns Park (see NPS, 1979a) with occasional added turbidity from the tributaries in Browns Park above Lodore Canyon and a substantial increase in sediment from the Yampa River. The Yampa also adds salt from irrigation discharge in river bottom lands upstream. In addition, the Yampa's summer flow warms the cold waters of the Green.

Floodplains and Wetlands

Flooding of the Green and Yampa rivers could affect most developments within the monument. In 1984 the U.S. Army Corps of Engineers mapped the 100- and 500-year floodplains in the headquarters, Quarry area, Placer Point, Green River and Split Mountain campgrounds, Rainbow Park, Ruple ranch, and Echo Park areas, and the Park Service mapped floodplains in the Deerlodge Park area. In addition, the Bureau of Reclamation and Army Corps of Engineers have contributed information used to temporarily delineate the 100-year floodplain at Lodore.

Many structures and facilities are in the 100-year floodplain--the campgrounds at Green River, Rainbow Park, Deerlodge Park, and Lodore, and a portion of the campgrounds at Split Mountain and Echo Park. The Placer Point picnic area is in the 100-year floodplain of the Green River, as is a large portion of the Ruple ranch at Island Park.

Park Service final procedures for implementing Executive Orders 11988 and 11990 except picnic and camping facilities and their associated sanitary facilities from compliance with the orders, provided that floodproofing is a consideration in their design and construction. All entrance, access, and internal roads to or within existing units are also excepted from compliance with the floodplain orders. Because sites outside the floodplain are never practicable alternatives for developments that directly support water recreation, boat ramps are excepted from compliance with these orders.

No historic objects, furnishings, or collections in the monument are or will be in the 500-year floodplain.

During the 1984 floodplain survey the Corps of Engineers also looked for flash flood zones. Their determination was that there was no flash flood potential on the Green and Yampa rivers. Flash floods could occur on Cottonwood Wash upstream from the Split Mountain campground, on Pool Creek near Echo Park, along the Echo Park road in Sand Canyon, and on Dripping Rock Creek near headquarters. Because flash flooding would be confined to these narrow, deep drainages, no existing developments would be affected by flash flooding. Therefore, no structures or facilities exist or are proposed in any high hazard area that is subject to flooding events so unexpected, violent, or otherwise devastating that human lives would be placed in immediate or grave danger.

The maximum release of 13,700 cubic feet per second from Flaming Gorge Dam in 1983 did not flood the developed portions of Lodore. Preliminary information from the Sacramento office of the Army Corps of Engineers indicates that 15,500 cubic feet per second on the Green River at Lodore more closely approximates the 100-year frequency flood, and as a result this volume has been used to delineate the preliminary 100-year floodplain shown on the Lodore development concept map. This volume would flood most of the existing facilities including the campground, management site, and sewage leachfields. Planning for this document has proceeded with the assumption of near-total flooding. However, before the actions are implemented, the 100-year floodplain will need to be verified.

There has been no formal mapping of wetlands at Dinosaur National Monument. However, the U.S. Fish and Wildlife Service has mapped some Yampa River vegetation from July 1977 aerial photographs. Cover types identified included wetland areas of riparian brush, shrub, and forest. A small area of riparian shrub was identified at the southern end of the Lodore campground. The Echo Park campground occupies an area identified as riparian brush and forest.

Air Quality

Air quality and air quality related values (such as visibility, acid rain, and climate) are assumed to be good at Dinosaur National Monument, although no quantitative data are available to support this assumption. National Weather Service meteorological readings are recorded daily, and during the fire season humidity and wind readings are also taken. The National Park Service has maintained a fixed multiwavelength high-contrast teleradiometer and a camera in an automated station near the Plug Hat picnic area from 1981 to the present. A manual telephotometer was operated at the same site from 1978 to 1981. A high volume dichotomous particulate sampler was put into operation at the headquarters area in 1984.

Dinosaur is a class II air quality "floor" area under the prevention of significant deterioration (PSD) provisions of the Clean Air Act, as amended, and as a category 1 area by Colorado standards. It is possible that the class II increment, which allows moderate degradation, may soon be exceeded by two energy projects under construction. Many other proposed energy-related projects could also affect air quality at the monument (see "Resources Management" section of the preferred alternative).

CULTURAL ENVIRONMENT

The inadequate environmental controls and storage space for the growing museum collection could mean disintegration/damage to these irreplaceable fossils. This situation is discussed in more detail in the "Facility Analysis" section. Fossils that were removed from the quarry decades ago are occasionally returned to the monument by the University of Utah. This adds slightly to the existing problem of storage space. A description of the booming black market for fossils can be found in the Natural Resources Management Plan.

The paleontological library is another important scientific resource. It is the most extensive in the National Park Service on the subject of fossil resources. It has at least 10,000 volumes, some of which date back to the 1830s, and many of the publications are one-of-a-kind. Although it is a valuable collection, it has never been catalogued. The library is not housed in an atmospherically controlled environment. If destroyed or damaged, this library could not be replaced.

Archeological Resources

The archeological remains at Dinosaur represent four prehistoric lifeways. From the period beginning about 9,000 years ago and lasting through A.D. 950, there is evidence of all three cultures in the area. Dinosaur is on the border of the Desert culture to the west, the Intermontane culture to the northwest, and the High Plains culture to the east. This common occupation of one area by different cultures is unusual, and it is one fact that makes the archeological resources extremely significant in terms of studying prehistoric culture contact.

The fourth and most extensive occupation of the area was by the Fremont culture. These people most likely represent a northern extension of the Pueblo-like cultures from the Southwest. The general Fremont occupation in Utah began about A.D. 950 and ended about A.D. 1150. New information from the monument suggests that the Fremont occupation may have lasted until A.D. 1300. These people eventually settled along the fertile river bottoms and used places like Jones Hole and Echo Park for growing crops. Fremont culture at the monument is best known from a series of open village sites in the Cub Creek area. Important sites are also known in the Castle Park area, which is the easternmost documented extent of the Fremont culture.

The majority of the pictographs and petroglyphs in the monument are attributed to the Fremont people. The "Vernal" style of Fremont rock art (distinctive human, animal, and geometric forms) characterizes the panels at the monument. The rock art at McKee Springs is perhaps the best executed in the intermontane region.

A total of 404 archeological sites have been recorded, although only an estimated 40 to 50 percent of the monument has received a reconnaissance-level survey. A complete survey is needed, but even more pressing needs are evaluation of the significance of the known sites, documentation of these resources, and provisions for their protection and preservation.

Unauthorized archeological site excavation does not appear to be a major problem; however, with the increasing market for prehistoric artifacts, the sites will be susceptible to increased destruction. Vandalism, along with natural deterioration, is evident at most rock art sites. In time, these sites could be rendered unavailable for study or public appreciation.

History and Historic Resources

In historic times this region was occupied by Shoshone Indians in the north and Utes in the south. This way of life gradually ended with the advent of European exploration and settlement. Europeans penetrated the region in 1776, when Franciscan friars Silvestre Veley de Escalante and Francisco Anatasio Dominquez traveled through the area with their expedition. Although their goal of establishing a route from New Mexico

to the California missions was not achieved, they left valuable maps and records of unknown western lands.

The 19th century's westward expansion brought trappers, explorers, cattlemen, and outlaws to the area. John Wesley Powell's exploration of the Green and Colorado rivers in 1869 is probably the best known adventure involving the monument. He boated the river canyons, explored portions of the monument, studied the land, and named many geographic features in Dinosaur and the West. In addition, the scattered remnants of homesteads, ranches, and trails provide tangible evidence of the hearty people who settled here. Places such as the Chew ranch, the Morris ranch, and Outlaw Trail are all remnants from settlement history. This is the only period from which historic structures survive. (See "Facility Analysis" section for more information on these and other historic structures.) Descendants of some of these pioneers are still living and ranching in the area today.

Running the Green and Yampa rivers has long been a tradition. First the explorers and trappers used the waterways, starting with W.H. Ashley who floated the canyons by bullboat in 1825. They were boated later by Julien, Powell, Galloway, and Dellenbaugh. In the early 20th century, recreational river running began. The Hatch family started their famed river running business here in 1929. The demand for river use is greater today than ever before.

The conservation movement has been important in the history of the monument. In the early 1950s Echo Park and Split Mountain were actively proposed as dam sites. Opposition to the dams was led by the Sierra Club and Lower Colorado Basin water interest groups. The final legislative defeat of the proposals in 1955 was an important victory for conservation interests, and it marked a turning point in preservation and development of Dinosaur National Monument. It also heralded changes in water resource utilization in the Colorado Basin.

The monument also has an important scientific history. The discovery of the dinosaur quarry in 1909 was and still is of worldwide importance. The physical features of the monument offered opportunities to scientists such as Powell, Emmonds, and Bradley to develop universal theories on geomorphology.

SOCIOECONOMIC ENVIRONMENT

Regional Characteristics

Dinosaur National Monument lies in Moffat County, Colorado, and Uintah County, Utah. Most of the population growth in these two counties between 1977 and 1982 came as a result of energy development in the region. With continued development of oil shale, coal, and other energy resources, forecasts for population in the immediate area of the monument before 1982 indicated that there would be marked increases over the next

few years. However, recent economic downturns, particularly in the synfuels industry, have resulted in the postponement of many of the major projects, and these forecasts must now be seriously questioned.

Table 17: Population

	1977	1982	% Increase
Uintah Co.	18,000	24,800	37.8
Moffat Co.	9,500	14,100	48.4
Utah	1,316,400	1,563,500	18.7
Colorado	2,696,000	3,036,700	12.6

Until recently agriculture was the mainstay of the regional economy, but energy-related employment and income have quickly emerged as forces behind the counties' economies, accounting for as high as an estimated 30 percent of the economic activity. Both counties have fairly large wholesale/retail trade, services, and government sectors, the first two being indicative of the presence of tourism. Tourism ranks fourth in the local economy.

Table 18: County Employment, 1981

	Percent of County	
	Uintah*	Moffat
Farming	1	4
Agriculture Services, Forestry, Fisheries	0.2	0
Mining	21	12
Construction	9	8
Manufacturing	2	3
Transportation and Utilities	7	10
Wholesale Trade	4	6
Retail Trade	14	21
Finance, Insurance	2	4
Services	28	13
Government	13	19

Table 19: County Income, 1981

	Percent of County	
	Uintah*	Moffat
Farming	2	1
Agriculture Services, Forestry, Fisheries	0.1	1
Mining	31	21
Construction	10	10
Manufacturing	2	2
Transportation and Utilities	8	15
Wholesale Trade	5	9
Retail Trade	7	14
Finance, Insurance	1	4
Services	25	9
Government	9	14

*Total is greater than 100% due to rounding.

Regional Recreation Patterns

Recreational resources within the region, which are in several national forests, a national recreation area (in Utah), and on private lands, are numerous and diverse (see the Region map in the "Introduction" section). The counties surrounding Dinosaur have a rich and varied natural landscape, plentiful wildlife, and several reservoirs and lakes. Fishing, boating, and hunting rank as the main recreational pursuits in northeastern Utah and northwestern Colorado. Summer is the most popular recreation season, and spring the second most popular.

There are numerous developed campgrounds in the Ashley and White River national forests and in BLM areas in northwestern Uintah County. Five private campgrounds are within an hour's drive of the monument. Flaming Gorge National Recreation Area northwest of the monument, which reported 786,413 visitor days in 1983, contains 24 campgrounds with 791 sites, five picnic areas, 10 boat ramps, and three marinas. The state of Utah maintains a campground between Vernal and Flaming Gorge at Steinaker Lake State Park.

River-running occurs not only on the Green and Yampa rivers within the monument, but also on these rivers above and below the monument. More than 300 miles of rivers in the region are suitable for some form of rafting, canoeing, or kayaking.

Monument Visitor Use and Carrying Capacity

Patterns and Trends. Visitation to the monument totaled 427,375 in 1983. Over the last 10 years total annual visitation has remained fairly constant. An analysis of the 10-year trend shows that annual increases have averaged less than 1 percent (table 20). The trend was one of general stability through the 1970s followed by a decline beginning later in the 70s and returning to earlier levels in 1983. The early 1980s rate has been relatively rapid, averaging nearly 10 percent annually since 1979 and increasing by approximately 8 percent between 1982 and 1983.

Table 20: Dinosaur Visitation - 10-Year Trend

Year	Total Visits
1974	326,000
1975	373,700
1976	391,600
1977	399,700
1978	415,500
1979	295,800
1980	332,800
1981	345,800
1982	396,900
1983	427,300
Average Annual Change	
74-83	+0.76%
79-83	+9.61%

Much of this recent growth can be attributed to regional population growth. At a time when many rural national parks are experiencing low or downward growth trends in visitation as a result of a weakened economy, visitation at Dinosaur is climbing. The region around Dinosaur has seen large-scale development plans in the energy industry, including coal mining, electric power generation, and preparation for an expected synfuels boom. The future of this industry in the region is uncertain, however, and an assumption of continued rapid growth may be in error.

Changes in total park visitation have generally paralleled traffic changes on US 40 since 1979 (table 21). During these years, tourism traffic has remained relatively steady, indicating an increasing regional resident component in park visitation.

Table 21: Average Daily Traffic - US 40

Year	ADT (vehicles)
1979	1,338
1980	1,395
1981	1,699
1982	1,814
1983	1,850

Average Annual Change +8.4%

In 1983, visitation was concentrated in the months of June, July, and August (65 percent); 85 percent of the annual visitation was between May and September (table 22).

Table 22: Monthly Visitation - 1983

Month	Visits	Visitor Hours
January	4,367	11,501
February	6,565	13,532
March	10,079	20,896
April	13,122	64,820
May	39,610	205,376
June	90,042	445,200
July	112,175	482,269
August	77,037	307,142
September	41,338	143,025
October	20,658	72,051
November	9,609	31,329
December	2,773	8,230
Total	427,375	1,805,371

There are six primary access roads into the park. Traffic counters on these roads show that in 1983 visitors concentrated in the Quarry area (37 percent), Cub Creek (26 percent), and Harpers Corner (17 percent). The other accesses were considerably lower, accounting for 15 percent of the total visits. River visits were 4 percent of the total. Analysis of visitor hours, however, shows a different picture. River users accounted for 40 percent of the total 1983 visitor hours, Harpers Corner Road accounted for 24 percent, and the Quarry area and Cub Creek together totaled only 19 percent of all visitor hours.

River users are in private and commercial groups, with both limited as to size of party and number of launchings per site per day. In addition, individual commercial operators have set annual ceilings of user days that cannot be exceeded. In 1983, 4,618 visitors engaged in commercial river trips, compared to 5,235 visitors in private groups.

Table 23: Visits by Area of the Monument - 1983

Area	Visits	% Park Visits	Visitor Hours	% Park Visitor Hours
Quarry	185,903	37.1	139,427	9.6
Cub Creek Road*	131,609	26.3	131,609	9.1
Harpers Corner Road	87,738	17.5	350,952	24.2
Island Park	8,543	1.7	17,085	1.2
Elk Springs Road	11,072	2.2	44,286	3.0
Deerlodge Park	36,011	7.2	144,044	9.9
Lodore	19,534	3.9	39,068	2.7
River Use	20,584	4.1	585,582	40.3

*The actual percentage at the end of ths road is actually somewhat less--estimates are about one-third of the total.

Estimates of use on the Echo Park and Yampa Bench roads are based on observations of the park staff. It is estimated that approximately 10 vehicles per day on the average peak season day travel on the Echo Park road. This represents 5 percent of the Harpers Corner road use and would indicate a peak daily use of approximately 30 vehicles per day for the Echo Park road. An estimated average of one to two vehicles per day travel on the Yampa Bench road (0.5 percent of Harpers Corner road) and four to six vehicles on the peak day.

Camping represents a significant portion of all visitor hours spent in the park (19 percent of all 1983 visitor hours, excluding river-related overnights). A total of 51,000 overnight stays, including river trip stays, were reported in 1983, of which 29,000 took place in developed campgrounds. Over the last 10 years there has been a steady decline in camping attendance. The estimated 2 percent average annual decline in total overnight stays and average 5 percent decline in overnight stays in developed campgrounds indicate that there has been less decline in overnight river stays. This may be attributable to the growth in private sector campgrounds adjacent to the park.

Table 24: Campground Visitation - 10-Year Trend

Year	Total Overnight Stays*	Campground Overnight Stays
1974	60,300	NA
1975	71,700	NA
1976	74,400	NA
1977	76,800	48,800
1978	76,900	47,200
1979	59,100	32,600
1980	65,900	38,500
1981	61,700	37,700
1982	67,800	39,000
1983	51,100	29,100
	Average Annual Change	
1974-1983	-1.76%	
1979-1983	-3.57%	-2.8%

*Includes river trip stays

The largest campgrounds in the park are Green River (100 sites) and Split Mountain (35 sites). These two campgrounds accommodated 12,472 and 11,750 overnight stays, respectively, in 1983. The Split Mountain campground averaged daily occupancy rates of between 86 and 100 percent during June, July, and August. Green River reported occupany rates averaging between 39 and 51 percent during these months; however, the campground is reported full on peak days.

Table 25: Campground Use and Occupancy - 1983

Campground	Total Overnight	Campsites Occupied June	July	August
Split Mountain	12,472	908	1,256	999
% Occupancy		86	100	92
Green River	11,750	1,165	1,526	1,070
% Occupancy		39	51	36
Echo Park	1,747	50	257	280
% Occupancy		12	59	65
Deerlodge Park	1,373	222	196	47
% Occupancy		74	63	15
Lodore	1,405	67	92	263
% Occupancy		13	17	50

The remaining campgrounds in the park (Lodore, Echo Park, and Deerlodge Park) show occupancy patterns similar to Green River. They are much smaller campgrounds, totaling 4,525 overnight stays in 1983. They vary somewhat in their months of highest occupany, however, due to varying river launch patterns between the Green and Yampa rivers. All campgrounds reach capacity on their peak days.

Table 26 displays the average and peak daily visitation to major use areas in the park in 1983. The capacity of all sites for recreational activities is infrequently exceeded in any of the areas on the busiest day.

Table 26: Average and Peak Daily Visitation - 1983 (visits)

Area	Average	Peak	Daily Capacity
Quarry	1,450	3,720	4,600
Harpers Corner	600	1,750	3,100
Island Park	58	170	200*
Deerlodge Park	180	720	800*
Lodore	115	390	400*
Split Mtn/Green River/ Cub Creek	980	2,620	3,306

*Takes into account maximum launch rates regulated by the River Management Plan (NPS 1979b).

The Quarry and Harpers Corner road are the two most heavily used areas of the park; both areas are used well below the capacity of their facilities. There is no indication that visitor satisfaction is being lessened at existing levels of use, and resource degradation is not excessive nor would it be expected at levels of use below the capacity estimates. Parking is the most significant limit to use at this time. Conditions are at times crowded in the quarry building, but this is due more to the space layout than to a lack of total available space. Plans are underway to correct this.

Use of the rivers is regulated by the River Management Plan (NPS 1979b), which controls launch rates and size of individual parties engaged in primitive river camping. These limits are currently enforced by the monument staff and represent the capacity limits that developed area launching facilities will need to accommodate. Other facilities at Deerlodge Park, Lodore, and Island Park (i.e., campgrounds and picnic areas) have sizes which will reach limits of use before resource or visitor experience values are threatened. In order to reach these capacity levels, visitation will have to grow steadily at 8 percent per year over the 15-year life of this plan. While in the past few years, visitation has grown at this rate,

the 10-year trend is much slower. It is likely that existing facility sizes are adequate to accommodate growth during the life of this plan.

The exception to this lack of carrying capacity problems on the river system is the boat ramp at Split Mountain, which is extremely overcrowded during the peak river rafting season. The general management plan proposes redesign of the ramp area to alleviate this problem.

Existing Interpretive Program. Two visitor centers serve Dinosaur National Monument--one at the quarry area near Jensen, Utah, and the other at the administrative headquarters near Dinosaur, Colorado. The quarry visitor center encloses the rock face on which in-place dinosaur fossils are exposed and also houses exhibits about dinosaurs. During the busy summer season visitors ride a shuttle bus to the quarry visitor center from an off-site parking area. General orientation is available at this shuttlebus center. The headquarters visitor center is used to orient visitors; it offers exhibits of general interest and a 10-minute slide program. Both centers sell a variety of publications, slides, postcards, and other items relating to monument resources.

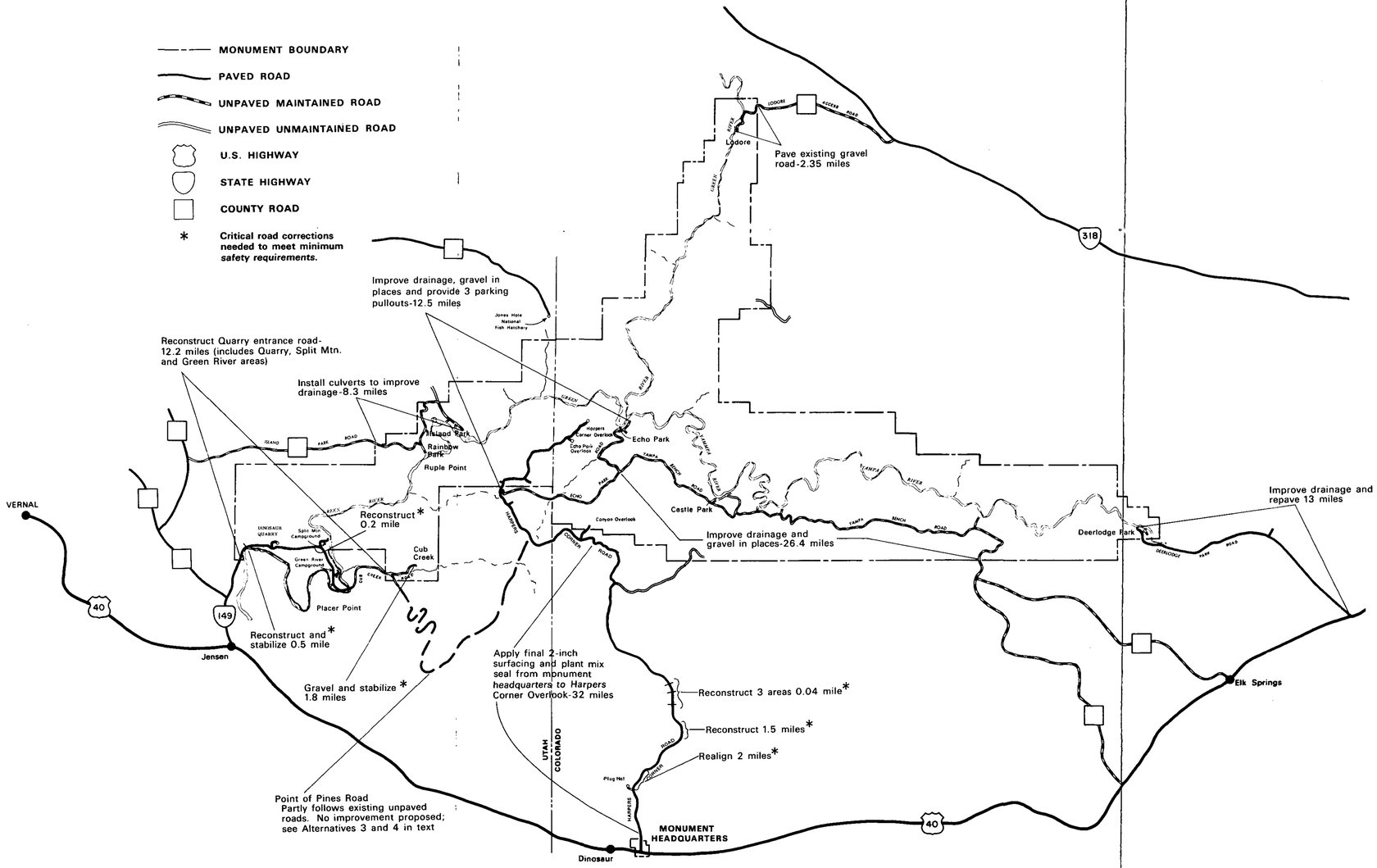
Monument staff are assigned at both visitor centers to answer questions. In the Quarry area interpreters also lead walks and hikes, give frequent short talks, and present evening programs at the nearby Green River and Split Mountain campgrounds. Informal programs are offered infrequently by river rangers to rafting groups on the Green and Yampa rivers.

For visitors who prefer to see the monument on their own there are wayside exhibits and a road guide booklet that discuss geology and natural history along the Harpers Corner road. There are also short, interpreted trails at Harpers Corner, Plug Hat (Harpers Corner road), and the Lodore and Split Mountain campgrounds.

Facility Analysis

Roads. The location and surface condition of roads to and within the monument are shown on the Road Improvements map. Table 27 indicates the location, length, surface treatment, and condition of the major roads.

Most of the roadways are on silt and clay shale, which are highly expansive, susceptible to extreme frost action, and have a very low load-bearing capacity when wet. Generally, the unimproved roads and some of the gravel-surfaced roads are slightly below natural ground level and are thus subject to various degrees of erosion because they often become runoff channels. Poor surface drainage is a major cause of road failure. Moisture from surface ponding is drawn into the soil foundation zone. This causes unimproved roads to lose their wheel-bearing capacity and develop deep ruts; paved roads may flex due to soil bearing loss, causing vertical distortion and cracking.



ROAD IMPROVEMENTS

DEVELOPMENT CONCEPT PLAN

DINOSAUR NATIONAL MONUMENT

COLORADO-UTAH

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

122	20,0188
MAY 86	DSC

ON MICROFILM

Table 27: Monument Roads

Name and Location of Road	Length in Miles: Graded	Gravel	Paved	Condition
Deerlodge Park US 40 to Deerlodge Park			13.0	Pavement cracking common; water enters foundation and causes undulation that could force some vehicles driven at moderate speeds off the roads; flooding of cross-drainages sometimes closes parts of road with mantle of outwash debris; portion of road near Deerlodge Park would be inundated during 100-year flood
Yampa Bench Boundary near West Cactus Flat to Echo Park Road	26.4			Very narrow, twisting vertical grades (up to 20 percent in east portion); subject to severe washouts and rutting
Echo Park Echo Park to Harpers Corner Road	12.5			Very narrow, twisting vertical grades (up to 15 percent in west portion); subject to severe washouts and rutting; western 2.5 miles across clay; portion in Echo Park would be inundated by 100-year flood
Harpers Corner US 40 at Headquarters to Harpers Corner			32.0	Locally extensive landslides on unstable slopes; section north of Plug Hat soon could be lost entirely due to landsliding; considerable cracking and vertical distortion in pavement, which in some places is on highly expansive clay
Quarry Area Boundary 4 miles north of Jensen to boundary at Cub Creek			10.2	Pavement highly distressed and distorted in places; could result in vehicles being forced off surface, even when driven at moderate speeds; subject to sinking and possible total loss at one point between entrance and quarry
Cub Creek	1.8			Narrow, winding dirt road crossing channel of Cub Creek in one place, and nearing complete closure in another due to severe erosion by creek along a sheer cliff; parts cross clay
Rainbow/Island Park	8.3			Much of road depressed about one foot that becomes a drainage canal when wet; severe erosion and deep rutting in clayey silt soil
Lodore Boundary to Lodore ranger station		2.4		Good gravel surface with adequate drainage; portion at development would be inundated by 100-year flood

On the Deerlodge Park road, about 5.6 miles west of US 40, is an overlook/parking area which receives virtually no use; it will be removed rather than maintained. This action also will be taken independent of this general management plan.

Trails. About 17 miles of trails and hiking routes are maintained throughout the monument. Existing trails generally originate in developed areas, and only a few receive heavy use.

The very popular Red Rock nature trail at Split Mountain campground is an easy 2-mile loop. A self-guiding leaflet on the geology and plant life of Split Mountain are available at the trailhead.

The Harpers Corner trail is an easy 1½-mile trail. This very popular walk begins at the Harpers Corner parking lot and proceeds to a spectacular observation point. A trail guide is available to explain the views of Whirlpool Canyon, the Mitten Park fault, Steamboat Rock, and Echo Park.

The heavily used Plug Hat trail is an easy ¼-mile walk that starts at the Plug Hat picnic area. Featured are exhibits of local history and geology.

The Jones Hole trail is an easy 4-mile hike. This popular route for fishermen and hikers starts at the Jones Hole National Fish Hatchery and follows Jones Creek south until it meets the Green River.

The Ely Creek trail is 7 miles long and is moderately difficult. Starting at the Ruple ranch in Island Park, the trail traverses White Sage Flats, drops down into Ely Creek, and intersects with the Jones Hole trail. The trail receives little use, except for the eastern end adjacent to Jones Creek.

The Ruple Point trail is approximately 4 miles long, receives moderate use, and is of average difficulty. It begins at the Island Park overlook on the Harpers Corner road and ends at Ruple Point where there are superlative views of Island Park, Moonshine Draw, and Split Mountain.

The Lodore nature trail, leading south from the campground to an overlook of the Green River at Gates of Lodore, is about a half mile long. A self-guiding leaflet is provided.

In conjunction with preparation of a backcountry management plan the staff is inventorying the trail and hiking route potential throughout the monument. More than 150 miles of foot routes ranging from side canyon treks accessible only by river runners to strenuous cross-country hikes for backpacking enthusiasts receive relatively little use at present. Almost all of these routes are unmarked and unmaintained. Dinosaur has not evolved as a hiking-intensive area as other parks have. The summer heat and aridity, the narrow configuration of the monument, and numerous geographic barriers have influenced this. Also, hiking opportunities have never been widely described in the type of hiking guides common to most regions but not available for the Dinosaur area.

Future publication of hiking opportunities at Dinosaur and its surrounding public lands could increase backcountry use.

Areas with potential for day hiking and backpacking include Daniels Canyon east of Cub Creek, upper Pool Creek north of the Chew ranch, the Red Wash/Split Mountain area north of the quarry, Wild Mountain east of Jones Creek, and Outlaw Trail, which runs from Cub Creek through Echo Park and exits the monument northeast of Zenobia Basin. Potential use of Outlaw Trail must take into consideration the fact that it lies partly outside the monument and that its route and its historical significance have never been determined.

Buildings. Table 28 lists the structures at Dinosaur National Monument by area and rates their condition. Locations of most structures are shown on the development concept plan maps.

The quarry visitor center has several deficiencies. There has been considerable movement of walls because the foundation is constructed on expansive soils. The constant movement of structural members and the warping of architectural elements requires frequent major maintenance performed on a case-by-case basis. Although the structure has been examined many times, an engineering study is needed to determine the structure's soundness and to establish monitoring and maintenance guidelines.

Other problems at the quarry visitor center involve the heating, cooling, and ventilation system. The temperature/humidity control is not adequate to provide for human comfort and proper storage of the paleontological library. Constant temperature and humidity are needed to keep these irreplaceable collections of books and fossils from disintegrating. The laboratory is poorly equipped for curatorial work and study. (Until recently, the quarry building and its irreplaceable contents had not been adequately protected from fire or theft. In 1985, a fire detection/suppression system and intrusion detection system was installed.)

In addition to the structural and utility systems deficiencies of the quarry building, the paleontological collection exceeds the available storage space and there are serious circulation and staff space allocation problems. There is no space within the building large enough to gather groups of children for school programs or groups for any other function.

The quarry maintenance building houses maintenance division operations and protection division equipment and is undersized to accommodate both functions, with inadequate shop and storage space for woodworking, welding, vehicle storage, and fire suppression equipment.

The headquarters building (administrative offices and visitor center) near Dinosaur, Colorado, is currently in excellent architectural and structural condition, although minor building movement sometimes occurs because of underlying expansive soils. Part of the basement, which is used for storage of natural and cultural resource collections, was recently improved for this function when fire detection/suppression and intrusion detection systems were installed.

Table 28: Inventory and Condition of Structures

Area	Building	Function	Condition
Quarry	Quarry*	Visitor use, management, and research	Fair
	Douglass office*	Not used (interpretive potential)	Fair
	2 metal sheds	Maintenance storage	Poor
	Maintenance building	Shops and fire cache	Excellent
	4 houses	Employee residences	Good
	2 apartments	6 employee residences (summer)	Good
Split Mountain/ Green River	7 comfort stations**	Public campground	Good
	Ranger residence**	Camptender's quarters (summer)	Good
Cub Creek	Morris cabin*	Interpretation	Poor
	4 outbuildings*	Not used	Poor
Headquarters	Headquarters building	Visitor use and administration	Excellent
	Maintenance building	Shops, storage, and fire cache	Good
	8 houses	Employee residences	Good
	1 apartment	8 employee residences (summer)	Good
Chew Ranch	Ranch house*	Not used	Fair
	Outbuildings*	Not used	Poor
	Kings cabin*	Not used	Fair
	Cabin*	Not used	Poor
Echo Park	Ranger cabin	Employee residence (summer)	Fair
Ruple Ranch	Cabin	Employee residence (summer)	Fair
Jones Hole	Ranger cabin	Employee residence (summer)	Fair
	Boatman's shed	Storage	Good
Round Top	Fire tower	Fire watch (summer)	Fair
	Trailer	Storage (summer)	Poor
	Ranger residence	Employee housing (summer)	Fair
Zenobia Peak and Basin	Fire tower*	Fire watch (summer)	Excellent
	Old Bassett cabin*	Not used	Poor
	Bassett cabin*	Not used	Poor
	Buffham cabin*	Private property	Unknown
Deerlodge Park	Ranger cabin	Employee residence (summer)	Good
Lodore	Lodore ranger cabin (Wade Curtis cabin)**	Employee residence (summer)	Fair
	Contact station**	Ranger station, apartment, and visitor information center	Excellent
	Maintenance building**	Storage, shop, and fire cache	Excellent
	Ranger residence**	Employee residence	Good

*Structures on the Dinosaur National Monument List of Classified Structures and/or structures for probable inclusion on National Register of Historic Places. All of the potentially significant structures in the monument need preservation and maintenance work. The specific treatment for these structures will be described in the cultural component of the resources management plan.

**Buildings in the 100-year floodplain.

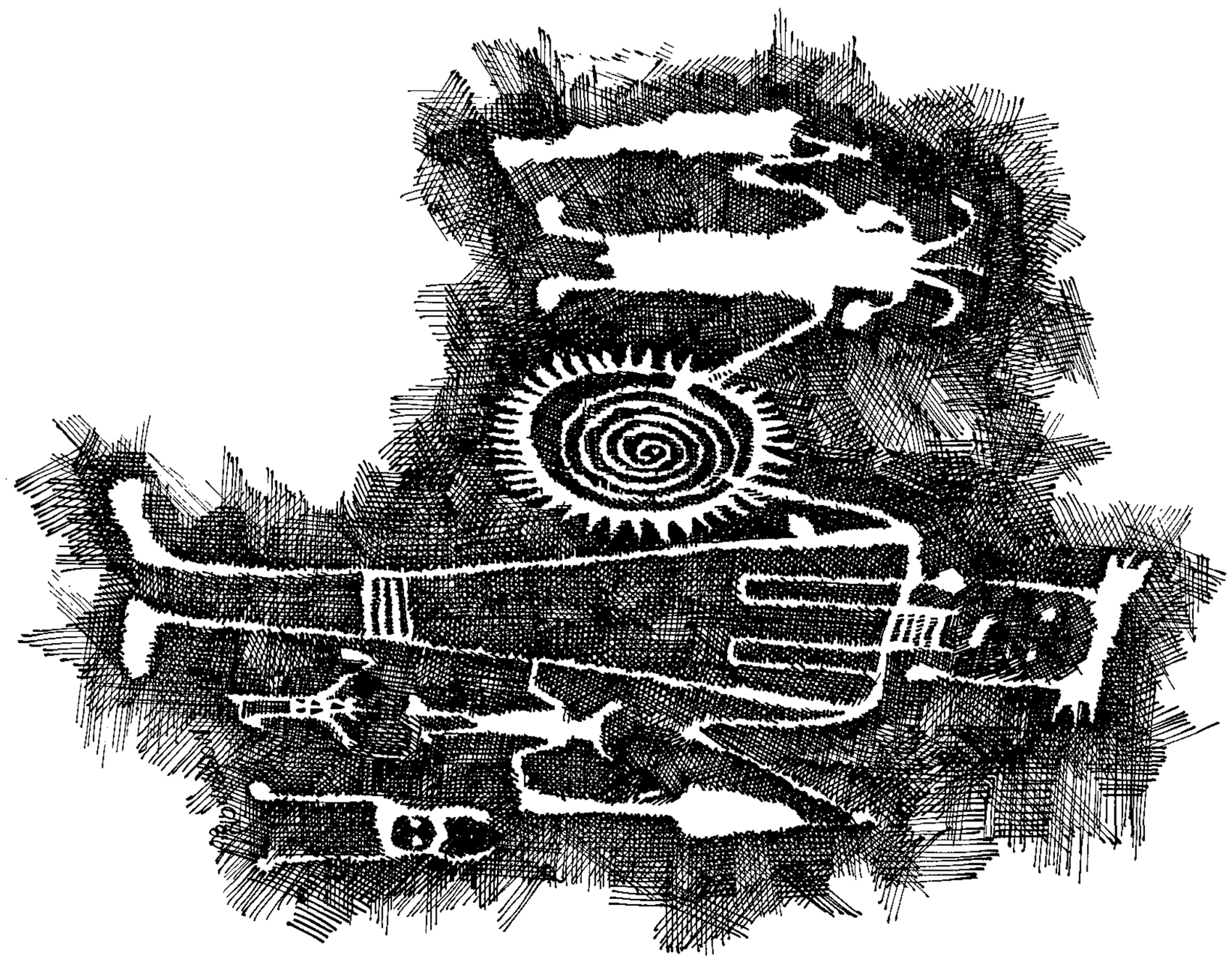
The headquarters maintenance building is large enough for current functions. It is in good structural condition, although recent movement caused by underlying expansive soils has been noted. It does not have a covered vehicle storage area, so the equipment cannot be protected from adverse winter weather.

Utilities. The locations, types, capacities, and condition of utilities are listed below. Locations of most of the utilities are shown on the development concept plan maps in the "Park Operations" section of the proposal.

Table 29: Utility Inventory

Location	Type	Capacity	Comments
Deerlodge Park	Sewer	Pit toilets (2)	Within the 100-year floodplain
	Water	Storage tank (300 gal)	Water must be trucked in
Echo Park	Sewer	Pit toilets (2)	Within the 100-year floodplain
	Water	Well, storage tank	Adequate for present use
Headquarters			
Administration building, utility area	Sewer	Septic tank, leachfield	Adequate
Residential area	Sewer	Lagoon	Too large for present use (corrections in progress)
	Water	Well, storage tank (200,000 gal)	Adequate
	Power	Commercial	Adequate
Cub Creek	Sewer	Pit toilets (2)	Inadequate
Placer Point	Sewer	Pit toilets (2)	Within the 100-year floodplain
Green River Campground	Sewer	Individual septic tanks and leachfields (4) serving 4 comfort stations and ranger residence	Within the 100-year floodplain
	Water*	Well in pumphouse Reservoir (20,000 gal)	Within the 100-year floodplain Adequate
	Power	Commercial	Adequate
Split Mountain Campground	Sewer	Individual septic tanks and leach-fields (3) serving 3 comfort stations	Within the 100-year floodplain
	Water*	Well in pumphouse	Water quality does not meet public health standards; new well, chlorinator and distributor system which are now being designed will be floodproof
		Reservoir (10,000 gal)	Adequate
	Power	Commercial	Adequate
Quarry Area	Sewer	Lagoons with lift station	Adequate
	Water	Well in pumphouse, reservoir (100,000 gal)	Adequate
	Power	Commercial	Adequate
Rainbow Park	Sewer	Pit toilets (2)	Within the 100-year floodplain
Lodore	Sewer	Septic tank, leachfield for ranger station, maintenance building, and residence	Within the 100-year floodplain
		Pit toilets (2)	Within the 100-year floodplain
	Water	Well in pumphouse, reservoir (50,000 gal)	Adequate
	Power	Commercial	Adequate

*The Vernal water system now serves Jensen and may have potential for connection to the Split Mountain and Green River campgrounds. This would eliminate the need for wells with treatment facilities in two floodable areas and probably improve the quality of drinking water at both locations. The feasibility of converting to the municipal system will be determined in the future.



ENVIRONMENTAL CONSEQUENCES

IMPACTS ON NATURAL ENVIRONMENT

This environmental consequence section will assess the impacts of the land protection plan as well as the general management plan.

Impacts on Paleontological Resources

None of the action alternatives would have major effects on the monument's nonquarry paleontological resources. The land protection proposals, in particular the eventual acquisition of inholdings, could provide additional protection for both known and undiscovered fossil resources. Fossil resources on lands retained in private ownership could be removed and lost to science.

Natural weathering would continue to cause deterioration of paleontological remains and could result in their eventual destruction. This effect is not, however, totally adverse because new fossils might be exposed by erosion and discovered for scientific study. Any partly exposed fossils would be surveyed to determine their extent and significance, and necessary protection methods would be prescribed.

Under all alternatives the paleontological resources at the quarry, Split Mountain, Green River, and Cub Creek could be damaged by development and related visitor use. The construction, upgrading, and relocation of facilities proposed under the four action alternatives could expose fossils to weathering and theft. Because there is improved access in alternatives 3 and 4 to many additional areas the effects on paleontological resources are rather uncertain. In particular, the trail from the quarry to the Racetrack, which is proposed in alternatives 3 and 4, would cross areas containing fossils.

Use of developed areas and the backcountry could also impact paleontological resources. New trails would introduce additional use, increasing the likelihood of disturbance or theft of unprotected fossils. Illegal digging and collecting could also occur in secluded areas.

Under all alternatives except no action the impacts of development and use would be mitigated by increased field staff and improved interpretive media. The current lack of ranger patrols in the Cub Creek area (which would not change under the no-action alternative) leaves fossils susceptible to illegal collection. More frequent patrols, at Cub Creek in particular, would discourage illegal collection, and more personalized interpretation here and in other locations could help reduce these impacts by educating visitors about the value of fossil resources.

Impacts on Soils and Vegetation

Grazing by domestic livestock contributes to disturbance of upland and some riparian communities in the monument. The boundary fence proposed in the Natural Resources Management Plan (NPS 1983c) and its

impacts, which are assessed in that document, would minimize the impacts of trespass grazing and could eventually help to eliminate the differences in species composition, diversity, and abundance between currently grazed and ungrazed communities on monument lands. All alternatives of this general management plan support the recommendations of the Natural Resources Management Plan.

The land protection proposals, which accompany all of the action alternatives, help implement the 1960 legislation that requires elimination of cattle grazing within the monument.

Under no action the monument would have no specific plan of action for responding to impending incompatible uses of land. It would be more difficult to prevent adverse uses or sites disturbed by oil, gas, and mineral extraction activities; removal or erosion of soil and removal of vegetation would result. Buildings, roads, and other facilities necessary to support the extraction operations would have the same impacts. Under the action alternatives the likelihood of these impacts would be greatly reduced by acquiring private and state-owned mineral interests and by enforcing compatibility standards and other federal regulations dealing with mineral development.

Under all of the alternatives the construction or upgrading of roads, trails, parking areas, and structures would require removal of vegetation and reduce percolation of water into soils. Grading and paving would compact soil. Site leveling for roads, trails, parking areas, and structures would remove or add soil, thereby altering its profile and its natural process of development. Topsoil removed from areas to be covered by pavement or buildings would be used to make up any shortage incurred in installing other facilities, thus minimizing the overall loss of organic matter. Nevertheless, the organic content of topsoils would be reduced by mixing. All disturbed areas not covered by development would be reseeded with native species to speed the rate of recovery and to minimize the encroachment of invading species.

Construction sites would undergo accelerated erosion until vegetation was reestablished in cleared areas. To the extent possible, buildings, roads, and other impervious structures would be designed to collect and channel runoff into natural drainages. Runoff in these areas might cause localized increases in erosion and changes in soil nutrient transport. Runoff would escape into adjacent vegetated areas, which could result in more mesic conditions and altered vegetation composition. Altered vegetative composition could also cause slight changes in soil chemistry.

Areas in and around campgrounds, picnic areas, trailheads, administration and maintenance buildings, and scenic and interpretive facilities would be affected by foot traffic. The primary impact on soils would be compaction, which would decrease permeability, locally alter soil moisture, and diminish the water storage capacity. The change in soil moisture might alter the relative abundance of some species and affect germination. Plants that invade disturbed areas would become more common. Where compaction occurred, increased runoff on the surface would increase

Table 30: Soils and Vegetation Impacted (Acres)

Facility/Location	Preferred Alternative	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4
Quarry/Cub Creek	64	59	64	67	72
Split Mountain	18	17	17	18	17
Green River	17	16	17	17	18
Placer Point	1	0.5	1	1	1
Echo Park/Chew Ranch	41	38	41	44	53
Yampa Bench	81	78	78	81	94
Headquarters	15	15	15	15	15
Harpers Corner/Point of Pines/Plug Hat	126	120	126	189	204
Rainbow Park	4	4	4	4	4
Island Park	39	30	39	43	46
Deerlodge Park	72	72	72	72	72
Lodore	32	29	29	29	32
Total	510	478.5	503	580	628
Net Change	31.5	0	24.5	101.5	149.5
% of Monument Affected	0.24	0.22	0.23	0.27	0.30

erosion. This might lead to exposure of root systems and mortality of more mesic plants. The impacts of trampling would range from complete exclusion of vegetation to slight alterations in species composition. Similar impacts would occur along road shoulders, where cars would crush vegetation and compact soil.

To minimize the soil erosion caused by foot traffic, developments would generally be constructed on slopes less than 15 percent. Trails would be well-defined where heavy foot traffic was anticipated, and visitors would be asked to stay on the treadways. Trail construction would include special design methods in areas where the slopes were steep and soils were easily eroded.

The areas of soils and vegetation affected by the impacts described above have been identified for each development under all the alternatives. A detailed breakdown of the acreage disturbed is shown in table 30.

The addition of shade trees proposed in the preferred and alternative 4 at Lodore would change vegetation there. Planting would be limited to native species, probably cottonwoods or box elders, reducing impacts to the existing vegetative community.

Impacts on Wildlife

The land protection proposals for future planning and resource coordination between the Bureau of Land Management and the National Park Service would protect wildlife habitat within and adjacent to the monument.

There would be few significant long-term impacts on wildlife under any of the development alternatives; the following small additional areas of wildlife habitat would be affected by construction: 31.5 acres, preferred alternative; 24.5 acres, alternative 2; 101.5 acres, alternative 3; and 149.5 acres, alternative 4 (see table 30).

The proposed developments and associated visitor use would disturb or destroy the habitat of some resident invertebrates, mammals, and birds, causing death or relocation. The Island Park area is critical winter deer range, and the road improvements proposed in alternatives 3 and 4, as well as the Ruple ranch campground construction in alternatives 3, 4, and the preferred alternative could result in deer/human conflicts during late fall and winter. Flight from humans in winter could stress these animals at a time when they need the greatest protection to avoid depletion of energy reserves and could result in the eventual death of some of the animals. The improvements proposed for the Echo Park road in alternatives 2, 3, 4, and the preferred alternative could also conflict with wintering deer and bighorn sheep. The improvement of the Yampa Bench road to a high-standard gravel road (alternative 4) could lead to visitor conflicts with wintering elk, deer, and antelope. These adverse effects on wildlife could be mitigated by closure of the Echo Park and Island Park campgrounds from November 1 to March 31.

The road improvement proposals for interior monument roads (alternatives 3 and 4 for the Island Park road; alternatives 2, 3, 4, and the preferred for the Echo Park road; and alternatives 3, 4, and the preferred for the Yampa Bench road) could lead to increased deer, bighorn sheep, and elk poaching problems because of improved access. This would be especially true for alternative 4, which proposes the paving of all roads except the Yampa Bench and Echo Park roads. The ranger station/residence (alternative 4) and the increased resource management staff (alternatives 2, 3, 4, and the preferred) proposed for Cub Creek would reduce the poaching threat along this section of road.

The alternative 4 proposal to develop a new campground in the Chew ranch area could adversely affect the reestablished bighorn sheep herd in the Pool Creek-Chew ranch area.

Impacts on Threatened and Endangered Species

The effects of the alternatives on threatened and endangered plants is unknown. All previously undisturbed areas proposed for construction would be surveyed for these plants prior to construction. If the threatened or endangered species were found the construction would be relocated.

Acquisition of the Island Park parcels under all action alternatives for land protection could reduce the present disturbances on bald eagles associated with activities on nonfederal lands. Acquisition of the inholdings in the area would reduce the need to plow snow to provide access in the winter, allowing the bald eagles undisturbed use of the area.

Increased use resulting from the campground proposals for Island Park (alternatives 3, 4, and the preferred) could affect wintering bald eagles. Unless these areas were closed when eagles were using them (about November 1 to March 31), human activities could disturb the eagles and possibly cause them to abandon the areas. These wintering areas are of special importance in light of the habitat problems along the Green River. The large mature cottonwoods along this river have traditionally been preferred roosting sites for bald eagles. However, since the impoundment of the Green River behind the Flaming Gorge Dam, there appears to have been a significant reduction in cottonwood regeneration, and it is possible that this wintering habitat will eventually be lost.

Under no action the subsiding section of the quarry entrance road just north of the monument boundary would continue to be repaired in place, with asphalt placed on the surface as needed. In itself this action would not affect a critical Colorado squawfish nursery habitat downstream from this area. However, because of natural loss of stability in this riverbank area or possible aggravation of displacements caused by failure to initiate long-term road stabilization, the entire slope might slide into the river. This would greatly increase the sediment load in the Green River, with unknown effect on the endangered squawfish.

Under all action alternatives the subsiding section of road would be permanently stabilized. Although the engineering techniques necessary have not yet been identified, it is possible that construction could increase sediment loads or by some other means adversely affect the endangered Colorado squawfish. Because it is impossible to determine any potential impact at this stage, a study of potential impacts will have to be prepared in conjunction with the engineering study before an engineering solution is selected. That environmental assessment would be submitted to the Fish and Wildlife Service for consultation under section 7 of the Endangered Species Act.

The improvement of the Yampa Bench road to a high-standard gravel road (alternative 4) could affect the endangered peregrine falcon. Visitor access to areas near aerie sites is currently restricted during nesting periods; however, disturbances have occurred when visitors have entered areas in violation of posted access restrictions. Improved access would lead to additional visitation along the road, and without increases in protection staff and patrols, inadvertent and deliberate disturbance of the peregrines at hack sites and aeries could result. It is possible, but not probable, that the spot improvements proposed for the Yampa Bench road in alternatives 3 and the preferred would also increase disturbance of the peregrines.

Impacts on Water Resources

As proposed under the action alternatives for land protection, future resource coordination would help to protect water quality in drainages tributary to the monument from the adverse effects of mining activities and impoundment.

The proposals for provision of potable water at Echo Park (alternatives 2, 3, 4 and preferred), the Chew ranch (alternative 4), the Ruple ranch (alternatives 3 and 4), Plug Hat (alternative 4), and Deerlodge Park (alternative 4) would increase consumption of local water. All water would come from groundwater sources, and the design of all supply systems would include appropriate conservation techniques and appliances to minimize the amount of water diverted from natural watersheds.

The exact sewage treatment sites, methods of disposal, and distances from streams have not yet been determined (development concept plan locations are tentative). New septic tank/leachfields would be provided outside the floodplain at the Split Mountain, Green River, and Lodore campgrounds under alternatives 2, 3, 4, and the preferred, and at Cub Creek, the Ruple ranch, and Deerlodge Park under alternative 4. Because soil would be used for one or more phases of sewage treatment in the watersheds, an unknown quantity of wastewater would be injected into the ground each year. Some of the nutrients in the wastewater (nitrates, phosphates, sulfates) would eventually reach surface streams, but in unknown amounts. All systems would meet state and federal regulations regarding design and public safety. Proper design of sewage treatment systems would minimize contamination of groundwater or surface streams.

Under the no-action alternative, the potential would remain for groundwater contamination because of the continued use of pit toilets. The conversion of existing pit toilets to vault toilets (or in a few alternatives to flush toilets) would reduce the possibility of groundwater contamination from sewage. This conversion is proposed at Cub Creek, Placer Point, Echo Park campground, and Deerlodge Park (alternatives 2, 3, and preferred), at the Chew Ranch (alternative 4), at Rainbow Park, and along Harpers Corner road (alternatives 2, 3, 4, and preferred), and at Lodore (alternatives 2, 3, and preferred). All comfort stations and vault toilets in the 100-year floodplain would be floodproofed (in all alternatives except no action), greatly reducing the risk that sewage would enter adjacent waters if facilities were damaged in a flood.

Impacts on Floodplains and Wetlands

The eventual acquisition of inholdings in the monument would protect those containing floodplains and wetlands from adverse impacts of private development.

The National Park Service has developed final procedures for implementing Executive Orders 11988 and 11990 (NPS 1982). These procedures were followed in this planning effort, and alternatives were developed that would avoid or mitigate the adverse impacts associated with continued occupation of the floodplains. Current NPS developments and facilities have no significant impacts on natural flooding processes or on floodplain values, and none of the alternatives would affect the natural moderation of floodwaters, maintenance of water quality, and groundwater recharge. No living resource values would be affected.

A flood at the monument could affect some existing facilities and the visitors using them (see the "Affected Environment" section and development concept plan maps for structures/facilities within the 100-year floodplain).

Although access roads are considered excepted actions from compliance with the floodplain regulations, floods could result in minor road damage at Split Mountain, Green River, Cub Creek, Echo Park, Rainbow Park, Deerlodge Park, and Lodore. The danger to visitors from road washouts and subsequent stranding would be minimized by the development of the flood emergency response and evacuation plan.

The use of the existing Green River, Split Mountain, and Lodore campgrounds in the 100-year floodplain would expose visitors to the possibility of loss of life and property in a flood. Because flooding can be monitored, is seasonally predictable, and generally occurs at a rate allowing evacuation, the risk at existing campgrounds could be greatly reduced under all the alternatives. Relocation of these campgrounds was considered impractical because of the substantial capital investment in existing developments and the lack of suitable alternative sites. Alternative sites are generally in arid open areas that are unattractive to visitors, and establishing shade cover would require costly installation

and long-term maintenance of irrigation systems. Berming of developments was considered but rejected because of the visual intrusion (6- to 8-foot earth structures). All sewage treatment facilities would be moved out of the 100-year floodplain in all action alternatives.

An emergency flood response and evacuation plan would be developed by the monument staff for dealing with all floodprone areas of the monument under all alternatives. Warning signs would be posted in flood hazard areas, and facilities and structures in the 100-year floodplain would be marked with flood heights. Evacuation routes would be identified as necessary, and provisions would be made for temporary water and sewer service. This plan would reduce the risk of loss of life and property to visitors.

All the action alternatives would remove all or part of the Echo Park campground out of the 100-year floodplain, reducing the risk to life and property. All alternatives except no action would relocate the Deerlodge Park campground outside the 100-year floodplain, further protecting people and property. The conversion of the Echo Park campground to a picnic area as proposed in alternative 4 would reduce the potential effects of flooding, as would the closure of the Rainbow Park campground and its conversion to a picnic area proposed in alternatives 3 and 4.

The no-action and preferred alternatives, as well as alternative 2, would maintain existing campground use in the 100-year floodplain at Rainbow Park; the potential flood effects would be mitigated by the emergency flood response and evacuation plan. The proposed campground at the Ruple ranch (alternatives 3, 4, and preferred) would be developed outside the 100-year floodplain.

Although the Placer Point picnic area is in the 100-year floodplain, it would not be used during potential periods of high floods, virtually eliminating the possibility of loss of life or injury (picnic areas are excepted from compliance with the floodplain regulations). Signs would warn visitors of the potential hazards of flooding. The loss of property would be limited to picnic tables, trash cans, and toilets.

Chemicals such as chlorine might be introduced into the floodwaters from damage to existing water treatment facilities at Split Mountain and Green River campgrounds, but the immediate dilution would render this impact negligible.

Impacts on wetlands would be minimal. The relocation of the campground at Echo Park would reduce the wetland area (riparian brush and forest) subjected to foot traffic and campground development, as previously described under vegetation impacts.

The buildings at Lodore are in excellent condition but would be subject to damage by a 100-year flood. The ranger cabin, which may be historic, would suffer the worst damage. If the cabin was not relocated, during a 100-year flood it would be inundated with 2-3 feet of water. The saturation of the logs would result in warping and delamination, the

chinking would fall out, and the cabin could float off of its foundation. The maintenance and ranger buildings have concrete foundations, concrete block construction, wood truss roofs, and drywall interior walls. A 100-year flood would submerge these buildings in 2-3 feet of water, but the main structures would remain sound. Interior walls, electrical work, and furnishings would be considerably damaged.

Impacts on Air Quality

There would be no significant impacts on air quality resulting from any of the visitor development alternatives. Utility, road, and building construction would temporarily increase the amount of particulates in local areas of the monument. A slight increase in automobile emissions could occur because of increased visitation; however, increasingly stringent emission controls would offset any potential adverse effects. The improvement of road surfaces at Cub Creek and Echo Park (alternatives 2, 3, 4, and the prefered), Yampa Bench (alternatives 3, 4, and the preferred), Island Park (alternatives 3 and 4), and Lodore (alternative 4 and the preferred) would improve air quality by decreasing the overall amount of particulates.

Impacts on Visual Quality

Visual quality would be enhanced by implementation of the land protection recommendations. Future planning and resource coordination between the National Park Service and the Bureau of Land Management would protect certain scenic viewsheds adjacent to the monument (see "Land Protection Plan" section for specific areas).

A computerized viewshed analysis was performed in 1984 to assist in determining impacts on visual quality. Impacts would result mainly from road construction and improvements and, to a lesser extent, from the expansion of existing developed areas.

The construction of a road to Point of Pines (gravel surface, alternative 3; paved surface, alternative 4) would result in some change in the existing landscape. The 4 miles of road descending from the summit toward Cub Creek would be visible from the Quarry area and the Green River campground. Visitors at these areas would see the road scar, flashing windshields, and in some cases the vehicles themselves. Dust plumes would be evident when the road was in use under alternative 3. Any overlooks developed on the east side of Point of Pines (alternatives 3 and 4) would be visible from Plug Hat and would occasionally intrude on this distant view of the Point of Pines cliff. This intrusion could be mitigated by locating the parking areas away from the cliff and providing short trails to overlooks.

About 3 miles of the Echo Park road are visible from the Iron Springs Bench viewpoint on the Harpers Corner road, 4½ miles of the same road are also visible from the Echo Park overlook, and 1 mile is visible from

the Harpers Corner overlook and trail. Flashing windshields, vehicles, and dust plumes on this dirt road would continue to be minor visual intrusions under all alternatives.

Approximately 7 to 8 miles of the Yampa Bench road (in discontinuous sections) are also visible from the Iron Springs Bench and Echo Park viewpoints, and 1 mile of that road is visible from the Canyon Overlook picnic area on the Harpers Corner road. The impacts of traffic would be the same as those described for the Echo Park road under all alternatives.

The Chew ranch can be seen from the Echo Park and Harpers Corner overlooks and the Harpers Corner trail. The development of a campground there, proposed under alternative 4, would enlarge the developed area, increasing the visual intrusion proportionately. Under all other alternatives the unimproved access would preclude increased traffic, keeping the intrusion of vehicles and people to a minimum.

The Ruple ranch developed area is visible from the main overlook on the Island Park road. Development of a drive-in campground at the ranch, proposed under all alternatives except 2 and no action, would increase the numbers of vehicles observed, but use of the Island Park area would likely remain low. About 4 miles of the Island Park road are visible from the overlook in Island Park, and 2 miles of the road are seen from the Ruple ranch development. Impacts of traffic and dust plumes would increase to a small degree at the overlook in Island Park and at Ruple ranch under the no-action and preferred alternatives and alternatives 2 and 3. Paving of the road under alternative 4 would eliminate dust plumes, but the road scar would be wider and more visible and traffic would increase.

IMPACTS ON CULTURAL ENVIRONMENT

Impacts on Paleontological Resources

The library museum collection and fossils would benefit from the installation of upgraded heating, ventilation, and air-conditioning systems in the quarry building. This action would be taken under all of the alternatives.

The no-action alternative would not solve the problem of inadequate storage space for the museum collection, including dinosaur fossils. Therefore, preservation problems would gradually increase as specimens were stored in miscellaneous locations. Environmental controls and security in these places could be worse than in present overcrowded storage areas. Lack of environmental controls will most likely result in destruction of these collections. Scattered storage with poor security could result in the loss of irreplaceable scientific materials.

Under the action alternatives a new collection storage building would be built to eliminate overcrowding and workspace problems in the laboratory

and the use of other buildings for overflow storage. This building would provide proper storage for the fossils because it would meet all curatorial environmental standards, would protect the collection from theft, and would consolidate the entire collection in one facility for research and study.

Impacts on Archeological Resources

Currently, archeological resources are threatened by several destructive activities. Surface and subsurface remains in several areas are subject to exposure, trampling and scattering as a result of livestock grazing and natural deterioration. Some of the monument's most significant prehistoric sites are on lands where the surface and subsurface rights are owned by the state of Utah; oil and gas exploration and mineral extraction on these lands could disturb or destroy significant resources. The land protection proposals, in particular the eventual acquisition of nonfederal lands and the establishment of agreements concerning use of adjacent lands, would increase protection of these resources and increase the potential for study and interpretation. Until the proposals were implemented the possibility of damage from grazing and other incompatible uses would continue. Archeological resources on lands in private ownership could be damaged, removed, and lost to science.

Construction of buildings, campgrounds, parking areas, trails, and roads could destroy unknown archeological resources. Construction activities would disturb and compact soils, which could alter the horizontal and vertical distribution of buried archeological remains, thereby damaging artifacts and the contextual environments of sites.

Public use of campgrounds, picnic areas, trails, and interpretative sites would affect nearby archeological resources. Easily accessible resources would be vulnerable to surface disturbance and theft. New trails would increase the likelihood of archeological sites being disturbed. Resources in backcountry areas would be vulnerable to inadvertent or deliberate disturbance, the latter including digging and collecting archeological material and defacing rock art panels. Vandalism of rock art could include scratching, chipping, or simply touching them, which adds oil that hastens their deterioration.

After formulation of the cultural component of the resources management plan, decisions regarding treatment of archeological resources would be more specific. Until that time mitigating measures would be determined on a case-by-case basis, in accordance with all applicable laws, regulations, and policies of the National Park Service.

Prior to any land-disturbing activities proposed in this general management plan, a professional archeologist would inspect the ground surface for prehistoric and historic remains. If any previously unrecorded resources were located, evaluation of significance and additional investigations would be completed and mitigations prescribed before the actions began. Similarly, in areas where subsurface remains

are likely, an archeologist would monitor construction actions. Where feasible, trail and road alignments would be shifted to avoid archeological resources; otherwise, sampling/collecting/testing procedures would be followed.

Under the action alternatives ranger patrols and educational programs would be initiated to discourage vandalism and inadvertent destruction of cultural remains. Known archeological sites would be monitored periodically to determine the need for protection, preservation, or data retrieval necessitated by grazing, natural erosion, or human impact.

In addition to the general impacts described above, the following specific impacts would result from the five alternatives.

Under the no-action alternative emergency realignment work along the Harpers Corner and Cub Creek roads could disturb unknown archeological sites. In alternative 2 and the preferred, proposed construction along the Harpers Corner road, in the Cub Creek area, near the Split Mountain campground, at Pats Cave, and at Rainbow Park and McKee Spring could disrupt archeological sites, but these activities would be mitigated as described earlier. Not altering basic patterns of access in the Point of Pines, Echo Park, Island Park, and Jones Hole areas (no action, alternative 2 and preferred) would help protect the resources there.

Opening new activity areas (alternatives 3 and 4), such as the Douglass property foot trail, the trail from the quarry to the Racetrack, the Point of Pines picnic area and trails, the Ruple Point spur trails, and the Chew ranch day use area, would increase the likelihood of unauthorized collection of artifacts and other damage to adjacent archeological sites. Adverse impacts would be reduced by mitigating measures such as increased public education.

A high-quality road to Rainbow and Island parks (alternatives 3 and 4) would encourage additional visitation and related impacts in these areas. Rerouting the road around the McKee Spring rock art site and eliminating visitor access (alternative 3 only) would lessen the likelihood of additional bullet marks and graffiti on the panels and would reduce visitor-caused degradation of the sites. There is, however, a high probability that new archeological resources would be discovered in rerouting the road, and this would require the mitigating measures previously discussed.

Lack of well-defined trails to the rock art at Cub Creek and McKee Spring (no-action) would continue erosion on steep slopes and could damage archeological resources on surface sites. The rock art would also be subject to vandalism. Constructed trails to rock art sites at Cub Creek (alternatives 2, 3, 4, and preferred), and at McKee Spring (alternatives 2, 4, and preferred) would channel use and reduce erosion and deterioration of adjacent sites. Increased public education about the importance of the archeological resources would also be provided. However, increased visitation to rock art sites could increase damage due to touching or other marring of the surfaces.

Construction and increased visitor activities at the Ruple ranch (alternatives 3, 4, and preferred) might result in unauthorized collection and other damage to archeological resources. These impacts would be mitigated by completing surveys and testing areas prior to construction activities; by siting parking, campgrounds, and trails in areas known to have no archeological significance; by increasing patrols; and by educating the public.

The improvement of roads, launch ramps, and water and sewer systems proposed in alternatives 2, 3, 4, and the preferred would impact areas at Lodore and Deerlodge Park, as described under the general impacts early in this section.

Continued grazing by cattle on the horizontal petroglyph site along the Harpers Corner road (no-action alternative) would continue to hasten obliteration of this unusual rock art. Fencing the horizontal petroglyph site (proposed in all action alternatives, pending agreement with the BLM) would eliminate the adverse impacts of grazing.

Periodic relocation of pit toilets in developed areas could also disrupt archeological sites, especially at Cub Creek, along Harpers Corner road, and at Echo Park and Rainbow Park. The change from pit to vault or flush toilets at these places and at Lodore, Deerlodge Park, and the Ruple ranch (under all action alternatives) would increase protection for archeological resources because the toilets would not have to be periodically relocated.

Continued archeological artifact storage in the headquarters building (under no action) would not meet curatorial standards because of the lack of necessary humidity and temperature control. Construction of a new collection storage building at the quarry under all action alternatives would benefit the archeological artifacts for the reasons stated under the impacts on paleontological resources.

Under the no-action alternative current limited staffing in the Cub Creek and Island Park areas would not be adequate to protect archeological resources, and vandalism and theft could continue. Opportunities to educate the public and interpret the importance of cultural resources would be limited, especially at Mantle Cave and Jones Hole. Increasing staff at the Cub Creek and Island Park areas under all action alternatives would improve protection as previously described.

A program to record and monitor deterioration of resources in the field (under all action alternatives) would enable managers to make more informed decisions about potential use and preservation.

Impacts on Historic Resources

The land protection proposals would have little effect on historic resources in the monument because most are already owned by the National Park Service. The Cub Creek and Zenobia Basin areas have

important histories associated with settlement, and they contain state and privately owned parcels of land. Under no action any subsurface exploration, mining, and drilling in the Cub Creek area would adversely affect the historic scene. More intensive ranching uses at Zenobia Basin might destroy evidence of the Outlaw Trail. Grazing as now practiced would have no effect on the buildings or historic scene.

With no action most old buildings and other structures throughout the monument would continue to deteriorate naturally until the cultural component of the Natural Resources Management Plan is developed, the required surveys completed, significance determined, and treatment decisions made and implemented. These structures, along with their historic settings and those aspects that might qualify them for inclusion on the National Register of Historic Places, would eventually be lost if action was not taken to halt their deterioration. Those historic scenes and structures that would likely be proposed for listing on the National Register (see table 28 in "Affected Environment" section) would be interpreted in their existing condition until required documents were completed and agreement was reached about their treatment.

Lack of preservation maintenance under the no-action alternative would have significant impact on historic resources. Although the Morris and Chew ranches and the Douglass office would be managed as historic sites, if the current levels of maintenance, visitor use, and natural weathering continued the sites would eventually lose the characteristics that could qualify them for listing on the National Register. Eventually these structures could become unsafe and would have to be removed entirely. Without more protection the items in Pats Cave would continue to be lost to rodents and weathering. Restoration of the Morris cabin and the immediate grounds proposed in alternatives 3 and 4 would preserve the resource for interpretation.

Stabilizing the Morris ranch and the Douglass office and providing minimal maintenance for the Chew ranch (alternative 2 and preferred) would give added life to the structures until the appropriate preservation treatment was determined. Increased visitation to these sites would add to the deterioration of the structures. However, maintaining and interpreting them would likely give visitors a better understanding of the history of the monument, possibly reducing these adverse effects.

Under alternative 4 the full restoration of the Douglass office would preserve this historic resource and provide another interpretive site near the quarry.

The removal of the Chew ranch buildings and the alteration of the historic setting to make a day use facility is the major impact of alternative 3. Review of the action with the Colorado historic preservation officer and the Advisory Council on Historic Preservation and thorough documentation of this resource would be required before demolition could begin.

The extensive improvements on the Echo Park road and the development of a campground on the Chew ranch property under alternative 4 would diminish the integrity of this historic site and greatly increase visitor use in the area. The main house would be preserved and adaptively used as a ranger residence, which would provide on-site resource protection. All necessary compliance activities would be completed before the initiation of this work.

Construction of permanent parking and a trail near the Chew ranch under the preferred alternative would be preceded by historic studies and a determination of significance. Without this information the historic scene and other historic qualities could be adversely affected.

Construction of a trail to Pats Cave from the Chew ranch under all action alternatives would increase visitor use of the area. This would probably lead to increased vandalism at both locations and eventual theft of more items in the cave. However, substitute items might be considered, provided this action is in agreement with studies of significance and decisions on treatment. This would still make the cave a worthy destination, and any remaining original artifacts could be protected. More frequent patrols by the Echo Park ranger would help deter vandalism at the Chew ranch and Pats Cave; natural deterioration could also be monitored. Self-guiding tours and signs might reduce vandalism by increasing public awareness of the importance of these sites.

Because the original house at the Ruple ranch burned in the late 1960s, part of the historic setting is gone; construction of a primitive drive-in campground some distance away (alternatives 3 and preferred) would only slightly change this altered historic scene. Before any work was done, the significance of the area would be determined through studies. Careful placement and design of the new campground could minimize the visual impacts, especially from the river. The Ruple ranch would be more intensely used under alternative 4. The construction of a campground, complete with water and sewer facilities, a paved road, a ranger residence, and a maintenance building would greatly alter the historic scene. Careful placement and design of the new structures could reduce the visual impacts.

The Lodore ranger cabin may be historic, but its significance has yet to be determined. The no-action alternative would not provide the interim stabilization work needed to preserve the structure. The building would continue to deteriorate and eventually be unusable for quartering work crews. Because this structure is in the 100-year floodplain, its importance needs to be identified to determine the final preservation strategy. Without future action, the structure would most likely be damaged in a 100-year flood. (See more detailed information under "Impacts on Floodplains and Wetlands".)

Stabilization and rehabilitation proposed in all action alternatives would help keep the Lodore ranger cabin in a usable condition. Roof and moisture protection work and interior improvements are proposed. Studies, documentation, designs, and consultation with the Colorado

historic preservation officer and the Advisory Council on Historic Preservation would be required before the work could begin. Because the cabin is in the 100-year floodplain, documentation to determine the significance of the cabin is needed in the immediate future to ensure its protection.

Increased protection staff at Cub Creek could help reduce vandalism at the Morris ranch under all action alternatives.

Under all alternatives the installation of a new heating/ventilation/air-conditioning system, alterations for handicap accessibility, and improvements for circulation could adversely affect the appearance of the quarry building (including the laboratory) and destroy some original building fabric. Until the status of the quarry building has been determined, changes to the building would be done carefully and with the same color, scale, and design as the original materials, assuring its architectural integrity. As previously discussed, any alterations to the structure would follow applicable laws, regulations, and policies.

IMPACTS ON SOCIOECONOMIC ENVIRONMENT

Impacts on Regional Economy

Under the no-action alternative there would be no significant changes in the monument's impact on the local and regional economy.

Pursuant to the 1960 legislation and supported by the land protection action proposals, acquisition of private land and elimination of appurtenant grazing privileges would result in the loss of some livestock production. However, the agricultural land lost is not prime or critical to the local economy. Acquisition of these lands would result in some loss of property tax revenues to Uintah and Moffat counties. However, the land is assessed at a low rate. One residential structure and an associated ranch building constitute the only major improvements on any of the properties. Federal in-lieu-of-tax payments would be made to Uintah and Moffat counties to help compensate for lost property tax revenue.

Even though the potential for discovery of minerals is low in areas 1, 2, and 3 (refer to Proposed Changes in Federal Land Management Status map), closing these areas to mineral extraction through protective withdrawal could result in the loss of lease revenues to the federal government. Acquisition of state land could result in loss of mineral leasing income to the state of Utah. This loss would be offset by new mineral leasing opportunities on exchanged land. Acquisition of state and private mineral rights by the National Park Service would result in the loss of potential mineral resources to the national economy.

Under the no-action alternative, construction money would be awarded for emergency repairs to the Harpers Corner and Cub Creek roads, and a portion of this money would be spent locally. The operations and maintenance budget of the monument would not change.

All of the action alternatives would involve large expenditures for development as well as increased operations and maintenance budgets. Tables 4 and 5 in the "Alternatives Evaluation" section show the relative costs of each of these alternatives. Although the exact amounts cannot be quantified, a significant portion of these funds would be expected to flow into the regional economy in the form of salaries and purchased goods and services.

Under the preferred alternative and alternative 2 visitor spending would likely continue at current rates. Improved access and recreational opportunities at Cub Creek, Island Park, Echo Park, and Yampa Bench might encourage visitors to lengthen their stay--an estimated increase of 1 percent over 1983 total visitor hours. To the extent that these opportunities resulted in additional overnight stays in the region, visitor spending might increase slightly.

Under alternatives 3 and 4 the major capital improvements, particularly along the Point of Pines road, would likely encourage much longer stays (an estimated 17 and 36 percent, respectively) and result in more visitor spending in the region. If the demand for camping began to exceed the capacity of monument facilities, nearby private campgrounds would likely benefit from increased use. Business prospects for new campgrounds would become more feasible.

River concessioners and private rafters would benefit from the improvement of boat ramps and roads leading to launching areas. All the action proposals would increase efficiency of access, decrease wear and tear on vehicles and equipment, and improve visitor safety.

Impacts on Landowners and Local Residents

All proposals for Park Service fee or easement acquisition of private lands are based on opportunity purchase. Therefore, a landowner's property would not be acquired without consent unless the landowner proposed or subjected the property to a use identified as incompatible with monument purposes. Acquisition of private ranchlands would result in partial loss of a way of life for some owners who had to vacate their lands. Even if the lands were exchanged for other grazing lands, the emotional attachment to familiar lands, often held in a family for several generations, could not be replaced.

At Castle Park one residence would be acquired and this use eliminated from the site; relocation assistance would be provided. No other landowners reside within the monument boundaries.

Construction of a gravel Point of Pines road to connect Harpers Corner road with Cub Creek would require acquisition of road right-of-way. Most likely this would be done through secretarial selection and would involve designation of both right-of-way and scenic easement within a 1,000-foot road corridor. Private and public lands would be acquired therefore changing the use of these lands.

IMPACTS ON VISITOR USE

The proposals for natural and cultural resource management and for land protection, to be implemented under all of the action alternatives, would have a beneficial effect on the visitor experience. More lands would be protected from adverse and incompatible uses; preservation and restoration efforts would be expanded to ensure that significant resources within and adjacent to the monument remain unimpaired; and opportunities to enjoy the rich and varied natural and cultural landscape would be increased. Unlike the previous sections of the environmental impacts, the effects of development and use proposals on the visitor experience would vary considerably under the alternatives, and these effects are described below.

No-Action Alternative

Visitors to Dinosaur would find conditions generally as they do today. The quarry area and Harpers Corner would be the only easily accessible attractions; the rest of the monument would continue to be remote and difficult to reach. Because of the lack of adequate signing and the limited staff to provide information and interpretation, many visitors would remain unaware of what to see and do and of the opportunities available outside these two areas.

At the quarry, conflicts between pedestrians and shuttlebuses on the access road would continue.

The potential for road closures due to slumping, landslides, washout, or general deterioration would continue on all monument roads. Closures would inconvenience people wishing to visit the monument's interior and could result in stranding during wet weather. Large-scale slumping or washouts on the quarry entrance, Cub Creek, and Harpers Corner roads could eventually force long-term closure until repairs were made, causing major disruption in visitor use. Entrance to Deerlodge Park would become less safe as the road deteriorated. The Echo Park and Yampa Bench roads would continue to be available only to those visitors with suitable vehicles.

Camping and boat-launching opportunities would remain unchanged. Traffic congestion and conflicts between boaters and campers would continue to be problems at Split Mountain. Other facilities would remain unimproved, offering few amenities for those floating the rivers or staying overnight. No group campsites would be provided, so those seeking group accommodations would have to accept single sites or stay outside the monument. Because no additional campsites would be provided, any increases in the demand for camping spaces would have to be accommodated by the private sector outside the monument.

Hiking opportunities would continue to be limited, and most visitors would remain unaware of routes that are available because they would not be

improved or marked. Additional opportunities to view and learn about the monument's archeological and historic resources would go unrealized. As historic structures like the Morris cabin, Douglass office, and Chew ranch buildings continued to deteriorate, they would become visual intrusions.

Preferred Alternative

The preferred alternative would enhance existing uses by upgrading roads, trails, and signs; by providing additional interpretive staff to serve visitors; and by constructing or redesigning facilities to support activities that have been established informally over the years. Recreation would remain generally the same as it is today, but identified problems would be solved and visitors would be better able to experience and appreciate the monument's attractions.

New directional signs would reduce confusion about where to go and what to see in Dinosaur, and improved interpretive media and services would also broaden the range of choices for people new to the monument. The marking of interior roads and trails would improve accessibility of previously unknown areas to many visitors.

The upgrading of all monument roads through repair, stabilization, realignment, graveling or repaving, and installation of drainage controls would allow safer, more dependable, and more enjoyable passage within the monument. The paving of the Lodore entrance road would ensure more reliable and dust-free access to this area. A loop trail from the shuttle parking area to the quarry building would remove pedestrians from the access road, thereby eliminating pedestrian/shuttlebus conflicts and ensuring safe foot access to the facility. Interpretation of the colorful terrain along the loop trail by means of signs or a leaflet would inform visitors about the geological setting of the quarry.

Campers and boaters would benefit from new or redesigned support facilities including a designated group campsite at Green River, a second boat ramp and flush toilets at Split Mountain, a redesigned campground and separate water for boaters at Echo Park, a new primitive drive-in campground at the Ruple ranch, an upgraded launch ramp in a more suitable location at Deerlodge Park, and a new launch ramp, shade trees, and flush toilets at Lodore. Redesign of the parking area at Split Mountain would eliminate boater/camper conflicts and reduce congestion. A redesigned picnic area with vault toilets at Placer Point would make an existing use more enjoyable. Because no additional campsites would be provided, future increases in the demand for camping spaces would have to be accommodated by the private sector outside the monument.

Opportunities to visit more remote areas of the monument and to see cultural, natural, and scenic resources would also be expanded. Upgraded trails to the Cub Creek petroglyphs and adjacent side canyons and to the McKee Spring petroglyphs; pullout parking at the Chew ranch, Whispering Cave, and the nearby petroglyphs; a new trail to Pats Cave; and a rehabilitated nature trail at Lodore would allow more visitors to

explore and learn about the monument's resources. Stabilization of the Morris cabin and Douglass office and maintenance of the Chew ranchhouse would permit improved interpretation of these historic resources.

Alternative 2

The impacts of this alternative would be the same as those of the preferred alternative except that no improvements would be made at the Ruple ranch, along the Yampa Bench road, or to the entrance road and launching areas at Lodore. Leaving the Lodore development in its present condition would probably have little effect on the majority of users, who are boaters accustomed to primitive camping experiences on the river.

Alternative 3

Under alternative 3 visitors who were willing to spend more time in the monument would benefit from improved road access to the interior and more trails into the backcountry. The impacts of improvements to roads, campgrounds, launching areas, picnic areas, trails, and cultural resources would be similar to those of the preferred alternative, with the following additions.

Paving of the Cub Creek road would permit safe, dependable, year-round passage to this area. Construction of a gravel Point of Pines road would provide a significantly improved driving opportunity for visitors willing to travel on unsurfaced roads--projected to be around 38,000 visitors per year. At present the only opportunity to tour the scenic plateau country of the monument is on the Harpers Corner road and, to a lesser extent (because of their unimproved condition), the Echo Park and Yampa Bench roads. Scenic overlooks and interpretive media on the new Point of Pines road would enhance visitor understanding of important natural features. Also, the Point of Pines road would provide a more scenically diverse route between the Quarry area and headquarters/Harpers Corner than US 40, the only connecting road at the present time. Construction of a high-quality gravel road into Rainbow Park and Island Park would greatly improve the reliability of in-park travel to these areas and might stimulate additional use, particularly by river runners and regional residents. Travel on the portion of the road outside the monument boundary would remain difficult until the county made improvements.

Camping and picnicking would be further expanded with the construction of a primitive campground at Plug Hat and a picnic/day use area at Point of Pines. These facilities would particularly benefit those visitors planning on a more extended visit to the monument. Because the campground would be primitive and the Point of Pines road would be gravel, its appeal would be only to a limited segment of the visiting population. The picnic area and day use trails at Point of Pines would offer visitors an excellent opportunity to enjoy the amenities at this spot.

There are outstanding views of the monument (Cub Creek, the Racetrack, Split Mountain, and the quarry) from this area. Current visitors to Point of Pines, primarily hunters and local residents who travel the existing ranch roads, might be disturbed by the loss of solitude because of increased public use.

Opportunities for hiking would also increase. The construction of a trail from the quarry to the Racetrack would permit visitors to view the impressive geology and scenery of that area. Improvement and extension of the Ruple Point trail would make new scenes of the monument accessible to hikers from the Harpers Corner road. Signing and upgrading the existing trails along the Yampa Bench road would increase hiking use to river overlooks. Upgrading the trail from the Ruple ranch to the Jones Hole trail would encourage public use of yet another scenic area.

The improvements at Deerlodge Park and Lodore would have the same impacts as those described in alternative 2.

Alternative 4

Under alternative 4 there would be major new developments and improvements to support river and nonriver use. Visitors would benefit from a substantially upgraded road system that would permit relatively easy access to what are now remote areas of the monument where new trails, campgrounds, and day use facilities would be provided. The impacts of alternative 4 would be similar to those of alternative 3, with the following additions.

A paved Point of Pines road would provide significant new opportunities for hiking, picnicking, camping, and viewing the spectacular scenic and geologic features of the monument and surrounding region, therefore lengthening the average stay by about 3 hours. Connection of Point of Pines with a paved Cub Creek road would permit easy and convenient access from the Quarry area to the headquarters and Harpers Corner for the general public. An estimated 175,000 visitors per year would travel the new road. Graveling the entire Echo Park and Yampa Bench roads would allow visitors to traverse the southern part of the monument in ordinary vehicles. Paving the Island Park road from the monument boundary to the Ruple ranch would further increase the ease of travel on that road under all weather conditions and might stimulate additional visitation, particularly by river runners and regional residents. Access from west of the monument boundary would continue to be difficult until the county upgraded exterior segments to a comparable standard.

Additional camping, boat-launching, picnicking, and day use facilities would expand recreational opportunities beyond those available under the other alternatives. The construction of five group campsites with flush toilets at Green River would benefit river users and other organized groups. Relocating the Split Mountain boat ramp area to Green River would eliminate the conflicts between boaters and campers at Split

Mountain and reduce the congestion there. Also, a highly scenic canyon area at the lower end of Split Mountain Gorge would be converted largely to low-intensity day use (i.e., nature observation, photography, picnicking, etc.). Congestion could subsequently occur at Green River, but with proper design of the launching facility, this could largely be avoided. With the relocation of the launching facility, river users coming from points upstream would have a half hour added to their trip (in slow water).

The construction of a developed campground at Plug Hat would increase camping opportunities for visitors using the Harpers Corner and Point of Pines roads and would make attractions in the monument interior more accessible to those staying overnight. Removing the Echo Park campground and replacing it with one at the Chew ranch would eliminate riverside camping opportunities there. The Chew ranch, however, would be transformed into an attractive use area with numerous other recreational opportunities, including camping, picnicking, and hiking. Development of a structured drive-in campground at the Ruple ranch, with paved loops, would provide an attractive new place to camp near the river. Paving the Deerlodge Park and Lodore campgrounds and providing flush toilets (both), shade trees (Lodore), and water (Deerlodge Park) would make these areas more attractive to the general public.

Hiking opportunities would be further expanded with the introduction of a trail from the quarry development to Split Mountain, the extensive trail systems in the Cub Creek, Chew ranch/Pats Cave, and Yampa Bench areas, and the marking of the Outlaw Trail.

New space in the headquarters visitor center made available by moving administrative offices to Vernal would be used for expanded exhibits on cultural resources, thereby introducing visitors to this little-interpreted aspect of Dinosaur.

IMPACTS ON PARK MANAGEMENT

No-Action Alternative

The present level and distribution of management functions within the monument would continue, as described in previous sections of the document. Staffing for resource management and visitor protection would remain inadequate. The crowded laboratory facilities at the quarry building would continue to be inadequate from a research and an employee safety standpoint. A shortage of work and storage space would also continue to exist in the quarry maintenance building.

The headquarters/administration function would continue to be centrally located to all areas of the monument. Contacts with other agency personnel in Vernal and Craig would require significant travel distances. Management would continue to have difficulty recruiting for and filling lower-grade permanent positions with qualified personnel (such as in the administrative division), because of the long commute to headquarters from distant communities.

Because seasonal quarters would not be expanded in the monument (except at Ruple ranch), some seasonal employees would have to continue to seek accommodations in nearby communities. At present, sufficient quarters appear to be available outside the monument.

Preferred Alternative

Upgrading the laboratory facilities at the quarry area would ensure quality curatorial work. New counter tops, cabinets, and sinks in the quarry building, and a new fossil storage building would maintain the scientific and interpretive value of the collection. Increasing the size of the quarry maintenance building would solve present storage and work space problems. Adding covered vehicle storage at the quarry and headquarters maintenance areas would provide additional cold-weather protection for park vehicles and reduce long-term wear and tear.

Additional staff for resource management, supervision, interpretation, and maintenance would improve overall management efficiency within the monument (see appendix E for detailed descriptions of duties of increased staff).

The impacts on headquarters administration and on seasonal employees seeking housing would be the same as under the no-action alternative.

Alternative 2

The impacts on park management would be the same as under the preferred alternative except that there would be no covered storage at the quarry and headquarters maintenance areas to increase maintenance efficiency.

Alternative 3

The impacts on park management would be essentially the same as under the preferred alternative. Additional seasonal quarters would allow employees to live in the park, thus reducing the personal cost of travel to and from work and strengthening security of the quarry area.

Alternative 4

The impacts on park management would be the same as those of alternative 3 except for headquarters administration. Moving the headquarters to Vernal, Utah, would require the operation of two offices--the new office and the existing headquarters building, which would serve as a district office. The Vernal location would reduce travel distance to the Quarry area but would generally increase distances to other areas such as Craig, Colorado. Nongovernment quarters would be relatively easy to obtain by headquarters staff in Vernal. Hiring of

lower-grade permanent employees would be easier in Vernal. Contacts with Utah agencies in Vernal would be easier but those with Colorado agencies would require a 40 percent increase in travel distance.

SUMMARY OF IMPACTS

Table 31. Summary of Impacts

	No-Action	Preferred	2	3	4	LPP
Natural Environment						
Soils and Vegetation	-	-	-	-	-	+
Wildlife	-	-	-	-	-	+
Threatened/Endangered	-	-	-	-	-	+
Water Resources	0	0	0	0	0	+
Floodplains/Wetlands	0	0	0	0	0	0
Air Quality	0	0	0	0	0	0
Visual Quality	0	0	0	-	-	+
Cultural Environment						
Paleontological Resources	0	+	+	U	U	+
Archeological Resources	-	U	U	U	U	+
Historic Resources	-	+	+	-	+	+
Socioeconomic Environment	0	0	0	+	+	-
Visitor Use	0	+	0	+	+	0

+ Beneficial Effect
0 No Effect or No Net Effect
- Adverse Effect
U Uncertain

AGENCIES CONTACTED

FEDERAL

Advisory Council on Historic Preservation
Department of Defense, Army Corps of Engineers
- Regulatory Unit 4, Grand Junction, CO
- Sacramento District Office

Department of the Interior
- Bureau of Land Management
  - Colorado State Office
  - Craig District Office (CO
  - Little Snake Resource Area (CO)
  - Utah State Office
  - Vernal District Office (UT)
  - White River Resource Area (CO)
- Bureau of Reclamation
  - Upper Colorado Regional Office
- Fish and Wildlife Service
  - Area Office (Salt Lake City, UT)
  - Jones Hole Fish Hatchery
  - Region 6 Headquarters (Denver, CO)

Environmental Protection Agency

STATE/COUNTY

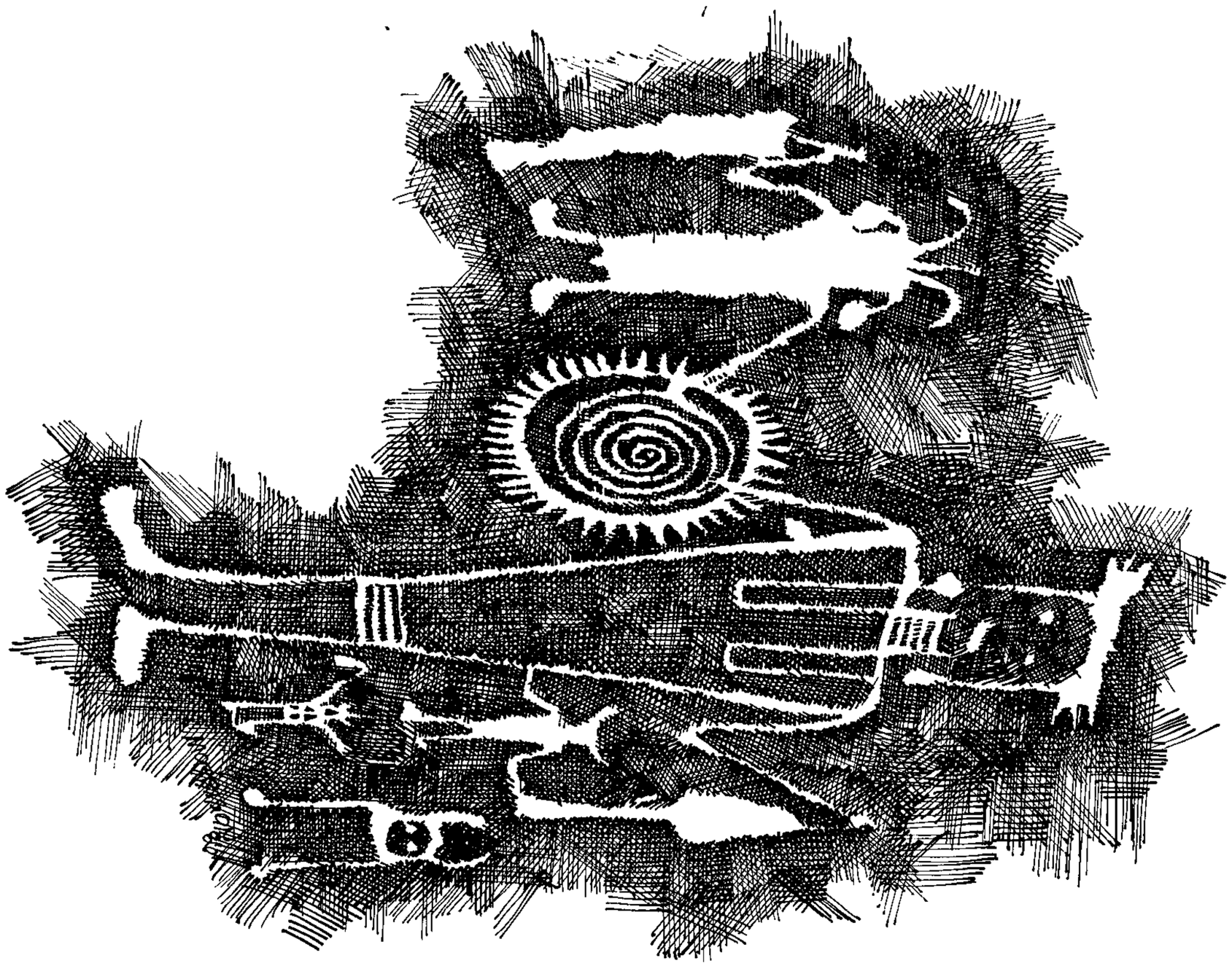
State of Colorado
- Division of Wildlife Resources
- State Historic Preservation Officer

State of Utah
- Division of Wildlife Resources
- Planning and Coordinating Committee
- State Historic Preservation Officer

County
- Planning Department, Moffat County, CO

SUMMARY OF PUBLIC INVOLVEMENT

During preliminary scoping for the planning project, a public response form was distributed requesting input on rating the significance of various planning issues at Dinosaur National Monument. A total of 111 forms were returned, 75 including requests to be retained on the mailing list. Public workshops were conducted in June 1983 in Craig, Colorado, and Vernal, Utah. These were not heavily attended, but the planning issues were discussed. Most of the concern expressed at the workshops centered around logistics of river use and policies about park operations and management rather than on planning issues.



FINDING OF NO SIGNIFICANT IMPACT
STATEMENT OF FINDINGS

FINDING OF NO SIGNIFICANT IMPACT

The National Park Service prepared this plan to guide management of Dinosaur National Monument so its resources will be managed as a total environment, perpetuating the natural, historic, and prehistoric features for which the area was established. The "Environmental Assessment" section of the draft General Management Plan/ Development Concept Plan/ Land Protection Plan/ Environmental Assessment that analyzed alternatives for managing Dinosaur over the next 15 years was released to the public in March 1986. The preferred alternative was identified in that document and is summarized below.

SELECTED ALTERNATIVE

The preferred alternative contains the actions necessary to meet legislative mandates, protect the monument's natural and cultural resources, upgrade roads and repair hazardous sections, improve visitor opportunities to see and learn about the unique resources of the monument, and upgrade facilities, signing, staffing, and services necessary to support the recreational uses already established. Further detail can be found in the "Proposed Action and Alternatives" section of the General Management Plan.

ALTERNATIVES CONSIDERED

Alternative 1, the no-action alternative, would be a continuation of existing management activities. The resources management actions described in the preferred alternative would be implemented only as funds allowed. Alternative 2 would implement the resources protection recommendations of the preferred alternative and would provide only minimum actions necessary to upgrade facilities and improve visitor use. Alternatives 3 and 4 would implement the preferred alternative as well as expand current visitor use opportunities through greatly improved access.

PUBLIC INVOLVEMENT

The environmental assessment was made available for public review and comment during a 30-day period ending March 28, 1986. During this period, 27 responses were received. Four responses came from other federal agencies, eight from state agencies, and one from local government. Nine responses were from the general public, two from concessioners, and three from groups representing several persons. Most respondents favored the preferred alternative, although some took exception to some elements. Those who disagreed with the preferred alternative usually wanted more development.

CONCLUSION

The proposals do not constitute actions that normally require preparation of an environmental impact statement (EIS). The proposals will not have a significant effect on the human environment. Negative environmental impacts that could occur are minor and temporary in effect. There are no adverse impacts on public health, public safety, threatened or endangered species, sites or districts listed on or eligible for listing on the National Register of Historic Places, or other unique characteristics of the region. No highly uncertain or controversial impacts, unique or unknown risks, cumulative effects, or precedent-setting actions were identified. Implementation of the actions will not violate any federal, state, or local laws.

Based on the foregoing, it has been determined that an EIS is not required for this project and thus will not be prepared.

RECOMMENDED: Joe L. Kennedy 6/11/86
Superintendent, Dinosaur National Monument

APPROVED: Lorraine Mintzmyer 8/29/86
Regional Director, Rocky Mountain Region

STATEMENT OF FINDINGS

INTRODUCTION

Because of the requirements of E.O. 11988 "Floodplain Management" (3 CFR 121, Supp. 1977) and E.O. 11990 "Protection of Wetlands" (3 CFR 121, Supp. 1977), as well as the final NPS procedures for implementing these orders, certain restrictions must be placed on development and use at Dinosaur National Monument. Mapping of the 100- and 500-year floodplains was performed by the U.S. Army Corps of Engineers for the headquarters area, Quarry area, Placer Point, the Green River and Split Mountain campgrounds, Rainbow Park, Echo Park, and the Ruple ranch area. The Park Service determined floodplains for development at Deerlodge Park, and the Bureau of Reclamation provided floodplain information for Lodore. The potential for flash flooding was also evaluated.

Although there has been no formal mapping of wetlands at the monument, the U.S. Fish and Wildlife Service has identified some cover types of Yampa River vegetation from aerial photographs. A small area of riparian shrub was identified at the southern end of Lodore campground. The Echo Park campground occupies an area identified as riparian brush and forest.

The March 1986 draft General Management Plan/ Development Concept Plan/ Land Protection Plan/ Environmental Assessment described and analyzed, among other things, the effects of flooding on existing structures and utilities within the monument. A detailed description (including maps) of the alternatives considered for each of the developed areas in the monument can be found in that document. Portions of the alternatives that deal with floodplains are extracted below.

WHY ACTIONS MUST BE LOCATED IN THE FLOODPLAIN OR WETLAND

The use of the existing Green River, Split Mountain, and Lodore campgrounds in the 100-year floodplain exposes visitors to the possibility of loss of life and property in a flood; however, the risks at existing campgrounds are minimized because flooding is predictable (seasonal), generally occurs at a rate allowing for evacuation, and is easily monitored. Relocation of these campgrounds was considered impractical because of the substantial capital investment in existing development and the lack of suitable alternative sites. Alternative sites are generally in arid open areas that are unattractive to visitors, and establishing shade cover would require costly installation and long-term maintenance of irrigation systems. Berming of developments was considered but rejected because of the visual intrusion (6- to 8-foot structures). All sewage treatment facilities would be moved out of the 100-year floodplain in all alternatives.

Because the campgrounds will remain in the 100-year floodplains, all pit toilets will be converted to flush or vault toilets and floodproofed in all developed areas.

ALTERNATIVES CONSIDERED

In all of the alternatives considered, all or part of the Echo Park campground would be moved from the 100-year floodplain. All alternatives except no action would relocate the Deerlodge Park campground outside the 100-year floodplain. The conversion of the Echo Park campground to a picnic area as proposed in alternative 4 would reduce the potential effects of flooding, as would the closure of the Rainbow Park campground and its conversion to a picnic area proposed in alternatives 3 and 4.

The no-action and preferred alternatives, as well as alternative 2, would maintain existing campground use in the 100-year floodplain at Rainbow Park. The proposed campground at the Ruple ranch (alternatives 3, 4, and preferred) would be developed outside the 100-year floodplain.

MODIFICATIONS TO MINIMIZE HARM

An emergency flood response and evacuation plan would be developed by the monument staff for dealing with all flood-prone areas of the monument under all alternatives. Warning signs would be posted in flood hazard areas, and facilities and structures in the 100-year floodplain would be marked with flood heights. Evacuation routes would be identified as necessary, and provisions would be made for temporary water and sewer service. This plan would reduce the risk of loss of life and property to visitors.

AFFECT ON NATURAL OR BENEFICIAL FLOODPLAIN VALUES

Current NPS developments and facilities have no significant impacts on natural flooding processes or on floodplain values, and none of the alternatives would affect the natural moderation of floodwaters, maintenance of water quality, or groundwater recharge. No living resource values would be affected.

The relocation of the campground at Echo Park would reduce the wetland area (riparian brush and forest) subjected to foot traffic and campground development.

There are no state or local floodplain protection standards that would affect the NPS proposals.

The standards and criteria of the National Flood Insurance Program (44 CFR 60) will be followed where appropriate.

CONCLUSION

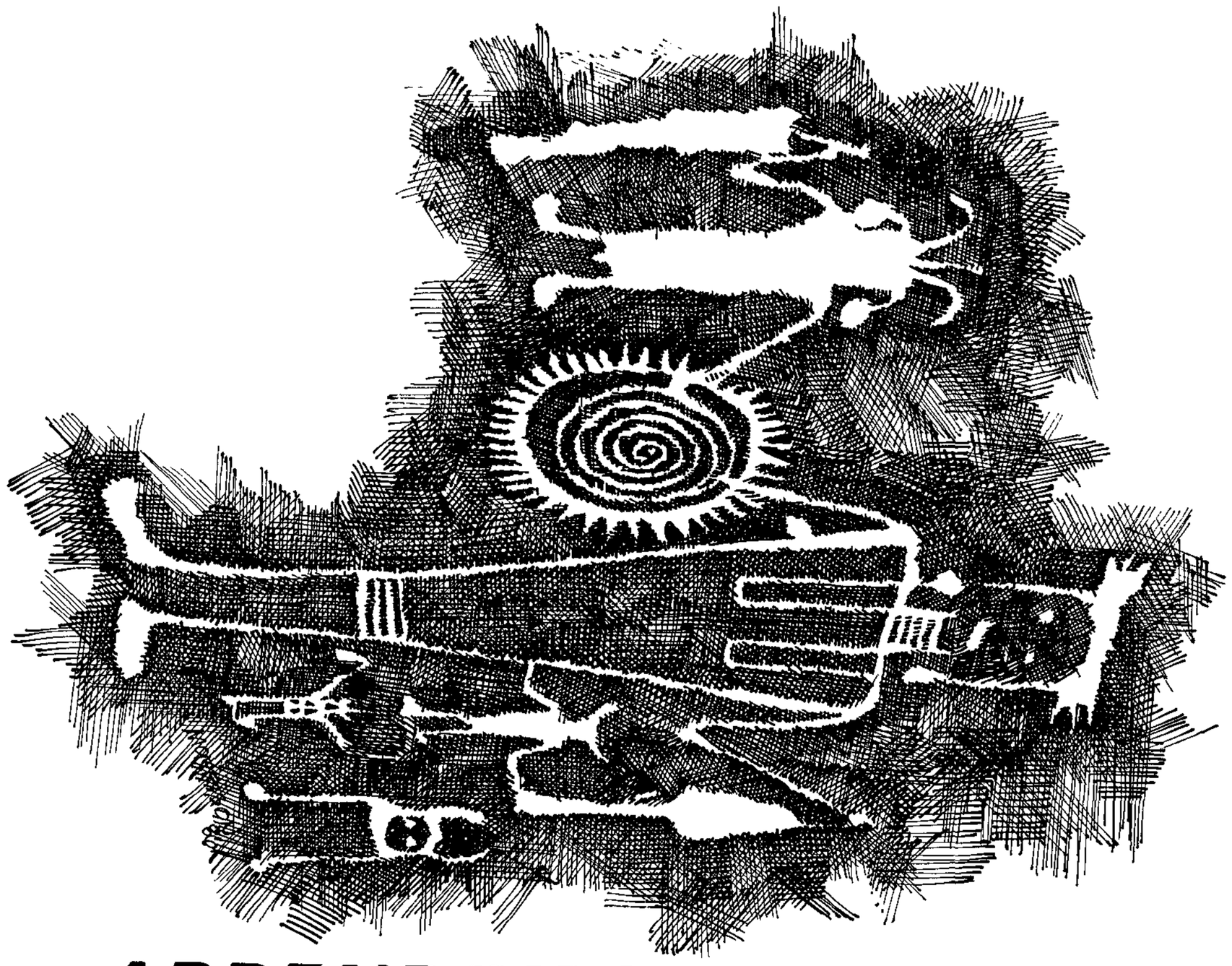
Based on the proposed action and mitigating measures described above, the National Park Service has determined that the preferred alternative is the only practicable alternative. This decision was based on the need to provide for adequate visitor and administrative structures/facilities for visitor opportunities and resource protection. The risk to human safety will be minimized by the emergency flood response and evacuation plan. The risk to federal investment is understood. There will be no effect on the natural or beneficial values of floodplains or wetlands. No structures or facilities exist or are proposed in any high-hazard area that is subject to flooding events so unexpected, violent, or otherwise devastating that human lives would be placed in immediate or grave danger.

RECOMMENDED: JUN 12 1986

Regional Director, Rocky Mountain Region
Acting

APPROVED: Acting 07/14/86

Director, National Park Service



APPENDIXES

26. Dinosaur National Monument

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Establishment: Proclamation (No. 1313) of Oct. 4, 1915	173
Boundaries enlarged: Proclamation (No. 2290) of July 14, 1938	175

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

[No. 1313—Oct. 4, 1915—39 Stat. 1752]

WHEREAS, in section twenty-six, township four south, range twenty-three east of the Salt Lake meridian, Utah, there is located an extraordinary deposit of Dinosaurian and other gigantic reptilian remains of the Juratrias period, which are of great scientific interest and value, and it appears that the public interest would be promoted by reserving these deposits as a National Monument, together with as much land as may be needed for the protection thereof.

NOW, THEREFORE, I, Woodrow Wilson, President of the United States of America, by virtue of the power in me vested by Section two of the act of Congress entitled, "An Act for the Preservation of American Antiquities", approved June 8, 1906, do hereby set aside as the Dinosaur National Monument, the unsurveyed northwest quarter of the southeast quarter and the northeast quarter of the southwest quarter of section twenty-six, township four south, range twenty-three east, Salt Lake meridian, Utah, as shown upon the diagram hereto attached and made a part of this proclamation.

While it appears that the lands embraced within this proposed reserve have heretofore been withdrawn as coal and phosphate lands, the creation of this monument will prevent the use of the lands for the purposes for which said withdrawals were made. Warning is hereby expressly given to all unauthorized persons not to appropriate, excavate, injure or destroy any of the fossil remains contained within the deposits hereby reserved and declared to be a National Monument or to locate or settle upon any of the lands reserved and made a part of this monument by this proclamation.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the city of Washington, this fourth day of October, in the year of our Lord one thousand nine hundred and fifteen and the
[SEAL] Independence of the United States the one hundred and fortieth.

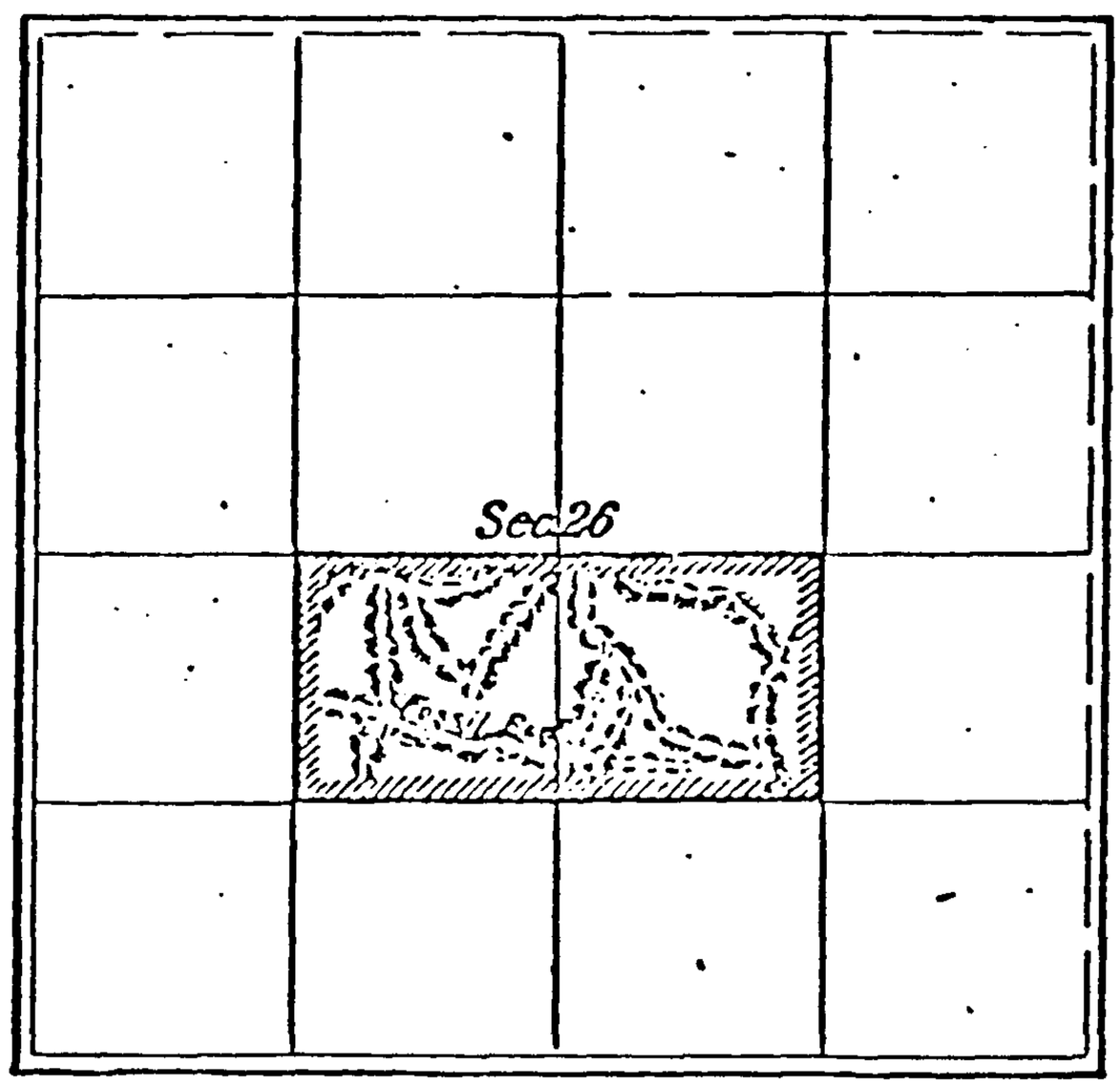
WOODROW WILSON.

By the President:
ROBERT LANSING,
Secretary of State.

DINOSAUR NATIONAL MONUMENT
UTAH

Embracing the NW.¼ of the SE.¼ and the NE.¼ of the SW.¼ of Sec. 26, (Unsurveyed) in T. 4 S., R. 23 E., Salt Lake Mer.

Monument Boundary



DEPARTMENT OF THE INTERIOR
Franklin K. Lane, Secretary
GENERAL LAND OFFICE
Clay Tallman, Commissioner

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

[No. 2290—July 14, 1938—53 Stat. 2454]

WHEREAS certain public lands contiguous to the Dinosaur National Monument, established by Proclamation of October 4, 1915, have situated thereon various objects of historic and scientific interest; and

WHEREAS it appears that it would be in the public interest to reserve such lands as an addition to the said Dinosaur National Monument:

NOW, THEREFORE, I, Franklin D. Roosevelt, President of the United States of America, under and by virtue of the authority vested in me by sec. 2 of the act of June 8, 1906, ch. 3060, 34 Stat. 225 (U. S. C., title 16, sec. 431), do proclaim that, subject to all valid existing rights, the following-described lands in Colorado and Utah are hereby reserved from all forms of appropriation under the public-land laws and added to and made a part of the Dinosaur National Monument:

COLORADO

SIXTH PRINCIPAL MERIDIAN

T. 6 N., R. 99 W., sec. 5, W½,
secs. 6 and 7,
sec. 8, W½,
sec. 17, W½,
secs. 18 and 19,
sec. 20, W½,
sec. 29, W½,
secs. 30 and 31,
sec. 32, W½; (partly unsurveyed)
T. 6 N., R. 100 W., secs. 1 to 30 and 33 to 36, inclusive;
T. 6 N., R. 101 W., secs. 1 to 30, inclusive; (partly unsurveyed)
T. 7 N., R. 101 W., secs. 25 to 36, inclusive; (partly unsurveyed)
T. 6 N., R. 102 W., secs. 1 to 30, inclusive; (partly unsurveyed)
T. 7 N., R. 102 W., secs. 5 to 8, 17 to 20, and 25 to 36, inclusive; (partly unsurveyed)
T. 8 N., R. 102 W., secs. 5 to 8, 17 to 20, and 27 to 34, inclusive; (partly unsurveyed)
T. 9 N., R. 102 W., secs. 16 to 21, and 28 to 33, inclusive; (partly unsurveyed)
T. 6 N., R. 103 W., secs. 1 to 14, inclusive;
secs. 23 and 24;
T. 7 N., R. 103 W., all; (partly unsurveyed)
T. 8 N., R. 103 W., sec. 1,
sec. 2, E½,
sec. 11, E½,
secs. 12 to 15, 22 to 28, and 32 to 36, inclusive; (partly unsurveyed)
T. 9 N., R. 103 W., secs. 13, 24, 25 and 36;
T. 6 N., R. 104 W., secs. 1, 2, 11 and 12; (partly unsurveyed)
T. 7 N., R. 104 W., all;

UTAH

SALT LAKE MERIDIAN

T. 4 S., R. 23 E., secs. 9 to 16 and 21 to 25, inclusive;
sec. 26, N½, E½SE¼, SW¼ SE¼ W½ SW¼, SE¼ SW¼
secs. 27, 28, and those parts of secs. 34 and 35 north of Green River; (partly unsurveyed)
T. 3 S., R. 24 E., secs. 25, 26, 35 and 36;
T. 4 S., R. 24 E., secs. 1 to 3, and 7 to 30; inclusive, (partly unsurveyed)
T. 3 S., R. 25 E., sec. 11, E½,
secs. 12 and 13,
sec. 14, E½,
secs. 20 to 36; inclusive, (partly unsurveyed)
T. 4 S., R. 25 E., secs. 1 to 12, inclusive, (partly unsurveyed)
aggregating 203,885 acres.

Warning is hereby expressly given to any unauthorized persons not to appropriate, injure, destroy or remove any feature of this monument and not to locate or settle upon any of the lands thereof.

The reservation made by this proclamation supersedes as to any of the above-described lands affected thereby, the temporary withdrawal for classification and for other purposes made by Executive Order No. 5684 of August 12, 1931, and the Executive order of April 17, 1926, and the Executive order of September 8, 1933, creating Water Reserves No. 107 and No. 152.

The Director of the National Park Service, under the direction of the Secretary of the Interior, shall have the supervision, management, and control of this monument as provided in the act of Congress entitled "An act to establish a National Park Service, and for other purposes," approved August 25, 1916, 39 Stat. 535 (U. S. C., title 16, secs. 1 and 2) and acts supplementary thereto or amendatory thereof, except that this reservation shall not affect the operation of the Federal Water Power Act of June 10, 1920 (41 Stat. 1063), as amended, and the administration of the monument shall be subject to the Reclamation Withdrawal[1] of October 17, 1904, for the Brown's Park Reservoir Site in connection with the Green River project.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the City of Washington this 14th day of July, in the year of our Lord nineteen hundred and thirty-eight, and of the Independence of the United States of America the one hundred and sixty-third.

[SEAL]

FRANKLIN D. ROOSEVELT.

By the President:
CORDELL HULL,
The Secretary of State.

[1] First form of withdrawal, pursuant to sec. 3, act of June 17, 1902 (32 Stat. 388).

12. Dinosaur National Monument

Page

Boundaries of monument revised; entrance road provided ..... Act of September 8, 1960 406

An Act To revise the boundaries of Dinosaur National Monument and provide an entrance road or roads thereto, and for other purposes, approved September 8, 1960 (74 Stat. 857)

Dinosaur National Monument. Boundaries revised. 39 Stat. 1752.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the boundaries of Dinosaur National Monument, established in pursuance of the Act of June 8, 1906 (34 Stat. 225; 16 U.S.C., 1952 edition, sec. 431), and administered in accordance with the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C., 1952 edition, sec. 1, et seq.), and Acts supplementary thereto and amendatory thereof, are hereby revised so that the monument shall include, subject to valid existing rights, those lands in the States of Colorado and Utah, encompassed within the following described boundaries:

Beginning at a point on the Utah-Colorado State boundary line at the northeast corner of section 12, township 3 south, range 25 east, Salt Lake meridian, Utah—

thence westerly along the north lines of said section 12, and section 11, said township and range, to the north quarter-section corner of said section 11;

thence southerly along the north-south quarter-section lines of said section 11, and section 14, township 3 south, range 25 east, to the north quarter-section corner of section 23, said township and range;

thence westerly along the north lines of said section 23 and sections 22, 21, and 20, said township and range, to the northwest corner of said section 20;

thence southerly along the west line of said section 20 to the northeast corner of section 30, said township and range;

thence westerly along the north lines of said section 30, said township 3 south, range 25 east, and section 25, township 3 south, range 24 east, to the north quarter-section corner of said section 25;

thence southerly along the north-south quarter-section lines of said section 25 and section 36 of said township and range to the northeast corner of the southwest quarter of said section 36;

thence westerly along the east-west quarter-section lines of said section 36 and section 35 of said township and range to the west quarter-section corner of said section 35;

thence southerly along the west line of said section 35, said township 3 south, range 24 east, to the south-

west corner of said section 35, at a point on the north line of section 3, township 4 south, range 24 east;

thence westerly along the north line of said section 3 to the northwest corner of said section 3;

thence southerly along the west line of said section 3 to the southwest corner of said section 3;

thence westerly along the south lines of sections 4, 5, and 6, said township 4 south, range 24 east, and unsurveyed sections 1, 2, 3, and 4, township 4 south, range 23 east, to the north quarter-section corner of unsurveyed section 9, said township and range;

thence southerly along the north-south quarter-section lines of said unsurveyed section 9 and unsurveyed sections 16 and 21 and sections 28 and 33, said township and range, to the southwest corner of the northeast quarter of said section 33;

thence easterly along the east-west quarter-section line of said section 33, said township 4 south, range 23 east, to the mean high water mark on the north or right bank of the Green River;

thence upstream along the mean high water mark on the north or right bank of the Green River within said township and range and township 5 south, range 23 east, township 5 south, range 24 east, and township 4 south, range 24 east, to a point at its intersection with the south line of section 30, said township 4 south, range 24 east;

thence easterly along the south lines of said section 30 and sections 29, 28, and 27, said township and range, to the north quarter-section corner of section 34 of said township and range;

thence southerly along the north-south quarter-section lines of said section 34, said township 4 south, range 24 east, and section 3, township 5 south, range 24 east, to the southwest corner of the northeast quarter of said section 3;

thence easterly along the east-west quarter-section lines of said section 3 and sections 2 and 1 of said township and range to the east quarter-section corner of said section 1;

thence northerly along the east lines of said section 1, said township 5 south, range 24 east, and sections 36, 25, 24 and unsurveyed section 13, township 4 south, range 24 east, to the northeast corner of said unsurveyed section 13, said township and range;

thence easterly along the south lines of sections 7, 8, 9, 10, 11 and fractional section 12, township 4 south, range 25 east, Salt Lake meridian, Utah, to a point of the Utah-Colorado State boundary line;

thence southerly along the Utah-Colorado State boundary line, being the west line of fractional sections 11, 14, and 23, fractional township 6 north, range 104 west, sixth principal meridian, Colorado,

to the southwest corner of lot 12, said fractional section 23, said fractional township and range;

thence easterly along the south one-sixteenth latitudinal section lines of said fractional section 23 and section 24, said fractional township and range, to the northwest corner of the southwest quarter of the southeast quarter of said section 24;

thence southerly along the north-south quarter-section line of said section 24 to the south quarter-section corner of said section 24;

thence easterly along the south lines of said section 24, said fractional township 6 north, range 104 west, and section 19, township 6 north, range 103 west, to the northwest corner of section 29, said township and range;

thence southerly along the west line of said section 29 to the southwest corner of the northwest quarter of the northwest quarter of said section 29;

thence easterly along the north one-sixteenth latitudinal section lines of said section 29 and section 28 of said township and range to the southwest corner of the northwest quarter of the northeast quarter of said section 28;

thence southerly along the north-south quarter-section line of said section 28 to the southwest corner of the northwest quarter of the southeast quarter of the said section 28;

thence easterly along the south one-sixteenth latitudinal section lines of said section 28 and section 27, said township and range, to the northwest corner of the southwest quarter of the southwest quarter of section 26, said township and range;

thence southerly along the west lines of said section 26 and section 35, said township and range, to the west quarter-section corner of said section 35;

thence easterly along the east-west quarter-section lines of said section 35 and section 36, said township and range, and sections 31, 32, 33, 34, 35, and 36, township 6 north, range 102 west, sections 31, 32, 33, 34, 35, and 36, township 6 north, range 101 west, and sections 31, 32, 33, 34, 35, and 36, township 6 north, range 100 west, sections 31, and 32, township 6 north, range 99 west, to the southeast corner of the northwest quarter of said section 32;

thence northerly along the north-south quarter-section lines of said section 32 and section 29, said township and range, to the southwest corner of the northeast quarter of said section 29;

thence easterly along the east-west quarter-section lines of said section 29 and sections 28 and 27, said township and range, to the southeast corner of the northwest quarter of said section 27;

thence northerly along the north-south quarter-

section lines of said section 27 and section 22, said township and range, to the northeast corner of the southwest quarter of said section 22;

thence westerly along the east-west quarter-section line of said section 22 to the east quarter-section corner of section 21, said township and range;

thence northerly along the east line of said section 21 to the northeast corner of said section 21;

thence westerly along the north line of said section 21 to the southeast corner of unsurveyed section 17, said township and range;

thence northerly along the east line of said unsurveyed section 17 to the east quarter-section corner of said unsurveyed section 17;

thence westerly along the east-west quarter-section line of said unsurveyed section 17 to the southeast corner of the northwest quarter of said unsurveyed section 17;

thence northerly along the north-south quarter-section lines of said unsurveyed section 17 and unsurveyed section 8, said township and range, to the north quarter-section corner of said unsurveyed section 8;

thence westerly along the north lines of said unsurveyed section 8 and unsurveyed section 7, said township 6 north, range 99 west, sections 12, 11, 10, 9, and 8, township 6 north, range 100 west, to the southeast corner of section 6, said township and range;

thence northerly along the east line of said section 6 to the east quarter-section corner of said section 6;

thence westerly along the east-west quarter-section lines of said section 6, said township 6 north, range 100 west, and unsurveyed sections 1 and 2, township 6 north, range 101 west, to the east quarter-section corner of unsurveyed section 3, said township and range;

thence northerly along the east section lines of said unsurveyed section 3, said township 6 north, range 101 west, and section 34, township 7 north, range 101 west, to the east quarter-section corner of said section 34;

thence westerly along the east-west quarter-section line of said section 34 to the east quarter-section corner of unsurveyed section 33, said township and range;

thence northerly along the east section lines of said unsurveyed section 33 and unsurveyed section 28, said township and range, to the east quarter-section corner of said unsurveyed section 28;

thence westerly along the east-west quarter-section lines of said unsurveyed section 28 and unsurveyed sections 29 and 30, said township 7 north, range 101

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west, and unsurveyed sections 25, 26, 27, and 28, township 7 north, range 102 west, to the east quarter-section corner of unsurveyed section 29, said township and range;

thence northerly along the east section line of said unsurveyed section 29 to the northeast corner of said unsurveyed section 29;

thence westerly along the north lines of said unsurveyed section 29 and unsurveyed section 30, said township and range, to the north quarter-section corner of said unsurveyed section 30;

thence northerly along the north-south quarter-section lines of unsurveyed sections 19 and 18 and sections 7 and 6 of said township 7 north, range 102 west, to the south quarter-section corner of section 31, township 8 north, range 102 west;

thence easterly along the south lines of said section 31 and section 32, said township and range, to the south quarter-section corner of said section 32;

thence northerly on the north-south quarter-section line of said section 32 to the southwest corner of the northeast quarter of said section 32;

thence easterly on the east-west quarter-section lines of said section 32 and section 33, said township and range, to the east quarter-section corner of said section 33;

thence northerly on the east lines of said section 33 and sections 28, 21, and 16, said township and range, to the east quarter-section corner of said section 16;

thence westerly on the east-west quarter-section line of said section 16 to the east quarter-section corner of section 17, said township and range;

thence northerly on the east section lines of said section 17 and section 8 and unsurveyed elongated section 5, said township 8 north, range 102 west, to a point in the south line of section 33, township 9 north, range 102 west;

thence easterly along the south line of said section 33 to the south quarter-section corner of said section 33;

thence northerly along the north-south quarter-section lines of said section 33 and sections 28, 21, and 16, said township and range, to the north quarter-section corner of said section 16;

thence westerly along the north lines of said section 16 and sections 17 and 18, said township and range, to the north quarter-section corner of said section 18;

thence southerly along the north-south quarter-section lines of said section 18 and section 19, said township and range, to the north quarter-section corner of section 30, said township and range;

thence westerly along the north line of said section 30 to the northwest corner of said section 30;

thence southerly along the westerly line of said section 30, said township 9 north, range 102 west, to the northeast corner of section 36, township 9 north, range 103 west;

thence westerly along the north line of said section 36 to the northwest corner of said section 36, said township and range;

thence southerly along the west line of said section 36, said township 9 north, range 103 west, to a point in the north line of elongated section 2, township 8 north, range 103 west;

thence westerly along the north line of said elongated section 2 to the northwest corner of lot 6, being a midpoint of the north line of said elogonated section 2;

thence southerly along the north-south line dividing said elongated section 2 to the north quarter-section corner of section 11, said township and range;

thence southerly along the north-south quarter-section line of said section 11 to the south quarter-section corner of said section 11;

thence westerly along the south line of said section 11 and the north line of section 15, said township and range, to the northwest corner of said section 15;

thence southerly along the west lines of said section 15 and sections 22 and 27, said township and range, to the northeast corner of section 33, said township and range;

thence westerly along the north lines of said section 33 and section 32, said township and range, to the northwest corner of said section 32;

thence southerly along the west lines of said section 32, said township 8 north, range 103 west, and section 5, township 7 north, range 103 west, to the northeast corner of section 7, said township and range;

thence westerly along the north lines of said section 7, said township 7 north, range 103 west, and section 12 and fractional section 11, fractional township 7 north, range 104 west, sixth principal meridian, Colorado, to a point on the Utah-Colorado State boundary line, being the northeast corner of section 12, township 3 south, range 25 east, Salt Lake meridian, Utah, the point of beginning.

The tract as described contains approximately 208,760 acres, subject to adjustment to lines of public land surveys.

Entrance road.

SEC. 2. (a) In order to provide suitable access to Dinosaur National Monument and facilities and services required in the operation and administration of the monu-

ment, the Secretary of the Interior is authorized to select the location of an entrance road or roads to the monument and to points of interest therein, from U.S. Route 40, including an entrance and related administrative headquarters site of not more than four hundred acres, and he may provide, upon lands donated outside of the monument, connections between Dinosaur National Monument park roads. To carry out the purposes of this Act the Secretary of the Interior may acquire non-Federal lands or interests in lands by donation, purchase, or exchange: *Provided*, That lands and interests acquired for said entrance roads and connections shall consist of the fee title to a right-of-way of not more than an average of twenty-five acres per mile and of scenic easements on lands adjoining the right-of-way, said easements not to exceed an average of one hundred acres per mile. Said roads and administrative site shall constitute a part of Dinosaur National Monument and be administered pursuant to such special regulations as the Secretary of the Interior shall promulgate in furtherance of the purposes of this section.

Regulations.

(b) The Secretary of the Interior is hereby authorized to construct, reconstruct, improve, and maintain upon the land so acquired or otherwise in Government ownership an entrance road or roads and connections of parkway standards, including necessary bridges and other structures and utilities as necessary, and funds appropriated for the National Park Service shall be available for these purposes.

Appropriations.

Grazing lands.

SEC. 3. Where any Federal lands included within the boundaries of Dinosaur National Monument as revised pursuant to this Act were legally occupied or utilized on the date of approval of this Act for grazing purposes pursuant to a lease, permit, or license issued or authorized by any department, establishment, or agency of the United States the person so occupying or utilizing such lands, and the heirs, successors, or assigns of such person, shall upon the termination of such lease, permit, or license be entitled to have the privilege so possessed or enjoyed by him renewed from time to time, subject to such terms and conditions as the Secretary of the Interior shall prescribe, for a period of twenty-five years from the date of approval of this Act, and thereafter during the lifetime of such person and the lifetime of his heirs, successors, or assigns, but only if they were members of his immediate family on such date, as determined by the Secretary of the Interior: *Provided*, That grazing privileges appurtenant to privately owned lands located within Dinosaur National Monument shall not be withdrawn until title to the lands to which such privileges are appurtenant shall have vested in the United States, except for failure to comply with the regulations applicable thereto after reasonable notice of default.

National Park Service

Dinosaur National Monument Colorado; Selection of Entrance Road

Notice is hereby given that the location for an entrance road, including the roadway and adjacent scenic easement areas to the Dinosaur National Monument, serving the east entrance to the Monument at Deerlodge Part—including Ranger Station, and related campground and boat launch facilities—has been selected pursuant to the provisions of section 2 of the Act of September 8, 1960 (74 Stat. 857–861).

The road and scenic easement is 12.587 miles in length, extending northerly and westerly from U.S. Highway 40 to the Dinosaur National Monument boundary near Deerlodge Park.

The road location selected embraces approximately 296.12 acres in a strip 200 feet wide that is to be acquired by the United States in fee or is already owned by the United States, and also approximately 1,175.84 acres of adjoining lands in a strip 400 feet wide on each side of the aforesaid 200 foot wide strip that will be subject to acquisition of scenic easements on nonfederal lands. The latter lies generally within 500 feet of the centerline and within 400 feet on each side of the 200 foot strip for the subject road. Approximately 622 acres in the area for scenic easement control are already owned by the United States. The lands and ownerships involved are depicted on Drawing No. 122/92,003 entitled "Dinosaur National Monument Land Status Map 09" and this drawing and the scenic easement estate and restrictions are on file in the office of the Superintendent at Dinosaur National Monument, Dinosaur, Colorado; the National Park Service Rocky Mountain Regional Office, Division of Land Resources in Lakewood, Colorado; and the National Park Service, Land Resources Division, Branch of Coordination and Control, Washington, D.C.

As provided in section 2(a) of the Act of September 8, 1960, the lands included in this notice constitute a part of the Dinosaur National Monument and therefore are subject to the laws and regulations applicable thereto. Such lands shall also be subject to any special regulations published by the Secretary of the Interior in furthermore of the purposes of said section. Consequently, the Federal lands within the Monument boundaries are closed to all forms of entry and appropriation under the public land laws, including the Mining Law of 1872 (30 U.S.C 22), and to mineral leasing under the Mineral Leasing Act of 1920 (30 U.S.C. 181), or the Mineral Leasing Act for Acquired Lands of 1947 (30 U.S.C 351). Valid existing rights in and to the Federal lands set forth in this Notice, existing on the date of this Notice, are not affected hereby.

Notwithstanding the inclusion of these lands in the Monument, the Bureau of Land Management is authorized to administer the former public lands within the location hereby selected for scenic easement control, for the purpose of grazing, insofar as grazing is consistent with section 3 of the Act of September 8, 1960.

Dated: August 27, 1985.

William Penn Mott, Jr.,

Director.

[FR Doc. 85–21595 Filed 9–9–85; 8:45 am]

BILLING CODE 4310–70–M

APPENDIX B: MANAGEMENT OBJECTIVES

These objectives are from the "Statement for Management" (NPS 1985).

General

Manage all the monument's resources as a total environment to perpetuate the natural, historic, and prehistoric features for which the area was established.

Acquire or otherwise protect, consistent with the Land Protection Plan, private and state inholdings as they become available.

Coordinate and cooperate with local agencies and groups to protect, manage, and portray significant regional resources.

Encourage the private sector to provide and expand overnight accommodations and services near the monument to supplement the camping opportunities provided by the park at the major use areas.

Maintain all park roads and facilities so as to maximize safe use and enjoyment by visitors while protecting the government's investments.

Provide concession services, such as river running and public transportation, necessary to facilitate visitor use.

Provide staffing sufficient to protect, manage, and interpret park resources and values.

Resources Management

Continue to provide a completed in situ fossil display at the quarry visitor center.

Gather baseline data on the geographic and geologic distribution and significance of fossil resources beyond the confines of the visitor center.

Improve and expand the management and interpretation of resources and resource data in accordance with NPS standards, 41 CFR 114, and NPS management policies.

Terminate grazing of domestic livestock in accordance with P.L. 86-729. In the interim, manage grazing so as to mitigate its impacts on monument resources and values.

Preserve the endangered Yampa River ecosystem; secure instream flow water rights sufficient to sustain monument values and uses.

Protect, manage, and maintain natural plant and animal communities within the monument.

Reestablish extirpated species when and where such reintroductions are feasible.

Repress the occurrence and spread of exotic species where feasible.

Protect, manage, and recover endangered species and their habitats where feasible and in cooperation with other federal agencies, state agencies, and participating entities.

Identify, protect, and preserve historic and prehistoric features.

Protect monument resources and values from adverse external influences.

Manage river use to minimize visitor impacts in the river canyons.

Restore fire to its natural role in ecosystem maintenance within the limits prescribed by the "Fire Management Plan". Cooperate with BLM and other entities in the management of interagency natural fire zones.

Encourage qualified research and management studies to increase knowledge of monument resources, to develop a comprehensive resource base inventory, and to provide management with the information necessary to make ecologically sound decisions. Particular emphasis will be placed on research on critical park resources such as the Yampa River ecosystem and endangered species.

Preserve pristine air quality in accordance with the Clean Air Act, as amended.

Maximize knowledge of the Paleo-Indian, Fremont, and Ute/Shoshoni occupations of monument lands, as well as the subsequent exploration and settlement of the same during historic time to enable management to make knowledgeable decisions concerning cultural resources.

Consistent with the cultural resources component of the resources management plan, identify and monitor the condition of all known cultural sites, both archeological and historical.

Visitor Services

Promote handicap access to park facilities whenever and wherever possible.

Ensure that interpretive programs and services adequately portray monument resources and values to visitors from a wide variety of educational, cultural, and social backgrounds.

Provide backcountry use opportunities within the monument consonant with resource protection.

Ensure a range of wilderness experiences for river runners of the Green and Yampa rivers.

APPENDIX C: INVENTORY OF SIGNIFICANT RESOURCES IN DINOSAUR NATIONAL MONUMENT

Theme Classification	Significant Resources	Specific Examples or Locations	Remarks
		NATURAL RESOURCES	
LANDFORMS			
	Geological Processes:		
	Mountain building	Uinta Mountains	The Uintas are the largest east-west range of mountains in the Western Hemishpere (except Alaska).
	Erosion	Entire monument	A 2- to 3-mile thickness of rock has been eroded from the region in the past 70 million years.
	Sedimentary deposition	Browns Park	Great thicknesses of older rock were eroded and redeposited in deep basins in the region.
	Stream piracy	Uinta crest across Lodore Canyon	The Continental Divide once traversed Dinosaur, but headward erosion by the Green River has shifted it northward 150 miles.
	Geological Features:		
	Structural Features-- Anticlines	Split Mountain, Blue Mountain	
	Synclines	Island Park and Jensen areas	Few places have features as well displayed, as classic, and with so many in juxtaposition as at Dinosaur. Erosion has progressed to a fortunate midstage where a great diversity of rocks and structures has been laid bare or dissected. The area is used extensively for geological research and as a teaching resource.
	Monoclines	Mitten Park, Island Park	
	Reverse faults	Island Park, Yampa Bench	
	Stairstep faults	Yampa Bench area	
	Meeting place of 3 faults	Mitten Park, Red Rock, and Yampa faults	
	Graben	Between Uinta and Yampa faults	
	Erosional Features-- Entrenched rivers	Four major canyons of the monument	Universal theories of antecedence, superposition, and drainage shifting have been strongly influenced by the geology at Dinosaur. Split Mountain anticline has been breached to its core by the Green River--a striking erosional anomaly.
	Antecedent streams	Drainages throughout the monument	
	"Racetrack" topography	Split Mountain	
	"Fossil" seastacks	Whirlpool Canyon	
	Four major river canyons	Yampa, Lodore, Split Mountain, Whirlpool	All four canyons are geologically distinct, showing different rock formations variously uplifted and eroded. They are regarded as great outdoor laboratories for geological study.
	Flooding and river processes	Green River, Yampa River	Riverbed gradient and sediment studies are underway for Yampa River.
GEOLOGIC HISTORY	Rock record spanning ¼ of the age of the earth. Includes 26 rock formations.	Entire monument	The rock record at Dinosaur covers a more complete span of time than at the Grand Canyon. The colorful strata have been upturned by folding and faulting, exhibiting numerous rock formations within short distances.

Theme Classification	Significant Resources	Specific Examples or Locations	Remarks
	Record of most major fluctuations in sea level (cycles of flooding) of North America.	Entire monument	
	Jurassic dinosaur fossils: -largest number of individuals -largest number of species -many complete skeletons -many skulls, juveniles -excellent state of preservation -complete community preserved	Dinosaur quarry display. Also potential for discoveries in other exposures of Morrison formation (Island Park, Split Mountain, Deerlodge Park)	Most productive quarry in the world for Jurassic dinosaurs. Best known and most extensively studied "window" into any single Jurassic paleo-environment. Source of only complete skull of Apatosaurus. Remains of 9-10 dinosaur genera, crocodiles, turtles, frogs, etc.
	Mesozoic fossils (other than Jurassic Period)		Extent unknown due to insufficient study, but to date over 100 fossil localities are known outside of the quarry building. Scattered discoveries of fossil bones, footprints, and plants of Triassic age indicate that resource maybe extensive and significant.
	Paleozoic fossils	Whirlpool Canyon, Split Mountain Gorge	Brachiopods, corals, crinoids, snails, rare trilobites. Extent unknown because of insufficient study.
	Museum collections	Collections housed primarily at the quarry visitor center	The paleontological collections are of worldwide significance and are a permanent resource for research.
LAND COMMUNITIES OF PLANTS AND ANIMALS	Meeting of mountains and high desert. Elevation range 4,735'-9,006'		
	Upland habitats	Monument-wide	Four major upland plant systems: Sagebrush/grassland Pinyon/juniper Douglas fir/Ponderosa pine Mountain mahogany
	Riparian habitat	Yampa River	Some of last natural/near-natural riparian habitats in Colorado River Basin due to free-flowing nature of Yampa River.
	Rare plants	13 sensitive species have been identified	Vegetation surveys are not yet complete; however, the Colorado Natural Heritage Inventory has identified 22 plant associations and 16 plant species of special concern that may exist within Dinosaur.
	Mammals	Bighorn sheep, mule deer (4 significant winter ranges), pronghorn antelope, elk, bobcat, mountain lion, black bear, coyote, ringtail, mink	
	Birds	Swainson's hawk, ferruginous hawk, Canada goose, golden eagle, prairie eagle, rough-legged hawk, red-tailed hawk, sage grouse, blue grouse, goshawk, marsh hawk, great blue heron, pinyon jay, and mountain bluebird.	Dinosaur has a unique avifauna because of the diversity of habitats, and particularly because of riparian habitats. Additional research is needed to better document Dinosaur's avifauna.
	Endangered species	Colorado squawfish Humpback chub -Yampa River Bonytail chub Bald eagle (winter range) Black-footed ferret	Bonytail chub believed to be extirpated. Primary spawning areas for Colorado squawfish in Colorado River Basin (only two known, one at Dinosaur). Free-flowing Yampa, with its concentration areas, spawning areas, and migration routes, may be critical to the survival of the squawfish throughout its remaining range. Yampa also contains suspected spawning areas for humpback chub. Ferret possible, but not

Theme Classification	Significant Resources	Specific Examples or Locations	Remarks
		Peregrine falcon	Dinosaur plays a critical role in recovery efforts to establish a core breeding population of peregrines. (Is northernmost remnant of naturally breeding peregrines in the Rocky Mountains.)
	Diminishing species	Razorback sucker Spotted bat	
	Extirpated species	Wolf Bison (petroglyphs in Island Park, also bone material found in the monument) Wolverine	Habitat is suitable for reintroduction of bison after grazing is phased out of the monument.
AQUATIC ECOSYSTEMS	Unimpeded river processes	Yampa River	Last major free-flowing tributary in the Colorado River system and essential habitat for endangered fish species.
SCENIC RESOURCES	Four canyons, each with a distinctive scenic character depending on geologic formations structure, and vegetation	Split Mountain Canyon	Arid with jagged walls
		Whirlpool Canyon	Scenically varied, spectacular faulting and drag folding
		Yampa Canyon	Striped sandstone walls and convoluted meanders
		Lodore Canyon	Ancient red quartzite, sandstone; deepest canyon in Dinosaur
	Magnificent vistas from canyon overlooks	Harpers Corner	Views of Whirlpool, Lodore, and Yampa canyons; Echo Park; and Mitten Park fault.
		Ruple Point	Views of the heart of the Split Mountain anticline, Island Park, Rainbow Park, and Diamond Mountain.
		CULTURAL RESOURCES	
INHABITANTS, EXPLORERS, AND SETTLERS			
The Earliest Cultures	Archeological remains representing three ancient lifeways: -Desert -Intermontane -High Plains	Swelter Shelter Deluge Shelter Baker Cabin Spring Lowell Spring	Prehistoric habitation dates from over 400 known sites 6000-7000 B.C. to A.D. 1150 inclusive. Deluge Shelter contains a stratigraphic record of 8,000-9,000 years of activity, making it one of the longest continuously occupied sites in the West. Deluge Shelter also shows a blend of eastern (High Plains) and western (Great Basin-Fremont) traditions. Archeologists claim that Dinosaur could have been designated as a unit of the national park system for its archeological uniqueness alone.

Theme Classification	Significant Resources	Specific Examples or Locations	Remarks
Prehistoric Villages and Communities	Archeological and rock art remains of the Fremont culture.	Village sites at Cub Creek, also the occupation at Deluge Shelter, Marigold Cave, Mantle Cave, Hells Midden	Fremont group (A.D. 950 to 1150) is probably the best known culture at Dinosaur.
		Pictograph/petroglyph sites at Cub Creek, McKee Spring, Echo Park, Jones Hole, and Yampa Canyon (esp. the Mantle Ranch vicinity)	Lizard petroglyphs at Cub Creek may be unique among Fremont sites. Rock art McKee Springs is perhaps the best example in the intermontane region.
Great Explorers of the West	Trappers and explorers associated with river history	Dominguez-Escalante expedition - 1776	Forded Green River near quarry.
		William Henry Ashley - 1825	Floated canyons by bullboat.
		Baptiste Brown - around 1830	Trapper for whom Browns Park is named, settled near Gates of Lodore. Site of historic Fort Davy Crockett located in 1960's survey.
		Denis Julien - 1838	Inscription in Whirlpool Canyon.
		William Louis Manly - 1849	Negotiated Green River looking for an easy way to California.
		John Wesley Powell - boated the canyons in 1869 and 1871 and explored portions of the monument	Named many places and features such as Gates of Lodore, Split Mountain, Disaster Falls, Triplet Falls, Hells Half Mile, etc.
		Nathaniel Galloway - late 1800s	Developed the stern-first rowing style.
		F.S. Dellenbaugh - early 1900s	Explorer Club member, historian of the Colorado River.
		Emery and Elsworth Kolb - early 1900s	Boated canyons of monument, photographed Pat Lynch in Echo Park.
The Cattlemen's Empire	Homesteads, ranches, and other structures associated with ranching and settlement history and continuity of ranching activities over time to the present	Chew Homestead near Echo Park (1910), Chew Ranch near quarry (active today), Morris ranch, Pats Cave (Pat Lynch), Tanks Peak mine, Buffam and Bassett cabins	Through the history of the white settlement in this area we have gained knowledge about the hearty character of the people who first domesticated the West.
	Story of Mormon Settlement - 1861		
	Outlaw history and association with famous outlaws such as Matt Warner, Butch Cassidy, Tom Horn, and others - early 1900s	Outlaw Trail, Browns Park	
SCIENCE AND INVENTION	Earl Douglass' discovery of the dinosaur remains and the methods developed to quarry and preserve the fossils	Dinosaur quarry museum, Douglass' office and campsite, Douglass' homestead	Display of fossils in place at this scale is unique in the world. Between 1909 and 1922 the Carnegie Museum removed about 20 complete skeletons and parts of 300 more, representing 10 different species. Specimens from the quarry are on display in some 30 museums around the world.
	Scientific value of the quarry, research by historic and contemporary paleontologists	Paleontological fossil and library collection	The quarry continues a fertile source for research and publication in vertebrate paleontology. The monument houses the most complete paleontological library collection in the National Park Service.

Theme Classification	Significant Resources	Specific Examples or Locations	Remarks
	Testing ground for theories of geomorphology worldwide	John Wesley Powell's reports	Powell originated the concept of antecedent erosion at Dinosaur; subsequently Emmons proposed superposition and Bradley correctly identified drainage capture.
ENVIRONMENTAL CONSERVATION			
	Endangered species preservation and recovery programs	Peregrine falcon recovery program	Most intensive and extensive peregrine recovery effort in National Park Service
		Colorado squawfish recovery program	
	Research on natural river systems	Yampa River	Research to establish links among many elements on river systems - i.e., ecological approach to natural river systems. Scientific value of the Yampa River system as the last undammed segment of the Colorado. Establishes a baseline to measure changes due to altered flows on other dammed river systems.
	Reclamation history	Proposed sites of Echo Park and Split Mountain dams	Final legislative defeat of dam proposals (ca. 1955) marked major turning point in preservation and development of Dinosaur and resulted in redefinition of water resource utilization in the Colorado Basin.
	Natural fire management program.	Parkwide	Major force in restoring vegetative communities to natural succession, ecological and aesthetic diversity.
	NPS history	Lodore ranger station, Zenobia fire tower	Extensive administrative history documents NPS influence on the area.
RECREATION	River-running - whitewater rafting, canoeing, kayaking	Four canyons with major rapids: Yampa Canyon (Warm Springs rapid); Lodore Canyon (Disaster Falls, Hells Half Mile, Triplet Falls); Whirlpool Canyon Greasy Pliers rapid); Split Mountain Canyon (Moonshine, Schoolboy, and S.O.B. rapids)	Traditional sport since early 1900s. Non-commercial demand for river running is increasing 20-30% per year. Yampa provides a unique experience since it is one of the last free-flowing big-water rivers in the western U.S.
	History of commercial river-running	Hatch family - commercial river-runners since 1929	
	Rivers qualifying for "wild" classification, based on nationally significant values.	Yampa River, Green River	Wild and Scenic River Study (NPS 1980a).
	Recommended wilderness of 186,328 acres plus potential addition of 4,215 acres	More than 90% of monument recommended	Wilderness Recommendation, (NPS 1974); periodically revised.

APPENDIX D: ANNUAL STAFFING REQUIREMENTS, ALL ALTERNATIVES

No-Action Alternative (Existing)

The monument is currently managed by the superintendent and a staff of 24 full-time, two part-time permanent, and 18 seasonal employees. The staff is functionally separated into five divisions--the superintendent's office, administration, maintenance, resource management and visitor protection, and interpretation. The monument is operated from several locations. The superintendent, administrative staff, chief of maintenance, chief of resource management and visitor protection, resources management specialist, and Colorado district functions are housed in the headquarters building in Dinosaur, Colorado. The quarry building houses the Utah district resource management and visitor protection and interpretation functions. Quarters and maintenance facilities are also present at each of these locations. A permanent ranger is quartered at Gates of Lodore and a maintenance worker services the area. Seasonal rangers are quartered at Jones Hole, Echo Park and Deerlodge Park. Following are the existing positions, grades, and division salary totals.

Position		Grade
Superintendent's Office:	$81,500	
Park Manager (Superintendent)		GS-13
Secretary (Typing)		GS-05
Administration:	$87,200	
Administrative Officer		GS-09
Purchasing Agent		GS-06
Clerk Typist		GS-03
Maintenance:	$443,000	
Facility Manager		GS-11
General Maintenance and Operations Foreman		WS-09
Maintenance Mechanical Foreman		WS-09
Engineer Equipment Operators (2)		WG-09/10
Maintenance Mechanic		WG-09
Electrician		WG-10
Automotive Mechanic		WG-10
Motor Vehicle Operators (6)		WG-05
Maintenance Workers (3)		WG-07
Resource Management and Visitor Protection:	$265,100	
Supervisory Park Rangers (3)		GS-09 (2), 12
Park Rangers (2)		GS-09, 11
Park Rangers (2)		GS-06/07
Park Rangers (2)		GS-05
Park Rangers (2)		GS-04

Interpretation:	$205,800	
Supervisory Park Rangers (2)		GS-09/11
Paleontologist		GS-11
Museum Technicians (2)		GS-08
Park Rangers (8)		GS-05 (6), 04 (2)
Park Rangers (2)		GS-03
Total Annual Cost	$1,082,600	(30.0 FTEs)*

Preferred Alternative

The following additional positions would be needed to support the proposed activities.

Position	Grade	FTE	Salary
Maintenance			
Maintenance Worker	WG-05/07/08	3.5	$ 49,000
Resource Management and Visitor Protection			
Park Ranger (seasonal)	GS-04/05	5.0	$ 72,000
Park Ranger (seasonal)	GS-05/06	0.5	$ 8,000
Interpretation			
Park Ranger (seasonal)	GS-05	1.3	$ 16,500
Park Ranger (permanent)	GS-06/07	1.0	$ 17,000
Total		11.3	$162,500

Details about how these additional positions would be utilized are at the end of this appendix.

Alternative 2

Park operations would be the same as for the preferred alternative, except that fewer employees would be needed to maintain less capital investment in roads and facilities and interpret to fewer visitors at backcountry locations. To operate the facilities and programs proposed in this alternative, the staff additions would be:

*Full-time equivalent

Position	Grade	FTE	Salary
Maintenance			
Maintenance Worker	WG-05/07/08	2.3	$ 33,200
Resource Management and Visitor Protection			
Park Ranger (seasonal)	GS-04/05	3.0	$ 40,000
Interpretation			
Park Ranger (seasonal)	GS-05	2.2	$ 34,300
Total		7.5	$107,500

Alternative 3

Alternative 3 would require the following staff additions:

Position	Grade	FTE	Salary
Maintenance			
Maintenance Worker	GS-05	6.0	$ 84,000
Resource Management and Visitor Protection			
Park Ranger	GS-4/5	2.0	$ 26,000
Interpretation			
Park Ranger (permanent)	GS-05	1.0	$ 15,000
Park Ranger (seasonal)	GS-05	2.5	$ 37,500
Total		11.5	$162,500

Alternative 4

Alternative 4 would require the following staff additions:

Position	Grade	FTE	Salary
Maintenance			
Maintenance Worker	WG-05	10.5	$147,000
Resource Management and Visitor Protection			
Park Ranger	GS-4/5	2.5	$ 32,500
Interpretation			
Park Ranger (permanent)	GS-05	1.0	$ 15,000
Park Ranger (seasonal)	GS-05	2.5	$ 37,500
Total		16.5	$232,000

APPENDIX E: DESCRIPTION OF WORK TO BE PERFORMED BY ADDITIONAL STAFF, PREFERRED ALTERNATIVE

Division/Position	FTE	Area/Tasks/Rationale
1. MAINTENANCE		
Maintenance Worker, WG-8	1.4	Yampa District* Roads. Personnel would supplement the WG-10 engineering equipment operator. Grade WG-8 is required by federal wage standards for employee to operate front-end loader and haul fill, rock, and debris. A preventive program is necessary to protect the investment in planned improvements. This program includes scheduled maintenance of the drainage systems on Lodore, Deerlodge Park, Echo Park, Yampa Bench, and Harpers Corner roads (for a total of 86.25 miles). The program also requires scheduled grading of dirt and gravel roads to ensure proper runoff profile. Asphalt-surfaced roads would routinely have cracks sealed, shoulders maintained, and patches made. Routine maintenance also would be performed on the new and improved launch ramps, campground roads, and parking areas. Low levels of road maintenance in the past have contributed to the poor condition of the present roads.
Maintenance Worker, WG-7	0.2	Yampa District Trails. Personnel needed to perform scheduled maintenance on proposed and existing trails, thereby preventing premature failure of improvements and protecting investment. Includes Pats Cave trail, Lodore nature trail, Ruple Point overlook spurs, etc.
Maintenance Worker, WG-8	0.6	Green River District* Roads. Personnel needed to establish same minimum preventive maintenance program for upgraded roads as described for Yampa District--including the quarry area, Cub Creek, Island Park, and Rainbow Park roads (for a total of 22.3 miles) and improved launch ramps, campground roads, and parking areas. As with the Yampa district, inadequate maintenance staffing in the past has not been available to retard deterioration.

*The monument is divided into two ranger districts; the Yampa district is basically the Colorado portion of the monument while the Green River district is basically the Utah portion.

Maintenance Worker, WG-5	0.3	Green River District Trails. Needed to perform scheduled maintenance on proposed and existing trails, thereby preventing premature failure of improvements and protecting investment. Includes new loop trail to quarry, access trails to canyons near the Morris cabin, new trails to petroglyphs at McKee Springs and Cub Creek, and the Ely Creek/Whirlpool Canyon overlook trails.
Maintenance Worker, WG-7	0.2	Green River District, Buildings and Utilities Personnel necessary to establish a rigid preventive maintenance program for the new sewer systems at Green River and Split Mountain campgrounds. These systems require daily operational inspections to ensure pumps are not clogged (allowing raw sewage to run onto the ground) and normal servicing of pumps, motors, drive belts, control switches, check valves, etc.
Maintenance Worker, WG-5	0.6	Personnel necessary to service, clean, and pump the new floodproof vault toilets, to clean and maintain new and rehabilitated flush toilets, and to collect solid waste at the new Placer Point picnic area and Ruple Ranch campground.
Maintenance Worker, WG-5	0.2	Personnel needed to meet increased workload of the enlarged 10,400-sq-ft maintenance building.
Total Maintenance FTEs	3.5	

2. RESOURCE MANAGEMENT AND VISITOR PROTECTION

Park Ranger, GS-4/5	0.4	Personnel required to manage grazing in a accordance with PL 86-729, which prescribes monitoring and regulations to mitigate the effects of grazing. The tasks involve developing an annual allotment plan, conducting range surveys, and conducting grazing impact studies.
Park Ranger, GS-4/5	0.4	Personnel required to perform tasks in accordance with clean air legislation. The tasks involve operating new meteorological stations and conducting air quality and acid rain studies to monitor the impact of nearby energy developments.
Park Rangers, GS-5	2.0	Personnel required to manage the outlying areas of Deerlodge Park, Echo Park, Lodore, Rainbow Park, and Jones Hole. Tasks involve conducting boating and safety checks and providing law enforcement, search-and-rescue, and emergency first aid services.

Park Ranger, GS-4/5	0.7	Personnel required for endangered species programs. The tasks involve conducting aerie searches, providing protection for monitoring known aeries, operating hack sites, evaluating habitat, and monitoring species that prey on the endangered peregrine falcon. Personnel also would monitor and protect wintering populations of bald eagles, conduct habitat studies, and implement, if needed, a roost tree replacement program.
Park Ranger, GS-4/5	0.8	Personnel needed for monitoring and expanding patrols to protect deer, elk, antelope, bighorn sheep, and bears from illegal hunting.
Park Ranger, GS-4/5	0.2	Personnel needed to complete the surveys necessary to record existing conditions as a baseline for managing unique rock art and other cultural sites and to protect historic and archeological resources from vandalism and illegal collection.
Park Ranger, GS-4/5	0.5	This seasonal ranger at the proposed campground at Ruple Ranch would patrol the trail between the ranch and Whirlpool Canyon overlook and provide visitor and resource protection in the Island Park area.
Park Ranger, GS-5/6	0.5	Presently there is a backlog of curatorial work and a 30-year delay in the survey for and protection of Mesozoic fossil sites within the monument. This position would locate previously unknown fossil sites, evaluate threats from erosion and vandals, recommend protection strategies, excavate and recover eroding fossils, and eliminate the accessioning and cataloguing backlog. The present paleontological staff does not have time to complete this kind of resource management and protection survey.
Total Resource Management and Visitor Protection FTEs	5.5	Consequences of not providing the above staffing include noncompliance with legislation for management of grazing at Dinosaur; not meeting policy and legal requirements for protecting endangered species and highly significant, irreplaceable archeological resources; failure to provide for protection of Dinosaur's air quality; not adequately protecting the monument's large mammal population from illegal taking; and not providing visitor and resource protection in the Island Park area where archeological and natural resources are deteriorating because of vandalism.

3. INTERPRETATION

Park Ranger, GS-5	0.3	Echo Park. A seasonal interpreter would provide evening campfire talks at the campground and tours at Chew Ranch, Pats Cave, the petroglyphs at Pool Creek, and along the trail at Harpers Corner. Also would provide on-site protection at Echo Park when ranger is not present and work at the headquarters visitor center.
Park Ranger, GS-5	0.6	Rivers. Backcountry seasonals (1 Green River, 1 Yampa River) would interpret the rivers and canyons and provide visitor protection. A seasonal would begin a five-day tour of duty at Lodore or Deerlodge Park with an evening campfire talk. The next day this person would inspect boats and equipment, present a short river safety talk, then launch for four days to make contacts with boaters. These contacts would include guided walks in side canyons, brief talks on other occasions along the rivers, and optional campfire talks. Seasonals would cover archeology, geology, history, or other topics, dependent on visitor interest and area being visited. In case of either emergencies or infractions of regulations, the seasonals would be trained to take appropriate action. With this minimum river staff, each boating party would receive at least one safety demonstration/inspection and at least one interpreted activity designed to motivate safer, lower-impact use of the rivers. The river staff, plus the Echo Park seasonal, would reduce impact on facilities, archeological sites, and the river ecosystem; reduce safety violations and boating accidents; and increase personal interpretive contacts by more than 10,000 visitors annually. Although most visits in the monument are to the quarry where almost all of the interpretive staff is employed, about half of the annual number of visitor hours at Dinosaur are spent on river trips where at present there is no interpretation and inadequate protection.
Park Ranger, GS-5	0.4	Headquarters. One additional summer seasonal at headquarters visitor center would help provide continuous seven-day coverage of the desk by uniformed personnel. Weekend interpretive activities, including talks at the visitor center and guided walks at Plug Hat and Harpers Corner trail would also be possible.

Park Ranger, GS-6/7	1.0	Yampa District interpreter position to supervise four GS-5 seasonal backcountry interpreters. Supervision would include drafting position descriptions, performance standards, providing staff orientation and training, auditing of interpretive activities and completion of mid-season and final evaluations. The position would also man the headquarters information desk during the summer and winter months, handle cooperating association sales, maintain the headquarters museum, and provide activities for local school groups. This additional supervisory workload would make giant inroads in the chief interpreter's time if a district supervisory interpreter was not in place and would reduce his/her effectiveness as a manager of the total interpretive program.
Total Interpretation FTEs	2.3	
Total Increase FTEs	11.3	

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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.

Publication services were provided by the editorial and graphics staff of the Denver Service Center. NPS D-52A, September 1986

☆ U.S. GOVERNMENT PRINTING OFFICE: 1986—676-038/40,003 REGION NO. 8