environmental assessment

develop visitor, administrative, and maintenance facilities

FOSSIL BUTTE

NATIONAL MOUMENT / WYOMING

ENVIRONMENTAL ASSESSMENT

DEVELOP VISITOR, ADMINISTRATIVE, AND MAINTENANCE FACILITIES
FOSSIL BUTTE NATIONAL MONUMENT
LINCOLN COUNTY, WYOMING

Prepared by:

U.S. Department of the Interior
National Park Service
Denver Service Center

April 1988

U.S. Department of the Interior
National Park Service
Environmental Assessment

Develop Visitor, Administrative, and Maintenance Facilities
Fossil Butte National Monument
Lincoln County, Wyoming

Summary:

The National Park Service (NPS) proposes to construct the first permanent visitor, administrative, and maintenance facilities at Fossil Butte National Monument since its Congressional establishment in 1972. Proposed facilities include: a 4,800-square-foot visitor center and administrative building on a 2-acre site approximately 1 mile north of Lincoln County Road 300; and a 2,000-square-foot maintenance building, materials storage yard, and seasonal-employee housing unit on a 5-acre site near the southwest corner of the monument. The employee housing unit is not part of this package and would be constructed at a later date if additional funding becomes available. Other proposed development includes construction/reconstruction of access roads, parking areas, wayside pullouts, directional signing, and utilities including water, sewer, power, and telephone lines.

The 1980 Fossil Butte General Management Plan (GMP) outlined the need for and approved proposals for development of permanent monument facilities. A reevaluation of management objectives, primarily due to previously unknown environmental constraints, has resulted in proposed changes to several of the original planning and design concepts presented in the GMP. This in turn has resulted in the need for an amendment to the GMP and this environmental assessment which describes the proposed changes and assesses their environmental impacts.

Included in this environmental assessment are new proposals for siting the new visitor-center/administrative-facility and construction of a separate maintenance-facility. Also included is a new proposal for construction of a seasonal-employee duplex apartment at the monument instead of the nearby community of Kemmerer.

This document also includes a proposal for the reevaluation of various monument springs as a source of potable water for the new facilities. The GMP originally proposed that potable water continue to be hauled from a commercial source outside the monument. Because of new data this issue is being evaluated further. A separate environmental assessment would be prepared at a later date if development of these springs is considered an appropriate action.

Identifying adequate sites for the proposed new facilities has been difficult. Chicken Creek Valley is sparsely vegetated and relatively narrow. There are very few areas where new facilities would not visually intrude on the landscape. In addition, there are numerous landslide zones throughout the valley.

Resource impacts would be minimized through the use of natural materials and nonintrusive building designs. There would be a long-term loss of approximately five acres of sage-grassland ecosystem from the direct placement of facilities. There is potential for an irretrievable loss of a small, but undetermined amount of fossiliferous bedrock from construction activities. Potential impacts to fossil resources would be mitigated by having a professional paleontologist available during construction activities. Because of the low scale of facility development, overall environmental impacts would be minor.

Facility development would allow for improved resource protection, visitor/administrative services, and visitor recreation and interpretive opportunities.

This environmental assessment evaluates three visitor-center/administrative-facility site alternatives, four maintenance-facility site alternatives, and two seasonal-employee housing alternatives.

Address Comments to:

Superintendent
Fossil Butte National Monument
P.O. Box 527
Kemmerer, Wy 83101

TABLE OF CONTENTS

INTRODUCTION

The 1980 Fossil Butte National Monument General Management Plan (GMP) provided the justification for development of permanent visitor, administrative, and maintenance facilities at the monument. The GMP also approved construction of a new paved access road, parking areas, wayside pullouts, interpretive trail, directional signing, and associated utilities.

Construction of new facilities is being jointly funded by the National Park Service (NPS) and the State of Wyoming. The state is funding reconstruction of the main access road within the monument, Chicken Creek Road, and parking. State funding accounts for over 30 percent of the estimated cost of facility construction/reconstruction. The NPS is funding the remainder of the project.

At the present time, Fossil Butte has no permanent visitor, administrative, or maintenance facilities. The existing temporary facilities are in poor condition, occasionally overcrowded, and inappropriately located. Chicken Creek Road is gravel surfaced and in very poor condition.

The visitor contact station serves as the primary reception and interpretive point upon entry into the monument. It is located just off Lincoln County Road 300 at the southeast edge of the monument (see Visitor, Administrative, and Maintenance Facilities map). The visitor contact station is not winterized and, consequently, is closed six months of the year. The facility consists of a 12-foot x 60-foot trailer, 400-foot-long gravel access road, a ten-vehicle gravel-surfaced parking area, vault toilets, and an interpretive trail that leads to an historic fossil-quarry site. There are no provisions for physically-handicapped visitors. The main exhibit room accommodates a maximum of 15 persons at one time and the fossil preparation room accommodates only six. Interpretive exhibits are poorly designed and constructed, and there is insufficient storage for paleontological materials. Some fossils are now stored in a 10-foot x 10-foot shed located several miles east of the monument. Utilities are limited to electrical and aerial and/or buried telephone service. Potable water is hauled from Kemmerer.

Administrative office space is in Kemmerer, Wyoming which is 12 miles east of Fossil Butte. Monument staff share a leased building with a number of other unrelated businesses. Because of the small size of the staff, protection and interpretation of the monument's resources would be better facilitated if staff offices were on site.

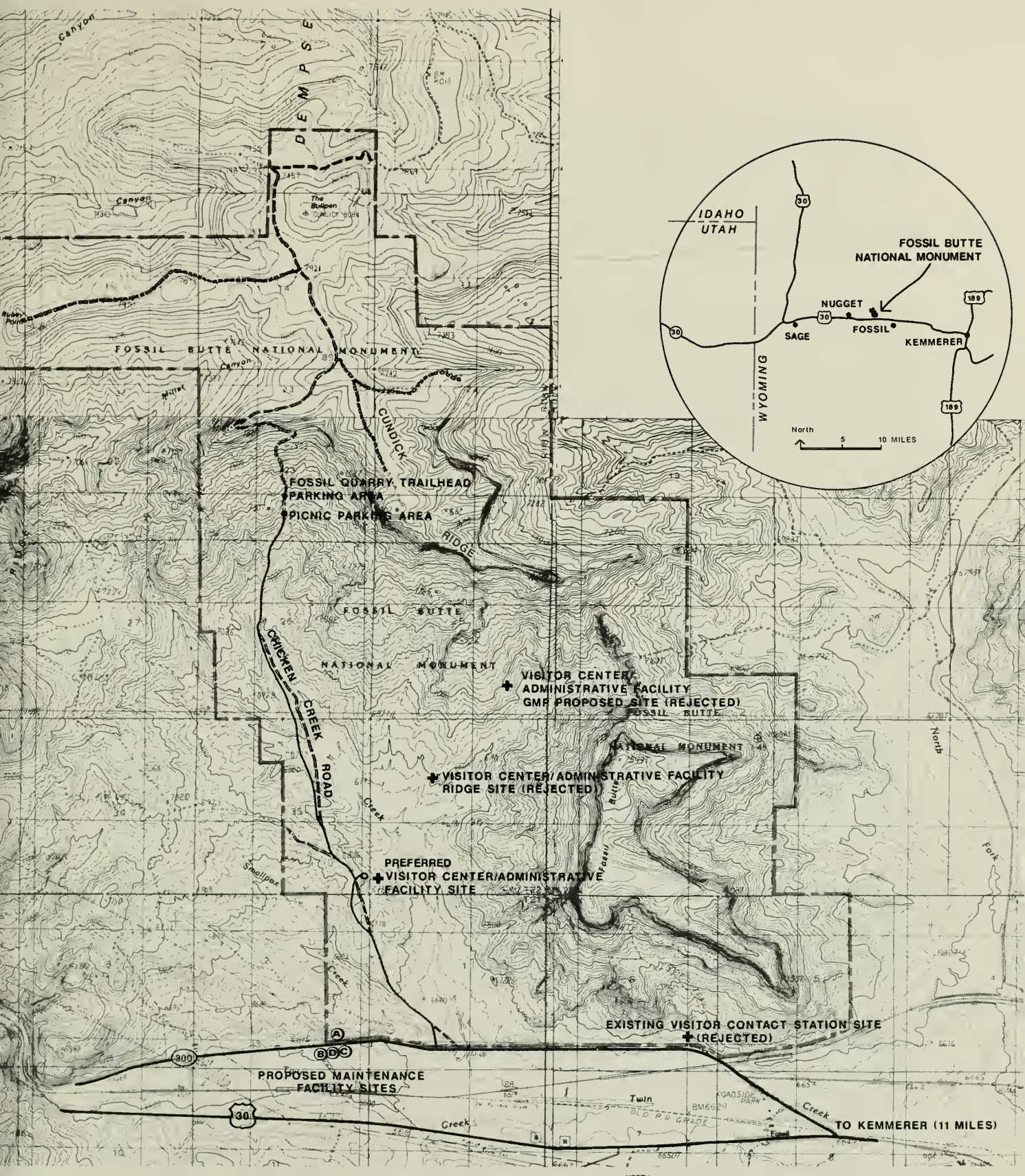
Presently, there is no separate maintenance facility to service Fossil Butte. Desk space is shared with other staff members at the administrative office in Kemmerer. Through annual renewal of a Memorandum of Agreement, the Bureau of Land Management (BLM) allows the NPS to use a portion of their Kemmerer materials storage yard for materials and equipment storage. A 12-foot x 60-foot trailer is also situated at the BLM materials storage yard for warehousing supplies and maintenance equipment. No utilities are connected to the trailer.

The existing shared maintenance facility arrangement is functional, but not ideal. Separation from other monument operational functions is inefficient. Adequate repair and preventative maintenance facilities are lacking and this situation reduces overall operational and functional efficiency and flexibility.

Currently there is no housing at the monument. All monument employees live in Kemmerer. The park maintains a mobile home at the BLM materials storage yard to provide housing for a maximum of three employees. At present this facility is adequate, but with anticipated increases in seasonal employment, additional housing would be needed.

Housing in Kemmerer is often expensive and difficult to obtain due to the boom-and-bust cycle of the regional energy-based economy. It is anticipated that inadequate housing may discourage many qualified seasonal employees from accepting jobs at the monument and could also financially prohibit the monument from providing housing to Student Conservation Association (SCA) and Volunteers-in-Parks (VIP) employees. Half of the monument's interpretive workforce is full-time volunteer personnel.

New visitor, administrative, and maintenance facilities would allow for increased management and operational efficiency, improve resource protection and visitor services, and increase recreation and interpretive opportunities.



TWO-TRACK, UNPAVED ROAD
EXISTING GRAVEL ROAD
PROPOSED PAVED ROAD
PARK BOUNDARY

NORTH
1/2
1 MILE

174/40006B MARCH 1988

VISITOR, ADMINISTRATIVE AND MAINTENANCE FACILITIES

FOSSIL BUTTE NATIONAL MONUMENT

U.S. DEPARTMENT OF THE INTERIOR / NATIONAL PARK SERVICE

PURPOSE AND NEED

The GMP's companion document, Assessment of Alternatives, General Management Plan, completed in 1978, evaluated several development alternatives and analyzed their associated environmental impacts. Since approval of the GMP and the assessment of alternatives, a reevaluation of facility needs has resulted in a number of proposed changes. This reevaluation is based on previously unknown environmental constraints and increased operational requirements and management efficiency.

The GMP identified a 125-acre development site within the monument for construction of the new visitor/administrative/maintenance facility. The primary criteria for selecting a site for the new facility was that it be 1) located near the source of the fossil specimens, where visitors would be able to view other significant monument resources, and 2) free from sight and sound intrusions. Subsequent testing of the 125-acre proposed development site identified soils problems requiring new sites to be evaluated and assessed.

Other GMP proposals which have been reevaluated include: the continuation of potable water hauling to the monument; construction of a seasonal-employee apartment in the new visitor center; and construction of a seasonal-employee dormitory in Kemmerer.

The purpose of this environmental assessment is to identify and describe proposed changes to the GMP, describe additional permanent-facility site alternatives, and identify and evaluate environmental impacts from these alternatives. Proposed changes to the original GMP include:

Identify new site for visitor center/administrative facility. As previously stated, additional analysis of the GMP-approved 125-acre development site identified major soils and drainage problems. The strict criteria for the new facility made finding alternate sites difficult. Additionally, numerous slump zones throughout the monument eliminated many potential sites.

Following extensive site analysis, only one appropriate alternative site was identified. This site is approximately 1.3 miles north of the southern monument boundary along Chicken Creek Road. Several other sites were evaluated but rejected for various reasons. All of these sites are described under the "Description of Alternatives" section.

Construct separate visitor center and maintenance buildings instead of a single facility. Further evaluation of a combined visitor center/administrative/maintenance facility concluded that separate facilities at different locations were necessary. As described above, the proposed site for the visitor center/administrative facility is 1.3 miles into the interior of the monument. To insure winter access to this facility, snowplowing of the access road and parking area would be required. Snowplow equipment would need to be stored at an accessible location adjacent to Lincoln County Road 300 (the main and only paved access road to the monument). This road follows the southern monument boundary.

Four potential maintenance-facility sites have been identified and evaluated. All of these sites are adjacent to County Road 300 near the southwestern monument boundary. All of these sites are out of view from the location of the new proposed visitor center and would be accessible during the winter season. The four sites are described in the "Description of Alternatives" section. Three of the sites are on BLM land. The BLM has tentatively agreed to a land exchange with NPS if one of their sites is selected for development. In addition to proximity to County Road 300, the separate maintenance facility must be out of view and not visually intrude on the proposed new visitor-center/administrative-facility or other primary visitor use areas.

As previously stated, the monument has no maintenance facility of its own. Maintenance equipment and materials are maintained and stored in Kemmerer at the BLM materials storage yard under a cooperative agreement. This location is considered logistically inefficient because personnel must travel lengthy distances (sometimes backtracking) to pick up equipment and materials.

Reevaluate various monument springs as a source of potable water for the new facilities. Potable water is now hauled to the monument from the town of Kemmerer. At the present time this is not a problem; the amount of water hauled is very small (used only for drinking). However, the new facilities would require more water because the facility would be open year-round and would have sinks and flush toilets. Hauling these additional amounts of water would result in a long-term commitment of manpower, funding, time, and equipment.

Regardless of whether springs are developed, water is hauled, or some other source or combination of sources is used, a 12,000-gallon water storage tank would be installed in the visitor center/administration building for potable uses and fire protection. The maintenance-facility/seasonal-housing site would be equiped with at least a 6,000-gallon water tank for the same purposes.

A November 1978 study, "Feasibility of Developing Ground Water Supplies in Fossil Butte National Monument, Wyoming" stated that developing monument seeps and springs would require extensive site preparation, long pipelines, and may not be dependable during dry periods. Based on this report, the GMP recommended a continuation of hauling water from Kemmerer's municipal water supply.

Further evaluation of monument springs over the past five years indicates that they may be more reliable than previously believed. Although 1987 was a dry year by Wyoming standards, the quantity of water flow measured by NPS engineers was more than adequate for the estimated requirements of three (3) gallons per minute (gpm). Spring flow was gauged at the end of the summer as 3, 3, and 5 gpm respectively from three springs. Also, site preparation for gathering and diversion of water would not be as extensive as originally thought.

Preliminary analysis by NPS engineers indicates that construction of a water diversion and distribution system to the new facilities would be a feasible, long-term, lower-cost alternative to hauling water.

Based on this information, the NPS Water Resources Division will further evaluate the potential for using spring water for potable use. Additionally, the BLM Rock Springs office will evaluate the potential natural resource impacts from spring water diversion. If these evaluations confirm that springs would provide the quantity and quality of water needed and could be developed without negatively impacting natural resources, this would be the preferred course of action. A separate environmental assessment to address the impacts from spring water development and diversion would be prepared at a later date following these evaluations.

Construct seasonal-staff housing in or near the monument. The GMP approved the development of seasonal-employee housing by providing an apartment in the new visitor center and constructing a dormitory in Kemmerer. The apartment would provide on-site housing to insure protection of monument resources, facilities, and borrowed property, such as fossil specimens. On-site housing would also help increase emergency response time and improve other visitor services.

The seasonal-employee dormitory was to meet additional housing needs. The GMP proposed that the dormitory be constructed by the NPS, and possibly shared with the BLM and the U.S. Forest Service (USFS). Since approval of the GMP, housing needs have changed, and the BLM and USFS no longer need additional housing. Additionally, the management decision to separate the visitor center and maintenance functions into two separate buildings would require limiting the size and cost of these structures with no room in either building for an apartment.

Because of the reduced housing needs, the proposed solution would be to construct a separate housing unit at the monument instead of a dormitory in Kemmerer. This would fulfill the GMP directive to provide housing and would insure protection of the monument's resources, while improving visitor services. Also, with the assurance that housing is available, it would remain feasible to recruit and use full-time volunteers to perform seasonal interpretive work.

ALTERNATIVES CONSIDERED

The proposed alternatives have been separated into three sections: visitor-center/administrative-facility site alternatives; maintenance-facility site alternatives; and seasonal-employee housing alternatives.

VISITOR-CENTER/ADMINISTRATIVE-FACILITY SITES

The GMP proposed that a single 6,000-square-foot building be constructed to house the visitor center and monument administrative offices. The GMP also identified a 125-acre site for this proposed new facility. Subsequent testing of this site showed there were severe soil and drainage problems. Several other sites were evaluated, but because of extensive soil problems (including dangerous slump zones) and the potential for high visibility of the new facilities, alternative sites meeting all design and construction requirements were difficult to identify. Only one acceptable site was found and is described below. Also described are a no-action alternative and several alternative sites that were considered but rejected.

The new visitor/administrative building would be a year-round facility and would continue to serve as the primary reception and interpretive point upon entry into the monument. This building would be constructed within the monument to ensure continuation of on-site interpretive activities and to assist in the development of resource-oriented interpretive programs. Locating this facility within the monument would also provide an interpretative setting with very few sight and sound intrusions.

The facility would be designed to blend with the surrounding environment by using architectural screening techniques such as a low-profile hexagonal building design, nonreflective metals, and local natural materials. Landscaping design, such as limestone or native sandstone walls and vegetated berms, would also be used to screen and blend the facility.

The 4,800-square-foot building, excluding the originally proposed maintenance facility, could comfortably accommodate up to 50 persons at one time. The building would contain a visitor services area, administrative offices, curatorial space, a library, restrooms, and storage area. A 12,000-gallon water tank would be installed for potable uses and fire protection. The visitor services area would include a lobby with an information desk, sales counter, interpretive displays, an audio-visual room, cooperating association displays, and space for fossil preparation demonstrations and school group activities. An attached outside deck would provide general views of the monument and specifically Fossil Butte and Cundick Ridge. Adjacent nature trails would be developed to provide further recreational and interpretive opportunities.

A 30-car paved parking lot (includes 4-5 recreational vehicle spaces) would be constructed near the building connected by a paved handicapped-accessible walkway. The parking lot design would have built-in expansion capabilities. Expansion would be inexpensive and aesthetically compatible, if needed.

Preferred Alternative: Road Site

The new visitor center would be constructed approximately 1.3 miles north of the existing intersection of Chicken Creek Road and County Road 300. This site is on the eastern flank of a low hill which slopes to the east and south into the Chicken Creek drainage about 1,500 feet away. This site is adjacent to and approximately 450 feet east of the present Chicken Creek Road alignment.

Chicken Creek Road is the main visitor use road in the monument. This road intersects with County Road 300 at the southern monument boundary and leads to the top of Cundick Ridge. The GMP proposed visitor-center/administrative-facility site required that approximately 4.5 miles of this gravel road be reconstructed. The new proposed visitor-center/administrative-facility site would reduce this distance by .7 miles, requiring only 3.8 miles of road reconstruction.

Chicken Creek Road would be reconstructed as an all-weather, paved (bituminous) road from County Road 300 northward, beyond the visitor center, to the picnic parking area. This road would have a 24-foot paved width (11-foot lanes, 1-foot striped shoulders) and 2-foot gravel shoulder extensions in the section from County Road 300 to the visitor-center/administrative-facility, a distance of approximately 1.3 miles.

Reconstruction would continue northward 2.5 miles, providing a paved 22-foot travelway with 2-foot gravel shoulders to the picnic parking area. Some realignment would be necessary to reduce safety and maintenance concerns. The existing picnic-area parking lot would be expanded and paved to accommodate six to eight cars.

A new four-to six-car gravel parking area would be constructed north of the picnic area near the proposed new Fossil Quarry trailhead.

Environmental impacts from road and parking improvements were described and assessed in the Assessment of Alternatives for the GMP, approved March 1978. This document evaluated construction impacts including the disturbance of approximately 9.5 acres of soils, sage-grassland vegetation, and pronghorn/sage grouse wildlife habitat, with increased visual and noise impacts. Below is updated information obtained since approval of the assessment of alternatives on additional impacts to resources and visitors.

An estimated 50,000 to 60,000 cubic yards of borrow material is needed for the road reconstruction project. It has been calculated that this amount of borrow material would be available from excavation of the preferred maintenance-facility site. If additional borrow material is required, another site has been identified on adjacent BLM land. BLM has tentatively agreed to allow extraction of additional borrow material and has agreed to prepare an environmental assessment if needed.

There is potential for disturbance of fossil resources during road reconstruction. To mitigate potential negative impacts, a paleontologist would be available during the construction period. In case fossil resources

are discovered, construction would be halted until evaluation and mitigation measures could be taken.

In 1987, further cultural resource evaluation was performed by the NPS Midwest Archeological Center (MWAC) and the Denver Service Center (DSC). The MWAC conducted several archeological investigations and determined that road construction/reconstruction would completely miss and/or would have low potential for disturbance or destruction of significant archeological remains. The Wyoming State Historic Preservation Officer (SHPO) concurred with the "no effect" determination on March 30, 1988.

Also in 1987, the DSC prepared a determination of eligibility form for the historic Chicken Ranch site. Through consultation with the Wyoming SHPO, the site was determined not to be historically significant and therefore not eligible for inclusion to the National Register. Road reconstruction would likely result in negative impacts to the ranch because the Chicken Creek Road alignment passes directly through the site. Because the site has been determined to be nonsignificant and has already been heavily impacted, no special action would be taken to protect it from further impacts.

Another impact from road reconstruction would be that access to the monument's interior would be curtailed during the construction period, approximately June to October, 1988. Closing the road to normal traffic during this period would decrease the overall road reconstruction costs. Chicken Creek Road would be closed to normal traffic during the week but would be open during the weekend. At all times, provisions would be made to allow some local traffic to get through such as ranchers and monument staff. Access to the existing visitor contact station would not be affected. During road closure, the monument's interior would still be accessible via a primitive dirt and gravel road (4x4 vehicle only) from the north.

No-Action Alternative

Under the no-action alternative, the existing trailer would continue to be used as the primary visitor contact facility and no new visitor center would be constructed. Administrative offices would remain in Kemmerer.

Alternatives Considered But Rejected

Existing Visitor Contact Station Site. This site was considered for potential development, but further analysis showed the same types of soil instability and drainage problems that exist throughout many areas of the monument. Major landslide activity has recently occurred in this area. On June 1, 1983 a slump along the southeast corner of Fossil Butte completely destroyed the Union Pacific tracks a short distance south of the monument boundary. Land in nearly all of sections 5 and 6 remains very unstable.

GMP Proposed Site. The 125-acre site proposed in the GMP was also rejected because of unstable soils and drainage problems. These environmental constraints were identified during detailed geotechnical evaluation of the site following approval of the GMP.

Ridge Site. This site, located on a ridge saddle approximately 1/2 mile east of Chicken Creek and 2 1/2 miles north of the existing intersection of Chicken Creek Road and County Road 300, was also rejected because of unstable soils. Although the site appeared to be adequate, routing of the 1.1-mile access road to the site would result in increased construction and maintenance costs. The road would also have to cross a landslide zone. For these reasons, this site was rejected.

MAINTENANCE-FACILITY SITES

The GMP proposed that the new visitor center include space for a maintenance facility. A reevaluation of a combined building/facility identified the need for a separate maintenance facility near the southern monument boundary. This location would allow ready access to snowplow equipment for winter maintenance of the 1.3-mile visitor-center/administrative-facility access road (Chicken Creek Road). This is based on the assumption that Lincoln County would continue to maintain County Road 300 including timely snow removal. It is estimated that a 3- to 5-acre site is needed. The facility would include a 2,000-square-foot maintenance building, a 1/2- to 1-acre paved and fenced materials storage/parking area, and paved access road.

Other requirements are that the maintenance facility be close to, but out of sight from, the new visitor center and that the site be large enough to accommodate a seasonal-employee housing structure (proposed for construction at some future date). Several potential sites adjacent to County Road 300 were evaluated, but only four adequate sites were identified. These four alternative sites, along with a no-action alternative, are described below. Three of these sites are on BLM land and one is on NPS land. Development of a BLM site would require an agency withdrawal by the BLM on behalf of the NPS. Under such action, the NPS would have an acreage increase. The monument has a legislated ceiling of 8,200 acres and is presently at 8,198 acres. A land exchange would be necessary with the BLM to prevent exceeding this ceiling. The BLM has expressed a willingness to conduct such a transfer in cooperation with the NPS Rocky Mountain Region Lands Office. This exchange would also need to be cleared by the Department of the Interior, Solicitors Office; it may be precluded by 16 USC 4601-22(a).

Alternative A (Preferred): Monument Site

The maintenance facility would be constructed within the current boundaries of Fossil Butte. This 5-acre site is near the extreme southwest monument boundary just north of County Road 300. This site represents the only adequate NPS land for this facility. The site is in a small U-shaped basin (swale) with a natural intermittent drainage channel running just to the west of the proposed new maintenance facility. The channel would be improved and stabilized to reduce site soil erosion and prevent channel shifting.

Grades within the site are approximately 6 to 8 percent, sloping southward towards County Road 300 and Twin Creek. Extensive recontouring would be required to fit facilities.

Alternative B: BLM West Site

This 5-acre site is just outside the monument near Fossil Butte's southwest boundary. This site is bordered by County Road 300 on the north, an unpaved Union Pacific service road on the east, and a utility corridor (underground telephone cable) to the south and west. The site is relatively flat terrain, with grades about 1 to 2 percent southerly towards Twin Creek.

Alternative C: BLM East Site

This 5-acre site is also near the southwest corner outside the monument and is also bordered by County Road 300 and utility corridors on the south (underground telephone) and west (overhead powerlines). There is room at this site for future expansion to the east if needed. The terrain is relatively flat.

Alternative D: BLM Central Site

This 4- to 5-acre site is between the BLM east and west sites. It is also bordered on the north by County Road 300 and on the south by a utility right-of-way. It is bordered on the west by the Union Pacific service road and on the east by another utility corridor (overhead powerlines). The terrain is relatively flat.

No Action Alternative

At this time there would be no action taken to construct a separate maintenance facility. The maintenance operation would continue to be remote and inefficient. Office and materials storage yard space would continue to be shared. The cooperative agreement would continue with BLM. Snowplow equipment would have to be stored at an undetermined site (most likely in Kemmerer).

SEASONAL-EMPLOYEE HOUSING ALTERNATIVES

The GMP proposed that a seasonal-employee apartment be provided in the proposed new visitor center and that a seasonal-employee dormitory be constructed in Kemmerer. The proposal to split the combined visitor center/administrative/maintenance facility into two separate facilities would require the elimination of certain design features including the seasonal-employee apartment. This would leave the monument with no housing, resulting in inadequate security for visitors, resources, and facilities.

The new proposal would be to construct a duplex apartment at the monument rather than a dormitory in Kemmerer. The duplex would be designed to accommodate up to six seasonal employees. It should be restated that the duplex is not part of the current new facility construction package (it would be constructed at a later date and additional funding would be required).

Because of the lack of adequate construction sites with utilities, the best solution for locating the building would be to construct it with, but set apart from, the proposed maintenance facility. Earth berming and vegetative screening would be used to limit potential visual and noise impacts.

Preferred Alternative: Construct seasonal-employee housing unit at monument

A seasonal-employee duplex housing unit would be constructed within the same site as the new maintenance facility, as previously described.

No Action Alternative

The GMP proposal to construct a seasonal-employee dormitory in Kemmerer would remain as the course of action. No seasonal-employee housing would be constructed at the monument. Because the USFS and BLM are no longer interested in a shared housing unit, a smaller unit could be built to house NPS employees only.

AFFECTED ENVIRONMENT

NATURAL ENVIRONMENT

Topography

Fossil Butte National Monument is in southwestern Wyoming, a region characterized by rolling hills and sage flats, interspersed with high buttes and ridges. The monument lies in a transitional zone between the arid basin region to the east and mountains to the west. Generally, this transitional zone supports greater varieties of plant and animal resources than the mountain or arid-basin zones. The predominant topographic features in the monument are Fossil Butte and Cundick Ridge, which rise more than 1,000 feet above the sage grasslands of Chicken Creek Valley. Monument elevations range from about 6,600 to over 8,000 feet. The monument consists of 8,198 acres, all of which are under NPS proprietary jurisdiction.

Geology, Paleontology, and Soils

The Green River and the Wasatch are the two primary geologic formations in the monument (see geologic map). These two formations contain the fossil resources for which Fossil Butte National Monument was established. Additional fossil resources are contained in subsurface Quaternary gravel and stream deposits.

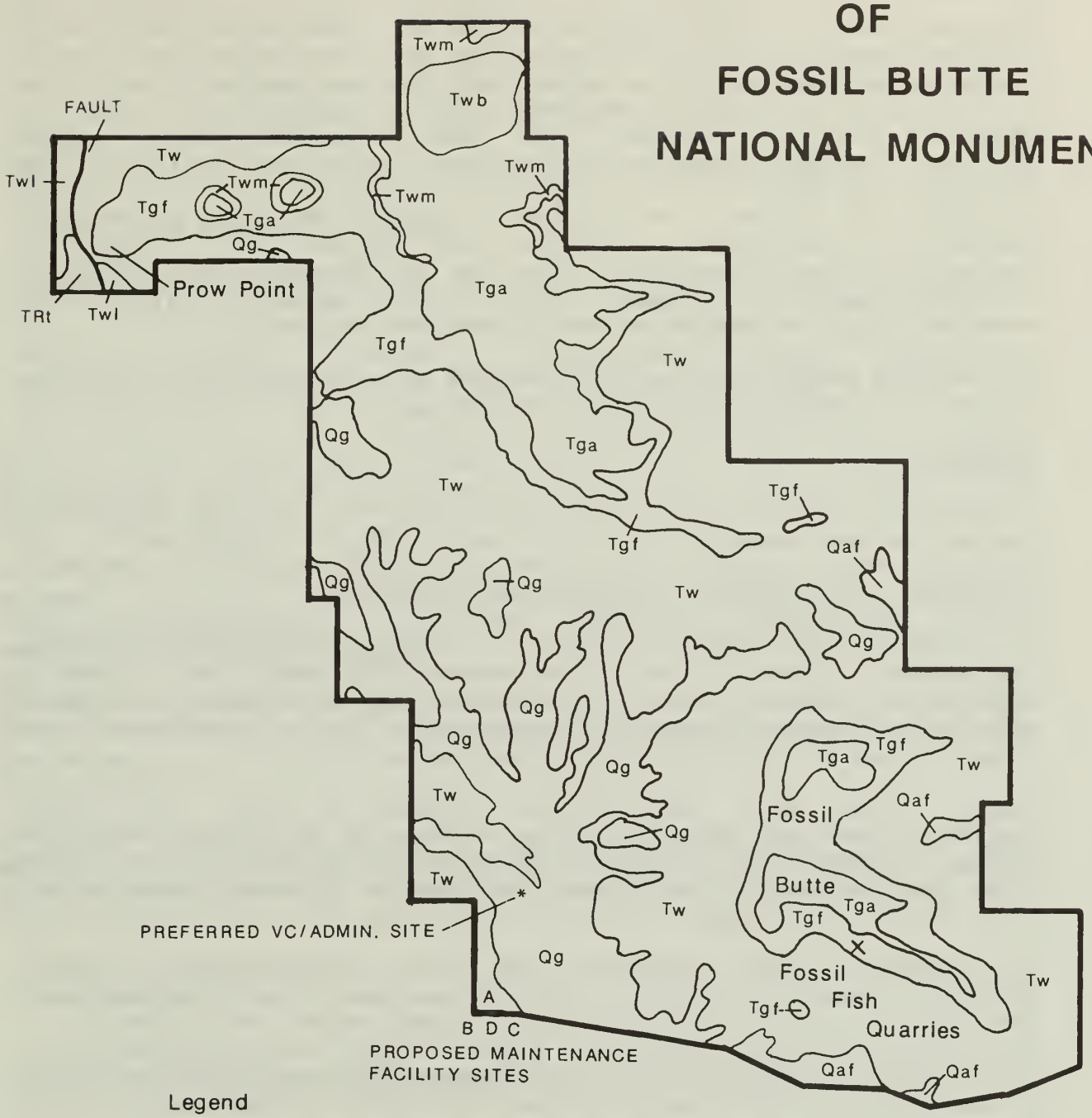
The uppermost, Green River Formation is a freshwater lake deposit containing 50-million-year-old fossil fish. The Green River Formation is comprised predominantly of mudstone, limestone, and shales. Fossils within this 165-foot (approximate thickness) formation are primarily found within one of two relatively thin layers known as the "18-inch" layer and the "split fish" layer. A variety of other fossils have been found throughout the Green River Formation including plants, invertebrates, and vertebrates.

Below the Green River Formation is the stream-deposited Wasatch Formation. Chicken Creek Road and all alternative development sites are underlain by the main body of the Wasatch Formation. The upper part of this main body is primarily mudstone composed of fine silt and very fine, bedded sand with a clay binder. Conglomerates occur as channel fills and contain calcium carbonate as cement as do a number of sandstone and siltsone layers in the upper main body. Fossil resources found in the Wasatch Formation include plants and invertebrates, as well as primitive horses, turtles, ancestral monkeys, rodents, snakes, birds, crocodiles, and fish. Fossils in the Wasatch are not as concentrated as in the Green River Formation and therefore their location is less predictable.

Underlying the proposed visitor center site and lying above the Wasatch Formation are Quaternary gravel and stream deposits. This material consists of poorly sorted and unconsolidated gravel, sand, silt, and clay derived from local formations. This material contains fragmented fossil resources.

The Wasatch Formation contains unstable expansive clays that, on steeper slopes, often result in landslides. Landslides also occur in the Green River formation, but are much less frequent.

GEOLOGIC MAP OF FOSSIL BUTTE NATIONAL MONUMENT



Legend

Quaternary	Qg–Qaf – Gravel & stream deposits	
Eocene	Tga – Angelo Member	Green River Fm.
	Tgf – Fossil Butte Member	Green River Fm.
	Twb – Bullpen Member	Wasatch Fm.
	Twm – Mudstone Tongue	Wasatch Fm.
	Tw – Main Body	Wasatch Fm.
	Twl – Lower Member	Wasatch Fm.
Triassic	TRt – Thaynes Limestone	

N

SOURCE: THE GEOLOGIC HISTORY OF FOSSIL BUTTE NATIONAL MONUMENT AND FOSSIL BASIN. NPS OCCASIONAL PAPER NUMBER 3.

174 | 20,017
NPS | APRIL 88

Detailed Fossil Butte soils mapping by the Soil Conservation Service shows that most slope and valley floor materials are either weathered bedrock or colluvium and alluvium. The erosional materials are derived primarily from the Green River and Wasatch formations. The alluvium consists mostly of clay (some expansive), silt, and some sand. These fine-grained materials make up soils that are poorly-drained and, on steep slopes, very unstable. When disturbed, they also have a very high erosion potential. Soils vary in depth throughout the monument. On the steep slopes of the butte, barren shale bedrock areas predominate. As the slope decreases, soil accumulation increases. In the Chicken Creek Valley, the soil deepens further, especially in leeward depressions. Several areas of saline soils are present in the monument as well as areas of wet soils from seeps and springs.

All proposed construction would be preceded by soils testing and properties evaluation to determine engineering limitations.

Vegetation

Southwestern Wyoming, including the Fossil Butte area, has been dominated by sagebrush-steppe vegetation for the past 7,000 to 10,000 years. The vegetation mosaic is controlled by the interrelationship of soil, moisture, topography, and natural and man-caused disturbances.

Six different woody-sagebrush species and subspecies predominate throughout the monument. Common species in the proposed development areas include big sagebrush, rabbitbrush, snowbrush, greasewood, and serviceberry interspersed with Indian ricegrass, junegrass, and wild rye. Almost all development would occur in areas with very low to moderate slopes.

Steeper slopes range from sparsely vegetated to barren shale areas. Scattered stands of limber pine grow on some of the higher north-facing slopes. Cottonwood trees dominate the southeast face of the butte. Aspen trees grow in moist colluvial downslope areas or in areas intermixed with pine. Cactus are extremely rare in the monument.

Wet meadows downslope from seeps and springs are dominated by various hydrophilic-vegetation species. This includes aspen trees, snowberry and a variety of other shrubs, grasses, sedges, rushes, mosses, and lichens.

Current and past cattle grazing in the monument has resulted in the presence of numerous exotic plant species. The full extent of these species has not been studied and their impact on native vegetation is unknown.

Wildlife

The abrupt change in monument elevation provides a diverse habitat supporting a wide variety of wildlife species. Representative species include mule deer, pronghorn, moose, elk, skunk, beaver, ground squirrel, jackrabbit, chipmunk, and cottontail. Four small colonies of whitetailed prairie dogs occupy approximately 18 acres near Chicken Creek. Coyotes, bobcats, and badgers are the monument's primary mammalian predators.

Over 70 species of birds can be found in the monument including redtailed hawks, golden eagles, great horned owls, and sage grouse.

The BLM conducted a stream survey in the region in 1975-76. Although neither Chicken Creek nor Smallpox Creek was surveyed in detail, the BLM map shows the streams in the monument as having no fisheries of significance.

Extirpated species include the grizzly bear, gray wolf, and bison.

Threatened and Endangered Species

A threatened-and-endangered-plant survey was completed in September 1987 by Mountain West Environmental Services. No threatened- or endangered-plant (listed or proposed) species were found in the proposed development areas. A "sensitive" (category 3C) species, the tufted twinpod (Physaria condensata), was found in two locations along the GMP-proposed Fossil Quarry trail. The 3C designation is a U.S. Fish and Wildlife Service (F&WS) category for "Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat." Although there is no legal requirement to avoid these plants, attempts would be made to do so.

Threatened-and-endangered-wildlife species which may be found in or near the monument include the black-footed ferret (Mustela nigripes), the peregrine falcon (Falco peregrinus), the bald eagle (Haliaeetus leucocephalus), and the whooping crane (Grus americana).

Although the monument is within the historic range of the black-footed ferret, an evaluation by the Wyoming Game and Fish Department determined that the presence of this endangered species in the project area is very unlikely (see appendix).

All three of the endangered bird species have been observed in or near the monument, but no monument nesting activity has been documented. Based on informal consultation with the F&WS, use of areas within or directly adjacent to the monument is as follows:

> The endangered peregrine falcon has been identified in the monument as a migrant.
>
> The endangered bald eagle has been identified as both a migrant and winter resident and has been known to use the monument for foraging.
>
> There has been no documented use in the monument by the endangered whooping crane, but they are found in areas outside the monument. It is conceivable that they could become summer monument residents, but this is not likely because preferred whooping crane habitat is very limited.

No areas of the monument are considered critical habitat for any of the endangered species mentioned. It is most likely that proposed facility development and subsequent use would have "no effect" on any of the above federally protected species. Concurrence with this determination is presently being sought from the U.S. Fish and Wildlife Service.

Water Resources

The major drainage in the monument is Chicken Creek, with a watershed which includes over half of the monument. Just to the south of the monument, Chicken Creek empties into Twin Creek. Chicken Creek is fed by springs at its head and another at the site of the old Chicken Ranch. Flows can generally be expected all year. At the north end of the monument, near Cundick Ridge, springs feed ponds which have been dammed to provide water for livestock. One pond is in the monument, the other is outside the boundary.

Little is known about the numerous springs and intermittent streams in the monument. The information that is available was gathered to assess the feasibility of developing ground water supplies within the monument to serve the needs of the proposed administrative and visitor use facility. A 1978 report "Feasibility of Developing Ground Water Supplies in Fossil Butte National Monument, Wyoming" prepared by the Water Resources Research Institute of the University of Wyoming, found that the well water is of low quality and discouraged the use of spring and seep waters because of their unreliability and development costs. Further analysis by NPS Denver Service Center personnel found that these springs may be more reliable than previously thought and determined that developing them as a potable water source may be cost-effective and dependable.

Springs in this semiarid environment provide surface water and support wetland vegetation that are extremely important to area wildlife. The NPS Water Resources Division will further evaluate the use of these springs as a potable water source. As stated previously, if development of monument springs is selected as the course of action, a seperate environmental assessment would be prepared at that time.

Presently, the water rights for all springs, streams, and seeps located within the monument are being investigated by the NPS Water Resources Division. Upon determination of water rights, any development of water, surface or underground, if approved, would require a permit from the Wyoming State Engineer prior to commencing construction.

Floodplains and Wetlands

The NPS conducted a floodplain survey of the Twin Creek drainage in October 1987. Based on cross-sectional data collected by the NPS and stream-flow data (100-year discharge) provided by the Wyoming State Highway Department, it was calculated that the 100-year flood contour of Twin Creek is at elevation 6590 feet. The 6590-foot contour is the approximate height of the present Twin Creek channel shoulder, therefore the existing channel would contain the 100-year flood waters. Based on this data, none of the proposed development sites are in the 100-year-floodplain. The 100-year floodplain contour is not shown on the project location map (page 3) because it is defined within channel limits.

Flash-flood potential is related to tributary drainages adjacent to the proposed maintenance sites rather than Twin Creek itself. The drainage areas of these tributaries are extremely small and present no life-threatening conditions, but may contribute to local erosion at the proposed

maintenance-facility sites.

Park roads are excepted from compliance with E.O. 11988 "Floodplain Management" under NPS procedures for implementation.

Seeps and springs at several locations in the monument have created small wet meadows in low drainage areas. These wetlands would not be affected by any site construction. As described in the "Water Resources" section, spring and seep waters have been dammed, providing two small stock ponds, one inside and the other outside of the monument.

Air Quality

The monument is designated a class II area under the Clean Air Act. Air quality is generally good, with occasional periods of regional haze. There are two major open-pit coal mines and a large coal-fired electric-generating plant within 10 miles of the monument. The nearest metropolitan area is Salt Lake City, 144 miles to the southwest. Vehicle traffic within the monument undoubtedly produces minor short-term air pollution, but this has not been monitored or documented.

CULTURAL ENVIRONMENT

Determinations regarding the potential National Register eligibility of cultural resources will be made in consultation with the Wyoming State Historic Preservation Officer (SHPO). Consultations would take place with the Wyoming SHPO if any previously unidentified cultural resources are found during construction.

Archeological Resources

Several Fossil Butte archeological investigations have been conducted, including a systematic investigation by the University of Wyoming in 1973. However, the final report on this investigation is unclear as to whether the entire monument was actually examined. Based on this information, the NPS Midwest Archeological Center (MWAC) was asked to perform site-specific investigations of all the alternative development sites, as well as the road reconstruction project.

These investigations were conducted and completed in 1987. Sites and artifactual materials which have been identified to date include materials that reflect Late Prehistoric aboriginal occupations.

It is the conclusion of the MWAC that proposed development would have few, if any, negative impacts on known significant archeological resources. The Wyoming SHPO has concurred with this "no effect" determination. There is potential for discovery of subsurface remains from construction activities. If this occurs, construction activities would be halted until an evaluation was performed by appropriate cultural resource personnel including the Wyoming SHPO.

Historical Resources

Significant historical resources in the monument include several early fossil quarries as well as an A-frame cabin used by early fossil hunters. These properties, which may be potentially eligible for nomination to the National Register, are well away from any proposed construction sites. Negative impacts to known significant cultural resources are not anticipated under any of the proposed alternatives.

Non-significant historic resources include the remains of 19th and 20th century ranching and sheepherding operations. Negative impacts from construction activities are expected under several of the development alternatives. These impacts are addressed under the "Environmental Consequences" section.

SOCIOECONOMIC ENVIRONMENT/VISITOR USE

Visitor use of Fossil Butte National Monument is totally day use, while visitor origin is approximately 6% local, 20% regional, 65% national and 9% international. The average length of stay is approximately one hour. Total annual visitation in 1987, both recreation and non-recreation, was 20,229; the most visitors the monument has ever received in a year.

It is anticipated that with new year-round visitor-use facilities and adequate directional signing, more visitors would be attracted to the monument. Also, improved facilities and increased interpretive and recreational opportunities would most likely result in increases in the average length of stay.

ENVIRONMENTAL CONSEQUENCES

IMPACTS COMMON TO ALL ALTERNATIVES

Areas in and adjacent to facility construction sites would experience short- and long-term environmental disturbances. Impacts would include the potential irretrievable destruction of bedrock from drilling, recontouring, excavating, and trenching; soil disturbances with increased potential for compaction and erosion; damage, destruction, and alteration of vegetation; displacement and death of wildlife; degradation of water and air quality; and increased noise pollution. Because of the low scale of facility development, these negative impacts would be minor. The only irretrievable impacts would be to bedrock (Wasatch Formation) and possibly fossil resources, but due to the small scale of development disturbance potential would be minimal.

Destruction of bedrock may occur in localized areas where bedrock is exposed or shallow. In some areas deeper bedrock may be fractured from excavation or drilling.

Chicken Creek Road and all alternative development sites are underlain by fossil bearing rock and the proposed visitor-center/maintenance-facility site is underlain by fossil bearing Quaternary deposits. Following consultation with NPS and BLM paleontologists and geologists, it was determined that there is potential for the disturbance/destruction of fossil resources. Even though this potential is considered slight, a paleontologist would be contracted or otherwise available throughout the construction period for inspection, evaluation, and/or consultation during bedrock disturbance activities. If fossil resources are uncovered, construction activities would be halted until a through evaluation of the site was completed.

Construction of the visitor center/administrative building, maintenance-facility, and seasonal-employee duplex apartment would result in a combined disturbance of approximately 20 acres of soils and sage-grassland vegetation. Of this 20 acres, new facilities would occupy approximately five acres. The remaining 15 acres would be recontoured to a natural appearance and revegetated. Topography would be altered from the recontouring of sites to fit facilities. Topsoil would be stored and reused to assist revegetation efforts.

Disturbed soils and associated damage to vegetation would increase the potential for soil erosion. This is particularly true at Fossil Butte where soils are fine-grained and easily carried by wind and water. Soil erosion would result in minor alteration of soil strata with a loss of some topsoil. There would be a temporary increase in siltation of Chicken Creek with minor degradation of water quality. Erosion control techniques such as matting and revegetation would be used to reduce potential soil erosion.

Compaction of soils would occur in areas of heavy construction equipment use, in areas of concentrated foot traffic, and from the direct weight of facilities. Compaction results in dense, firm soils with reduced pore space that limits air and water infiltration; this reduced porosity increases surface runoff and accelerates local erosion. Reduced porosity also limits the ability of soils to support vegetation. Buildings, parking lots, and

other impermeable structures would either wholly or partially eliminate direct inflow of water to soil, which would result in local changes in soil chemistry and alter adjacent vegetation types.

Vegetation on all the proposed construction sites is predominantly native grasses interspersed with sagebrush. Most vegetation within and directly adjacent to the construction sites would be destroyed. Upon completion of construction activities, disturbed areas would be revegetated. This would include landscape recountouring to a natural appearance and seeding with native grass species. Because of the arid environment and harsh winters at the monument, it would take 15 to 20 years for construction scars to heal. If revegetation efforts are successful, native grasses would become reestablished within one to two years. If revegetation efforts are not successful, exotic plant species may become more prolific. In those areas where vegetation was destroyed the potential for soil erosion would be greater. Past vegetation studies near Fossil Butte have found that soil disturbances related to facility development apparently release and improve physical soil conditions, resulting in a lush, dense regrowth of sagebrush. This dense growth of sagebrush would help to blend many of the new facilities. Also, additional moisture and nutrients in areas on and adjacent to leachfields would alter vegetative composition and density at those sites.

Construction of facilities would also result in a combined destruction of about 20 acres of wildlife habitat. There would be a long-term loss of approximately five acres from direct facility placement and a short-term loss of the remaining 15 acres. Within the construction areas, small burrowing and nesting animals would be displaced or killed. In adjacent areas, there would be a long-term displacement of wildlife species (mostly pronghorn and sage grouse) because of construction activities and subsequent visitor/park staff use. All the alternative development sites are located adjacent to road corridors and are not considered critical habitat for any of the monument's wildlife species.

Due to very little monument use by identified endangered species, there would be "no effect" from facility construction or use.

Minor degradation of water quality would occur in areas where eroded soils enter nearby creeks and intermittent streams. This erosion would result in temporary increases in turbidity and siltation. There is so much natural erosion occurring in this area that the additional amounts of eroded soils would not result in a significant negative impact to water quality. Traditional grazing use of monument lands are to be allowed through 1989 by Secretarial decision. Heavy grazing of riparian zones along Chicken Creek will also no doubt, continue to impact water quality as well. The water is also highly saline due to soluable salts in the shale units.

Minor degradation of air quality would continue in and along travel routes, construction/maintenance sites, and concentrated visitor use areas. Dust, fumes, and increased vehicle emissions would be the principal pollutants during construction. Following construction, additional automobile emissions from increased visitation would be the principal long-term air pollutant. Paving of Chicken Creek Road would result in decreased dust and particulates, improving air quality along the roadway.

There would be short-term increases in noise pollution during the construction of facilities. Additional use of the monument would result in minor increases in long-term noise pollution.

VISITOR-CENTER/ADMINISTRATIVE-FACILITY SITES

Preferred Alternative: Road Site

Natural Resources. Construction of the visitor center/administrative building, parking area, walks, trails, and utilities would result in minor short- and long-term impacts as described above. Construction of facilities would result in the disturbance of approximately ten acres. There is potential for disturbance/destruction of fossil resources during excavation and drilling. There would be a long-term loss of approximately two acres from the direct placement of the visitor center, parking area, walks, etc. The other eight acres would be rehabilitated/revegetated.

Cultural Resources. No negative impacts to cultural resources would be expected from development of this site. The site was surveyed by MWAC and no surface materials were identified. The site also appears to have low potential for significant subsurface resources.

Socioeconomic/Visitor Use. Construction of the visitor center at this site would provide a setting close to the monument's significant fossil resources with few sight and sound intrusions from transportation corridors outside the monument. This meets the GMP directives for siting requirements.

Increased visitation could result in congestion during peak visitation hours with increased litter and noise. Being closer to the monument's significant fossil features would encourage more visitors to take advantage of the monument's interpretive and recreational opportunities (interpretive trails, picnic area, wayside pullouts, scenic overlooks).

Park staff would have much better facilities for the development and presentation of interpretive programs and could better carry out resource and visitor protection responsibilities.

No Action Alternative

Natural Resources. Continuation of existing use at the temporary visitor contact facility would have few, if any, impacts on natural resources. The unstable soils throughout this area would continue to be a safety concern for visitors and staff.

Cultural Resources. There would be no additional impacts to cultural resources from continued use of the existing visitor center.

Socioeconomic/Visitor Use. Visitor use would most likely continue along current trends. There would continue to be reduced administrative capability in terms of visitor protection. The small visitor contact trailer facility would remain closed during the winter months, limiting interpretive programs. Periods of crowding would continue. The facility would remain inaccessible to handicapped visitors.

MAINTENANCE-FACILITY SITES

Preferred Alternative: Monument Site

Natural Resources. Construction of the maintenance building and materials storage yard, gravel parking area, and driveway would result in the disturbance of approximately eight acres. These impacts would be similar to those discussed under "Impacts Common to All Alternatives" section. There would be a long-term loss of two acres; the remaining six acres would be rehabilitated/revegetated.

Recontouring of the site to fit facilities would require the removal of approximately 50,000 to 60,000 cubic yards of earthen material. There is potential for disturbance/destruction of fossil resources during construction activities. Topsoil would be saved for reuse in revegetation efforts. The remaining earthen material would be used to meet fill material requirements on the Chicken Creek Road reconstruction project.

Improving and stabilizing the intermittent drainage channel would reduce long-term soil erosion and prevent channel shifting. Impacts from this drainage stabilization would be minor soil displacement with short-term erosion.

Cultural Resources. This site contains scattered historic material, probably from early 20th century animal-herding activities, and animal bone, probably remains of sheep, deer, or antelope. A MWAC evaluation of these materials concludes "the site does not appear to possess sufficient significance to warrant nomination to the National Register of Historic Places. Development of this site appears to have very low potential to affect significant subsurface cultural resources." The Wyoming SHPO concurs with this "no effect" determination.

Socioeconomic/Visitor Use. Construction of the maintenance facility at this site would allow for convenient all-weather access and would increase the overall operational efficiency of maintenance activities. Because this site is on NPS land, no land transfer/exchange with BLM would be required. This site, along with all other proposed maintenance facility sites, is out of view from most areas in the monument including the proposed location of the new visitor center/administrative facility. All the sites are visible from areas south of the monument including sections of County Road 300, U.S. Highway 30, and the Union Pacific railway line. Design features including the use of native materials, earthen tones, nonreflective metals, and soil berming would be used to help reduce the visibility of this facility.

Alternative B: BLM West Site

Natural Resources. This site is on relatively level terrain with sparse vegetation (heavily grazed by sheep in recent years). Construction would result in the disturbance of approximately eight acres. Fossils may be disturbed/destroyed during construction. Two of the eight acres would be occupied by facilities, with the remaining six acres rehabilitated/revegetated.

Cultural Resources. This site contains surface material that appears to be remains of a historic structure. The significance of this site is unknown and a more detailed evaluation, including a determination of eligibility, would be necessary before any construction activities occurred. There is potential for subsurface aboriginal remains. Site excavation may result in the disturbance of in-situ aboriginal materials resulting in the reduction of the sites historic integrity. If the site is developed and subsurface materials are uncovered, a work stoppage would be required until an evaluation of materials was conducted.

Socioeconomic Environment/Visitor Use. Impacts would be similar to those described in alternative A. Construction would require a land exchange with BLM. A parcel of NPS land has not been identified for this exchange and legal issues are unresolved. There would be no additional impacts to natural and cultural resources, but the exchange would require additional boundary survey work and relocation of boundary fencing.

Alternative C: BLM East Site

Natural Resources. Impacts would be similar to those described under alternative B.

Cultural Resources. This site has been surveyed and no significant surface archeological resources or cultural materials were identified. There is potential for subsurface aboriginal remains. If the site is developed and subsurface materials are uncovered, a work stoppage would be required until an evaluation of materials was conducted.

Socioeconomic Environment/Visitor Use. Impacts would be similar to those described under alternative A. As with alternative B, construction would require a land exchange with BLM.

Alternative D: BLM Central Site

Natural Resources. Impacts would be similar to those described under alternative C.

Cultural Resources. Impacts would be similar to those described under alternative B.

Socioeconomic/Visitor Use. Impacts would be similar to those described under alternative A. As with alternative B, construction would require a land exchange with BLM.

No Action Alternative

Natural and Cultural Resources. Because there would be no construction, there would be no impacts to natural or cultural resources.

Socioeconomic/Visitor Use. The general efficiency of the maintenance operation would not be improved. Maintenance materials would continue to be stored in Kemmerer, often requiring lengthy trips and much back-tracking. Office space would continue to be shared with other monument staff, which at

times produces crowded conditions and reduces staff efficiency. Snowplow equipment would also have to be stored and maintained at a off-monument site, most likely in Kemmerer. This operation would be very inefficient, making winter access to the proposed new visitor center/administrative facility unreliable.

SEASONAL-EMPLOYEE HOUSING ALTERNATIVES

Preferred Alternative: Monument Site with Maintenance Facility

Natural Resources. Construction of a seasonal-employee duplex apartment would result in the disturbance of an additional two acres at the preferred maintenance-facility site. The building and parking would occupy one acre with the other acre rehabilitated/revegetated. Fossils may be disturbed/destroyed during construction activities.

Cultural Resources. Impacts would be similar to those described under the Preferred alternative, however, an additional two acres would be disturbed with increased potential for negative impacts.

Socioeconomic/Visitor Use. The GMP directive to provide seasonal-employee housing at the monument would be met. The benefits of having employees living at the monument would be increased protection of monument resources, facilities, and borrowed property such as fossil specimens. It would also increase emergency response time and help improve other visitor services.

No Action Alternative

Natural and Cultural Resources. At this time no seasonal-employee housing would be constructed at the monument. There would be no direct impacts to resources. However, the extra protection provided by employees living on-site would not be available. This would increase the potential for negative impacts to resources such as vandalism, poaching, and theft.

Socioeconomic/Visitor Use. The GMP directive to provide seasonal-employee housing at the monument would not be met. Use of the seasonal-employee trailer in Kemmerer would continue to be the only government housing available. As explained in the "Purpose and Need" section, it may become difficult to recruit seasonal employees due to the lack of adequate low-cost housing.

CONSULTATION/COORDINATION

USDI, National Park Service
- David McGinnis, Superintendent, Fossil Butte National Monument
- Bruce Jones, Archeologist, Midwest Archeological Center
- Ted Fremd, Paleontologist, John Day Fossil Beds National Monument
- Staff, Rocky Mountain Regional Office
- Staff, Denver Service Center

USDI, Bureau of Land Management
- Gary McNaughton, Geologist, Kemmerer Resource Area Office

USDI, U.S. Fish and Wildlife Service

Wyoming Game and Fish Department
- Robert Luce, District Game Biologist

Wyoming State Highway Department

REFERENCES

GEO/RESOURCE CONSULTANTS

1984 Geologic Resources Inventory of the Green River Basin, Wyoming.

MOUNTAIN WEST ENVIRONMENTAL SERVICES

1987 "Survey for Threatened or Endangered Plants on the Proposed Development Areas of Fossil Butte National Monument." Unpublished report submitted to Fossil Butte National Monument. Cheyenne, Wyoming.

NATIONAL PARK SERVICE, U.S. DEPARTMENT OF INTERIOR

n.d. The Geologic History of Fossil Butte National Monument and Fossil Basin. National Park Service Occasional Paper Number Three. Prepared by Paul O. McGrew and Michael Casilliano, Department of Geology, University of Wyoming. Government Printing Office. Washington, D.C.

1978a Assessment of Alternatives, General Management Plan. Fossil Butte National Monument. Wyoming.

1978b Feasibility of Developing Ground Water Supplies in Fossil Butte National Monument, Wyoming. Peter Huntoon, Wyoming Water Resources Research Institute. University of Wyoming. Prepared under contract CX1200-8-B072.

1980 General Management Plan. Fossil Butte National Monument. Wyoming.

1984 Grazing Impact Study on Fossil Butte National Monument, Wyoming. Prepared for NPS by Mountain West Environmental Services. Cheyenne, Wyoming.

1985a Fossil Butte National Monument Statement for Management. Kemmerer, Wyoming.

1985b "Flora List for Fossil Butte National Monument". Geographic Information Systems Office. Denver, CO.

1985c Natural Resources Management Plan and Environmental Assessment. Fossil Butte National Monument. Wyoming.

1987a "Archeological Survey of Proposed Maintenance Facility Locations, Fossil Butte National Monument, Wyoming." Midwest Archeological Center. Lincoln, Nebraska.

1987b "Archeological Survey of the Proposed Location for a New Visitor Center, Fossil Butte National Monument, Wyoming." Midwest Archeological Center. Lincoln, Nebraska.

1987c "Archeological Survey of the Proposed Modification to the Chicken Creek Road, Fossil Butte National Monument, Wyoming." Midwest Archeological Center. Lincoln, Nebraska.

1987d "Archeological Survey of a Fourth Proposed Maintenance Facility Location, Fossil Butte National Monument, Wyoming." Midwest Archeological Center. Lincoln, Nebraska.

1988 "100-Year Floodplain-Fossil Butte National Monument." by Jim Ellis, Geotechnical Specialist, memorandum dated January 12, 1988 to Project Manager, FOBU-TCE, Denver Service Center, Denver, Colorado.

ORIEL, S.S. and J.I. TRACEY
1970 Uppermost Cretaceous and Tertiary Stratigraphy of Fossil Basin, Southwestern Wyoming. Geological Survey Professional Paper 635. Government Printing Office. Washington, D.C.

RUBEY, W. W., S. S. ORIEL, and J. I. TRACEY, Jr.
1975 Geology of the Sage and Kemmer 15-Minute Quadrangles, Lincoln County, Wyoming. Geological Survey Professional Paper 855. Reprint, 1981, by The Geological Survey of Wyoming, Laramie.

PREPARERS

David J. Kenney and Lynn E. Peterson, Natural Resource Specialists, National Park Service, Denver Service Center

APPENDIX

THE STATE OF WYOMING

ED HERSCHLER
GOVERNOR

Game and Fish Department

BILL MORRIS
DIRECTOR

September 24, 1987

Mr. Dave McGinnis
Superintendent
Fossil Butte National Monument
Diamondville, WY

Dear Dave:

I am writing in response to your request for evaluation of the potential for occurrence of the black-footed ferret within the proposed road reconstruction/realignment and Visitor's Center areas on Fossil Butte National Monument. I have the following comments after our field tour of the area on September 23, 1987.

The enclosed map indicates the occurrence of white-tailed prairie dog towns within the project area. The area surveyed was between and along the Chicken Creek and Smallpox Creek drainages; bounded by old Highway 30 on the south and the picnic area in Section 23 on the north. A total of four (4) prairie dog towns were located (identified on the map as polygons A through D). Towns A, B, and D of 4 acres, 3 acres and 6 acres respectively; had less than 10% of the burrows active, and no prairie dogs were observed while the survey was in progress. Town C of approximately 5 acres was very active with more than 90% of the burrows being used; and several prairie dogs on the surface during the survey.

The results of this survey indicate the occurrence of prairie dogs, which are the primary indicator of the potential presence of the black-footed ferret, is very limited on the project area. Our records also do not show the occurrence of any large prairie dog town complexes within several miles. Therefore it is my opinion that there is very little likelihood for occurrence of black-footed ferrets on the project area now or in the immediate future. I do not believe it would be worthwhile to conduct black-footed ferret searches because of the extremely low probability of success.

Thanks for the opportunity to comment on this project.

Sincerely,

Bob Luce

Bob Luce
District Wildlife Biologist

Headquarters: 5400 Bishop Boulevard, Cheyenne, Wyoming 82002